MTU Aero Engines

ANNUAL REPORT 2018

PROSPECTS

Products, processes and projects for a successful future.

2018

Table of contents

MTU share information

[T1] MTU share data

Number of shares	52 million shares of no-par stock
Type of share	Registered shares
Equity capital	€ 52 million
WKN / ISIN /stock exchange symbol	A0D9PT / DE000A0D9PT0 / MTX
Trading segment	Prime Standard
Stock-market segment	MDAX
Designated sponsor	Goldman Sachs
Notifications	Electronic Federal Gazette (Bundesanzeiger)

[T2] Share performance and dividends over the past 5 years

	2014	2015	2016	2017	2018
Year-end quoted price	72.16 €	90.10 €	109.80 €	149.40 €	158.40 €
Annual performance	1%	25%	22%	36%	6%
Dividend per share	1.45 €	1.70 €	1.90 €	2.30 €	2.85 €

Selected consolidated financial information and key figures with year-on-year comparison

[T3] Selected consolidated financial information and key figures at a glance

in € million (unless stated otherwise)	2018	2017	Change 2018-2017 in %
Revenues and earnings			
Revenues	4,567.1	3,897.4	17.2
attributable to the commercial engine business [1]	1,602.8	1,289.9	24.3
attributable to the military engine business [1]	431.1	444.9	–3.1
attributable to the commercial maintenance business [1]	2,799.8	2,285.3	22.5
Gross profit	851.3	710.9	19.7
Earnings before interest and tax (EBIT)	620.2	521.2	19.0
Earning after tax	453.3	358.7	26.4
Adjusted earnings			
Earnings before interest and tax (EBIT adjusted)	671.4	572.5	17.3
EBIT margin in %	14.7	14.7	
Net income	479.1	404.9	18.3
Balance sheet			
Total assets	6,850.8	6,225.2	10.0
Equity	2,144.2	1,841.3	16.5
Equity ratio in %	31.3	29.6	
Net financial debt	854.0	827.0	3.3
Cash flow			
Cash flow from operating activities	594.7	460.9	29.0
Cash flow from investing activities	–336.1	–340.8	1.4
Free cash flow	202.9	151.1	34.3
Cash flow from financing activities	–262.7	–332.9	21.1
Number of employees at year end			
Commercial and military engine business	6,109	5,599	9.1
Commercial maintenance business	3,622	3,247	11.5
Total number of employees	9,731	8,846	10.0
Share indicators			
Earnings per share in €			
Undiluted earnings per share	8.67	6.90	25.7
Diluted earnings per share	8.10	6.46	25.4
Dividend per share in € [2]	2.85	2.30	23.9
Dividend yield in %	1.8	1.5	
Total dividend [2]	147.2	118.4	24.3
Outstanding common stock at Dec. 31 (million shares)	51.5	51.5	

[1] Before consolidation

[2] Proposal to the Annual General Meeting for 2018 based on an expected volume of 51.5 million dividend-entitled shares. Prior year: Resolution by the Annual General Meeting for the financial year.

PROSPECTS

Products, processes and projects for a successful future.

2018 was yet another record-breaking year for MTU. To maintain its course of profitable growth, MTU is working on new **products, processes and projects** that hold excellent promise for continued success in the future.

PRODUCTS

Ideally positioned for the future ____ MTU is well-placed in all thrust and power categories, in both its commercial engine business and the military sector. By way of example, on the following pages MTU presents three engines from its wide-ranging portfolio that serve as guarantors for the company's long-term success.

Guarantors of MTU's success

PW1000G

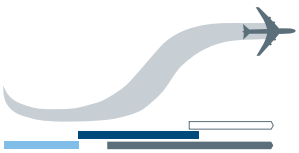
Major leap forward in jet engine technology with unparalleled commercial success: the Geared Turbofan™ engines of the PW1000G family are poised to occupy a dominant position on the market for short- and medium-haul aircraft. page 4

GE9X

Impressive performance during testing: the GE9X engine for the Boeing 777X will define the future on long-haul routes. And MTU is on board with its GE9X program share. page 8

T408

Launched on the market in 2018 and fit for the future: the T408 engine for Sikorsky's CH-53K heavy-lift cargo helicopter. The engine has enormous potential for further applications. page 10



Portfolio

Guarantors of success at every stage of their lifecycle: MTU provides service support for engines in all thrust and power classes from development and manufacturing through to maintenance. page 12

The PW1000G family: a bestseller at the start of a long lifecycle

Economical, low in emissions and quiet – these are the criteria for the next generation of aircraft engines. The Geared Turbofan™ (GTF) engines designed and built by Pratt & Whitney and MTU, and already in operation, are leading the way.

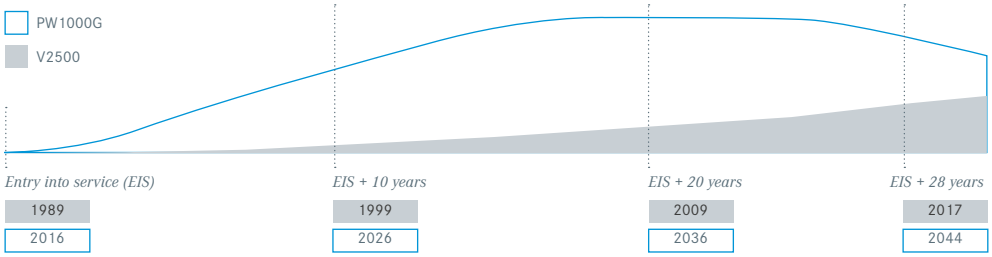
Unparalleled commercial success: firm orders and options for almost 10,000 units placed by the end of 2018.

Right from the outset, the GTF has proved to be the top-selling aircraft engine of all time. With its program share in the PW1000G family, MTU has been part of this success story from the get-go. The GTF is poised to occupy a dominant position in civil aviation's key market segment – namely short- and medium-haul aircraft. This is borne out not only by the number of orders on hand, but also by the fact that as many as four aircraft manufacturers are placing their trust in the Geared Turbofan™.

Geared Turbofan™ in service – on the Airbus A320neo

Excellent prospects: 20,000 GTF engines across the entire lifecycle

The GTF outpaces its predecessor – the V2500 – by far, with more than twice as many deliveries expected across the entire lifecycle.



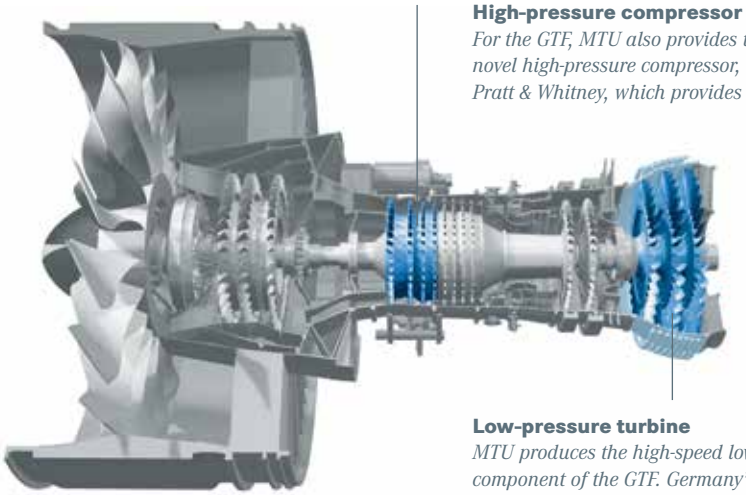
Four aircraft manufacturers are placing their trust in the GTF – and MTU is always on board.

The engines of the PW1000G family power the A320neo, the A220 and, from 2018, the Embraer E190-E2. In 2018, MTU and Pratt & Whitney delivered almost twice as many GTF engines to customers as in 2017, thus meeting their delivery target. This is the result of an unparalleled feat of strength, with the production ramp-up proceeding at record pace. Thought is also being given to the next phase in the lifecycle: in 2018, construction began on the EME Aero facility in Poland, the world's largest and most advanced MRO shop for Geared Turbofan™ engines, in a joint venture with Lufthansa Technik.

15 % TO 18 % PROGRAM SHARE: MTU BENEFITS FROM THE SUCCESS OF THE GTF.

Engine		Aircraft type	MTU's program share
PW1100G-JM		Airbus A320neo	18 %
PW1200G		Mitsubishi MRJ	15 %
PW1400G-JM		Irkut MC-21	18 %
PW1500G		Airbus A220	17 %
PW1700G		Embraer E-Jet E175-E2	15 %
PW1900G		Embraer E-Jet E190-E2 /E195-E2	17 %

The ultimate in high tech – with key engine components made by MTU



High-pressure compressor
For the GTF, MTU also provides the first four stages of a novel high-pressure compressor, developed together with Pratt & Whitney, which provides the last four stages.

Low-pressure turbine
MTU produces the high-speed low-pressure turbine, a key component of the GTF. Germany's leading engine manufacturer is the only company worldwide to have mastered this technology, for which it won two German innovation awards.

Efficiency that pays

What sets the GTF propulsion system apart is that it features a reduction gearbox between the fan and low-pressure shaft on which the low-pressure compressor and low-pressure turbine that drives the fan are seated.
The gearbox allows the fan with its large diameter to rotate more slowly, and at the same time the low-pressure compressor and turbine to rotate much faster.

The advantages:
- lower fan pressure ratios and therefore higher bypass ratios
- all components achieve their optimum speeds
- very high overall efficiency
- fewer compressor and turbine stages make for lighter engines and lower maintenance costs

Benefit to customers: significantly reduced operating costs

The GTF is a major leap forward in jet engine technology from which customers can benefit to a high degree: compared with its predecessor, the V2500, the GTF engine has saved over 250 million liters of kerosene on more than 550,000 flights since entering service. This represents a reduction in operating costs for the airlines in excess of 100 million U.S. dollars.

SAVINGS ON OPERATING COSTS

U.S. $ 100 million

since the GTF entered service, compared with the V2500

KEROSENE SAVINGS

250 million liters

since the GTF entered service, compared with the V2500

Good for the environment: more economical, environmentally compatible and silent

The new GTF technology lowers fuel consumption, CO2 emissions and reduces the noise footprint. MTU's key technologies play a crucial role in this improvement. They help to make the engine considerably more fuel-efficient, environmentally compatible and silent – to the benefit of the airlines, people living under flight paths, and not least the environment.

KEROSENE

-16 %

Fuel consumption is significantly reduced.

CO_2

-16 %

Carbon dioxide emissions are also lower.

NOISE

-75 %

The GTF substantially reduces the noise footprint.

Key component for the Geared Turbofan™: MTU's high-speed low-pressure turbine.

GE9X: the largest jet engine ever

The GE9X for the Boeing 777X is set to redefine the future for long-haul airliners. The market launch is planned for 2020.

Long haul is the supreme discipline in civil aviation. MTU is represented in this market with the GEnx and the GP7000 and safeguards the future with its participation in the GE9X program. In terms of the ratio between fuel consumption and thrust, the GE9X is the best engine GE has brought to the market yet. MTU is responsible for the development and manufacture of the extremely demanding turbine center frame.

BILLIONS IN POTENTIAL REVENUES

€ 4 billion

in revenues anticipated by MTU over the entire lifetime of the GE9X program.

HIGH DEMAND

950

firm orders and options have already been placed for GE9X engines.

Mounted on the wing of GE's airborne test cell, a Boeing 747, the GE9X took off for the first time in 2018.

MTU INSIDE: WHAT SETS THE GE9X APART

MTU DEVELOPMENT AND MANUFACTURING

- Turbine center frame

APPLICATIONS

- Boeing 777X

FACTS

- Utilization of proven GE90 and GEnx technologies
- Maximum fuel efficiency and lower emissions
- High-quality materials, lower weight
- Low noise emissions

A new dimension of engine

PARAMETERS FOR SUCCESS:

3.4 meters

The fan case has a diameter of **134 inches – or 340.36 centimeters.**

Pressure ratio 27:1

An 11-stage high-pressure compressor *achieves a pressure ratio of 27:1 – according to GE Aviation "the highest in aviation history". The engine has an overall pressure ratio of 60:1.*

Lightweight and strong

The titanium aluminide blades of the low-pressure turbine *are lightweight and extremely strong.*

TCF for directing hot gases with temperatures of up to 1,000°C

MTU develops and manufactures the GE9X turbine center frame **(TCF).** *The component directs the hot gas flows with temperatures of up to 1,000 degrees Celsius from the high-pressure turbine past structural components and cables into the low-pressure turbine – with minimum aerodynamic losses.*

16 blades

The carbon fiber composite fan consists of 16 blades *– no widebody engine on the market today has fewer.*

10% LESS FUEL

The GE9X is designed to reduce **kerosene consumption** *by* **10%** *compared with its predecessor, the GE90-115B.*

T408: helicopter engine for the 21st century

The engine that powers the CH-53K heavy-lift cargo helicopter features everything a military propulsion system of the future needs: the T408 is strong and powerful, while offering low fuel consumption and low maintenance costs.

A milestone in the military engine business

Since May 2018, the United States Marine Corps has been flying Sikorsky's CH-53K heavy-lift cargo helicopter. Its engine, the T408 turboshaft engine, can now demonstrate its capabilities every day anew and show its potential for further applications – in a future heavy-lift helicopter for European armed forces, in transport aircraft, ship propulsion systems or in power generation.

The T408 is the first U.S. military engine program in which MTU has been given full responsibility for an entire module – clearly underscoring MTU's exceptional expertise in this area of technology.
In addition to developing and producing the power turbine, MTU also holds the licenses for maintenance, final assembly and testing of the T408 models for a future European heavy-lift cargo helicopter.

The impressive performance of the new heavy-lift cargo helicopter powered by the T408 engine gives rise to enormous potential for further applications.

MTU INSIDE: WHAT SETS THE T408 APART

MTU DEVELOPMENT AND MANUFACTURING

- Three-stage power turbine
- Exhaust casing
- Output shaft

FACTS

- Turboshaft engine featuring a free-running power turbine
- Two-stage gas generator turbine
- Three-stage power turbine

MTU'S PROGRAM SHARE

18%

More powerful. More economical. More cost-effective.

MORE POWER

+57%

Compared with its predecessor, the T64, the T408 delivers 57 percent more power.

LOWER FUEL CONSUMPTION

–18%

The new turboshaft engine cuts the specific fuel consumption by 18%.

FEWER COMPONENTS

–63%

The engine consists of 63% fewer components, thus reducing maintenance costs.

Extremely strong and resilient

The T408 features a more robust compressor design that enhances the engine's performance capability. At the same time, the engine is more resistant to sand erosion and salt water corrosion, making it ideal for flying missions of the U.S. Marine Corps.

An engine for heavy-duty work

EXTERNAL LOAD

16,000 kg

The new heavy-lift cargo helicopter can transport a payload of 16 metric tons of – that's equivalent to the weight of two full-grown elephant bulls.

ENGINE

7,500 shaft horsepower

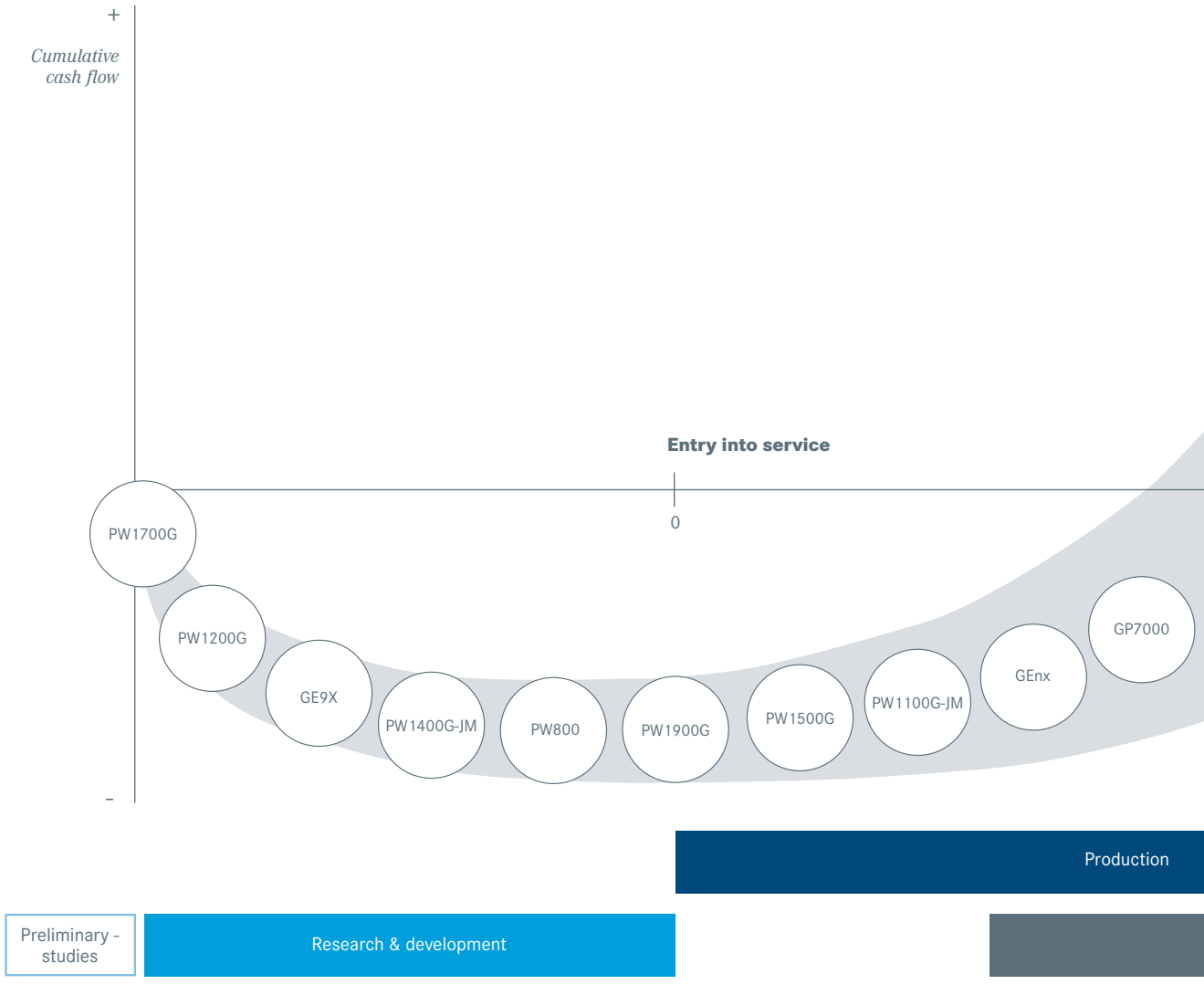
Transporting weights of this magnitude takes power: three engines with 7,500 shp each have what it takes.

Portfolio: guarantors of success at every stage of the lifecycle

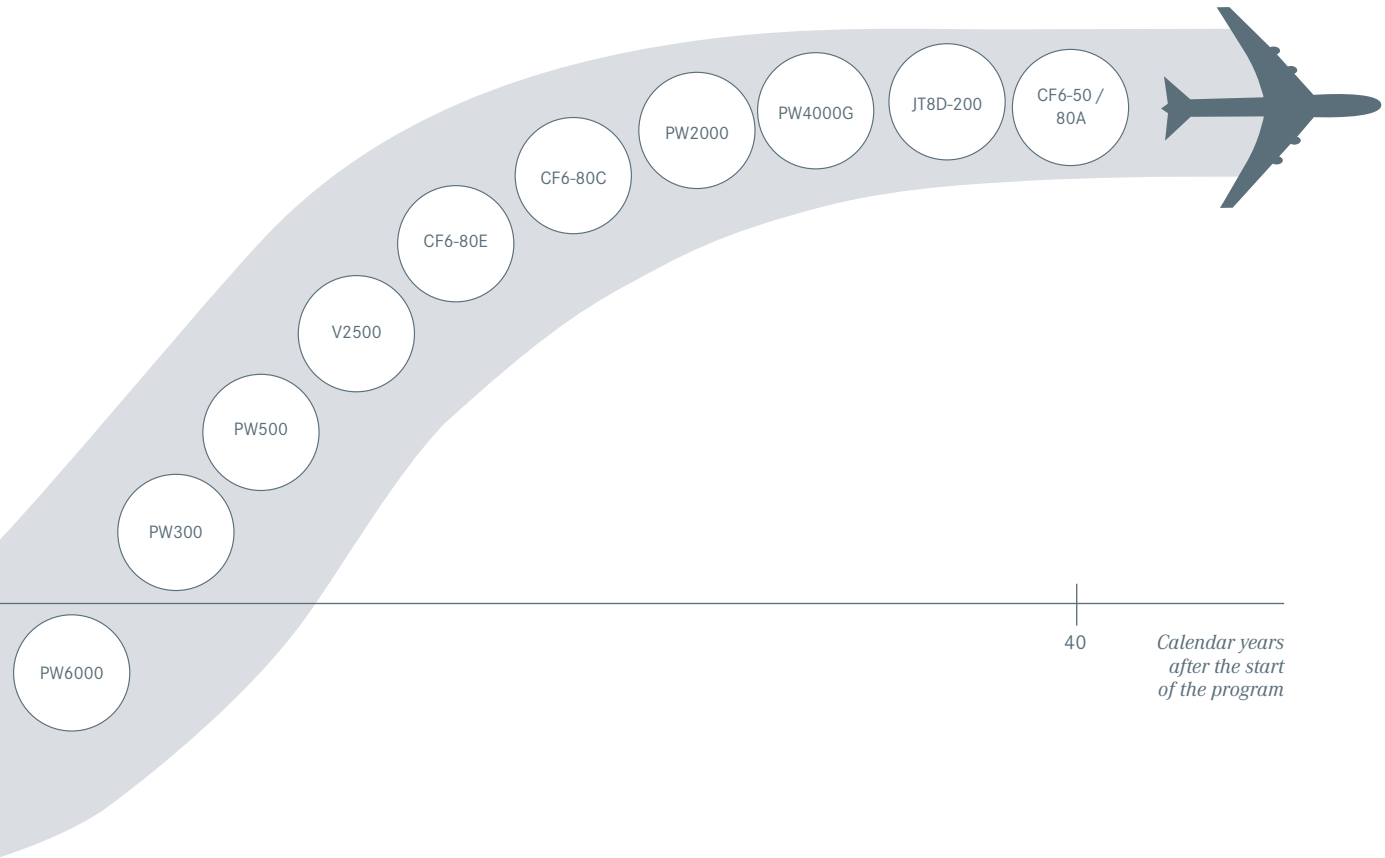
The PW1000G family and the GE9X are still in the early stages of the more than 30-year lifecycle of commercial engines. MTU has a well-balanced portfolio of engines in all thrust and power classes and at every stage of their lifecycle.

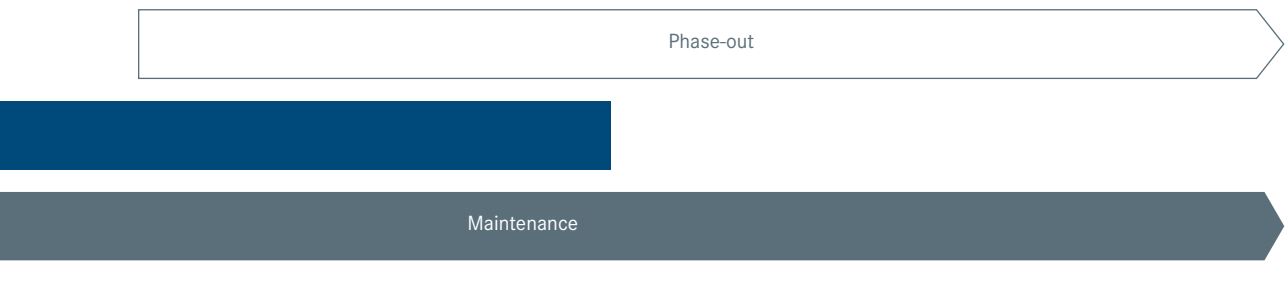
Engines are high-tech products with a lifecycle of 30 years and more. Capital expenditure on research and development and at the start of production is followed by many years of cash inflows from spare parts sales and maintenance services.

The well-balanced portfolio of engines at every stage of their lifecycle allows MTU to utilize cash inflows from established engine programs for investments in new engines, thus building an excellent basis for future success.



From development project to cash cow: following production ramp-up, attention increasingly focuses on maintenance – with high cash inflows by far exceeding initial capital expenditure.





PROCESSES

Small steps, big impact ____ MTU knows from experience that optimized processes enhance the efficiency of engine development, manufacture and maintenance. This important lesson, combined with comprehensive innovation management, new manufacturing methods and intelligent use of digital technologies, lays the foundation for future success.

Levers for future success

Innovation

The technology roadmap for MTU's development activities over the coming few years constitutes the framework for future innovations. The new innovation management process provides additional stimulus. page 16

Additive manufacturing

MTU is among the trailblazers of the 21st century when it comes to the use of this key technology. By 2030, up to 15 % of engine components could be manufactured using additive techniques page 18

Digital factory

In Manufacturing 4.0, products and machines are flexibly interconnected and communicate with one another. MTU already boasts the most advanced blisk production facility in the world – with correspondingly optimized processes. page 20

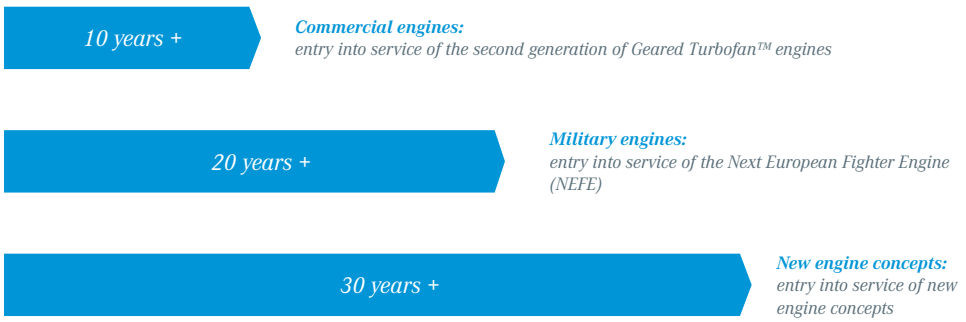
Innovation: proactively shaping the future

MTU is bubbling with ideas – every year the company files 400 patent applications and submits around 200 invention disclosure reports. The levers for future success are a pronounced culture of innovation, an established technology process and group-wide innovation management.

MTU's Clean Air Engine (Claire) technology agenda has ambitious goals: to cut CO_2 emissions by 40 % and perceived noise levels by 65 %.

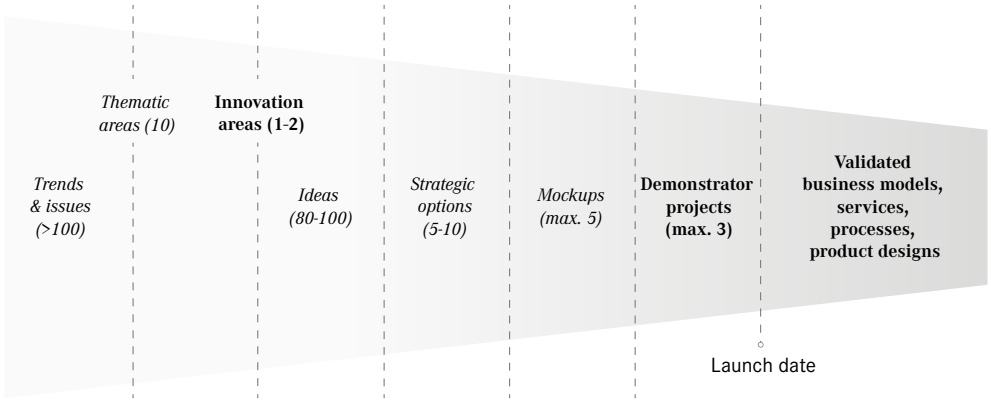
The targets for the next ten years are ambitious. These are formulated in MTU's overarching Clean Air Engine – or Claire for short – technology agenda. The name reflects the aim: the engine of the future will be designed to fly with considerably less fuel, emit far lower levels of CO_2 and be significantly quieter. Specifically, by the year 2050, the plan is to reduce fuel consumption and CO_2 emissions by 40 % and noise levels by as much as 65 %. MTU uses a technology radar to identify new technological possibilities early on and uses the results to derive initial drafts for future engine concepts. In this, it draws systematically on the best ideas from the various specialist departments. Together, these individual projects form the MTU Leading Technology Roadmap. The roadmap currently covers some 150 individual projects, extending from development, manufacturing and assembly through to maintenance.

MTU'S TECHNOLOGY ROADMAP LEADS TO A PRODUCT ROADMAP



In the commercial engine business, MTU is already working on the second generation of GTF engines, which can be expected to hit the market around ten years from now. The focus in the military sector is on developing an engine for a new European fighter jet – with a time horizon of around 20 years. MTU is also reflecting on the design of completely new propulsion systems. For example, a flight demonstrator for a hybrid electric system is currently being developed and two revolutionary engine concepts have been defined.

MTU'S INNOVATION PROCESS



The Innovation Engine deploys scouts to probe the outside world and track down trends early on.

Innovations secure a technical lead and lay the foundation for future growth. In keeping with this premise, MTU has given innovation a top spot on the company's agenda.

In 2018, a new, group-wide innovation management system was introduced, known as the Innovation Engine. The idea behind the Innovation Engine is that – like an engine driving MTU's development activities – it acts as a scout, permanently tracking new trends and topics. Subsequently, 1 to 2 innovation areas are selected, internal ideation challenges are held and options for implementing the ideas are determined. This is followed by prototyping. Here, demonstrators are developed to bring the innovations to maturity.

MTU is already working on the technologies of tomorrow.

Additive manufacturing: a revolution in production

MTU is among the pioneers in the use of additive manufacturing in engine construction. A dedicated department is constantly exploring new areas of application and working in a targeted way to develop an efficient and material-friendly production process of the future.

By 2030, 15% of an engine could be built from additively manufactured components.

Additive manufacturing processes, commonly also known as 3D printing, will play an important role in production in the 21st century. MTU is a pioneer in this field: as one of the first companies in the engine industry, MTU has been making production parts using additive manufacturing since 2013 – for the borescope eyepieces used for the PW1100G-JM engine that powers the A320neo.

In 2018, the company set up a dedicated MTU department for additive manufacturing. The new organizational unit is made up of around 30 experts specializing in different areas.

Their task is to examine new applications and construction methods in accordance with bionic principles – in other words, apply phenomena of nature to technology – continuously refine additive manufacturing technology and industrialize the entire production chain.

Experts predict that by 2030, at least 15% of an engine could be built from additively manufactured components. MTU's experts are already working on turning this forecast into reality.

Additive manufacturing is a process of the future. MTU has been using it to make production parts since 2013.

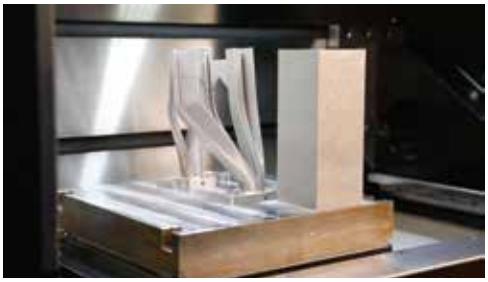
SUSTAINED GROWTH

€ 6.3 billion

Revenues from additive manufacturing in Europe are set to double to € 6.3 billion by 2022.

MTU is one of the biggest patent holders for additive manufacturing processes.

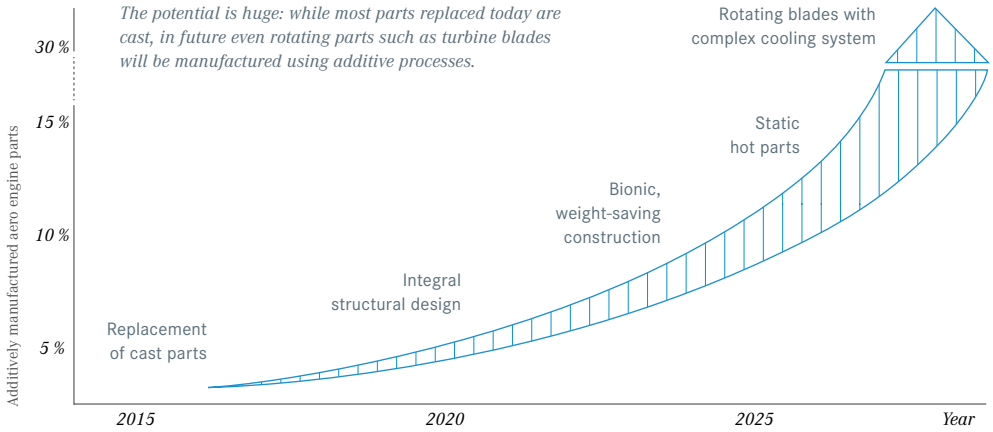
Additive manufacturing enables rapid 3D production of complex components. Based on digital 3D design data, components are built up from materials layer by layer; previously they were milled or cast as a workpiece from a solid block. MTU is working continuously to further develop the technology and ranks among the top 10 patent holders.



FIVE MAJOR BENEFITS OF ADDITIVE MANUFACTURING

- Complex components can be produced using fewer materials and tools
- Manufacture of complex components that were previously technically impossible or very difficult to produce
- Realization of new, more efficient designs possible
- Shorter development, production and delivery times
- Lower production costs

MANUFACTURING 4.0: WHICH ENGINE PARTS ARE "PRINTED"



Digital factory: start of a new era

Automation and digitalization will be the keystones of tomorrow's production environments.With its blisk center of excellence, MTU is among the pioneers in this field. Continuous improvements along the entire value chain pave the way to the smart factory.

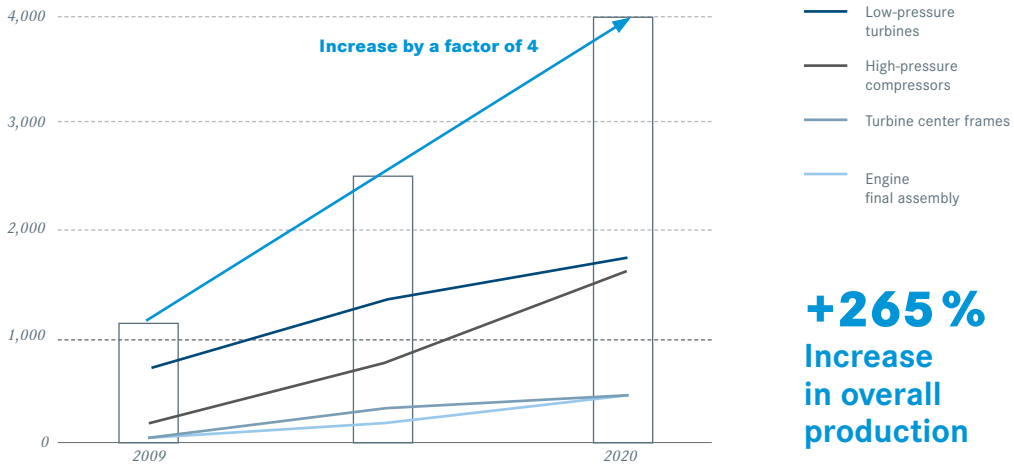
MTU's largely autonomously controlled blisk center of excellence already allows us to look ahead to the future of production. At the heart of the innovative manufacturing concept is a 96-meter long main distribution system. This is connected to a central computer that can automatically control all processes at any time. This is where blade integrated disks, or blisks, are produced. These are high-tech components that are produced in one integral process from one piece and are used in modern engine compressors. MTU already operates the world's most advanced production facility for these engine parts. And that is just the beginning.

Automation and digitalization are currently important issues in production. A continuous process of improvement determines the daily routine. Among other things, this is achieved by targeted recording and monitoring of appropriate reference values during the machining of components. The greater the understanding of the processes, the easier it is for experts to take preventive action to avoid even minor deviations and ensure machines undergo timely maintenance. In the future, algorithms will be able to further improve the quality of predictions and thus help to make production processes even more precise and economical.

At the heart of blisk production is a 96-meter long, computer-controlled main distribution system.

BY 2020, MTU'S PRODUCTION VOLUME IS SET TO ALMOST QUADRUPLE

Automated and digitalized processes are making an important contribution to managing the enormous growth predicted for the coming years. Within a decade, MTU will have quadrupled its production volume, with the number of assembled engines and modules manufactured – low-pressure turbines, high-pressure compressors and turbine center frames – increasing from 1,100 to 4,000.



Digitalization along the entire value chain

In the coming decade, the digital factory will increasingly gain in importance along the entire value chain, including downstream and supporting processes.

Three examples illustrate the transition:

- Automated production allows manual activities to be decoupled from machine cycles. This reduces the strain on employees while increasing the degree of precision.
- In the digital factory, components are transported to the workstations using fully automated transportation systems.
- Automated measuring of the processes and individual adaptation of the control programs for the machines increase precision in the manufacturing process.

Lifecycle engineering: "digital twin" offers new possibilities

Parallel to each physical component, a digital twin is produced, into which flows all the data from development and across the whole lifecycle. This enables the experts to simulate new processes and new technologies on the computer and implement them in practice significantly faster. Ultimately, a "digital factory" combines all technologies, production processes and tool development – as well as all value streams – to create an intelligently connected manufacturing workflow.

PROJECTS

Thinking about tomorrow today ____ To cope with unabated growth, MTU will need to expand its locations – this will be a key project over the coming years. Just as important is thinking about the next generations of commercial and military engines at an early stage and getting to grips with the technologies behind them.

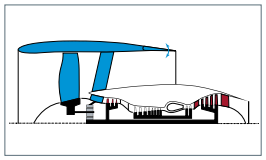
Projects for a successful future

Locations

Whether in Germany, China, Canada or Poland – MTU is expanding its global network at many OEM and MRO locations. This will allow the company to manage future growth. page 24

NEFE

In 2040, a new European fighter jet is expected to take to the skies. MTU is prepared: the concept for the next-generation engine is ready – the Next European Fighter Engine. page 26



Collaborations

Low-noise, low-emission aircraft and the engines of the future – MTU is addressing these issues in various research partnerships on a national and European level. page 28

Locations: room for future growth

The global volume of air traffic is continuing to grow unabated – and MTU is keeping pace. The company is expanding its capacities in America, Asia and Europe and is investing in existing and new locations.

INCREASING PASSENGER NUMBERS = NEW GROWTH OPPORTUNITIES

7.8 billion passengers

By 2036, the number of air passengers worldwide is set to nearly double.

The International Air Transport Association, IATA, is predicting that by 2036 the number of passengers will almost double – to 7.8 billion. For MTU, this means a growing demand for commercial engines and related maintenance services over the next several years.

The company is preparing to meet this demand through numerous expansion projects at the existing locations and construction of a new maintenance facility. MTU is also currently studying the options with regard to setting up a new repair center – another area that is seeing a substantial increase in demand.

EMPLOYEES WORLDWIDE	LOCATIONS WORLDWIDE	NEW HIRES IN 2018
9,731	15	885
MTU is an attractive employer on three continents	*MTU is present in Europe, America and Asia*	*Expansion of the locations will entail an increase in the workforce.*

Worldwide presence, at home in Germany

MTU has its roots in Germany. The company's headquarters in **Munich** remains the largest site. In the Bavarian capital, all research and development activities are pooled, along with manufacturing. The production ramp-up of the Geared Turbofan™ engines, in particular, is making it necessary to create additional capacities.

Langenhagen near Hannover is the centerpiece of the MTU Maintenance group. The site undertook early preparations for the maintenance of the PW1000G family by expanding the area available for this work and taking on additional staff.

In **Ludwigsfelde** in Berlin-Brandenburg, MTU Maintenance is currently building a new logistics center. With this, MTU is addressing the growing future demand for maintenance services for aircraft engines in the lower and medium-thrust categories, as well as for industrial gas turbines.

Expansion on three continents

MTU Aero Engines Polska began producing engine parts in **Rzeszów** in south-east Poland in April 2009, and has quadrupled its workforce in the intervening period. Now in the nearby vicinity, one of the most advanced maintenance shops in the aerospace industry is being set up: EME Aero (Engine Maintenance Europe), a joint venture between MTU and Lufthansa Technik. Operations are expected to start in 2019, with the two JV partners investing some 150 million euros by 2020.

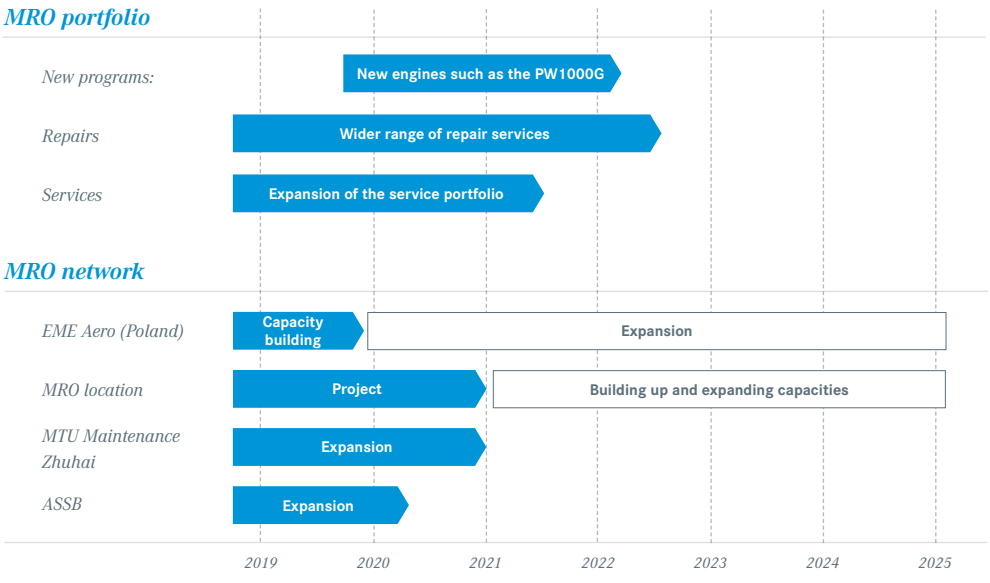
More than 8,000 kilometers away in **Vancouver**, Canada, MTU Maintenance Canada is currently also expanding its portfolio. In 2018, MTU Maintenance Canada in Vancouver wrapped up its first V2500 shop visit – on a new maintenance line. Thus the company is now also able to offer repair capabilities in Canada for one of the world's most frequently flown engines.

MTU Maintenance is currently increasing its capacities in **Zhuhai**, southern China, by 50%. The joint venture with China Southern hopes this will enable it to advance to the position of leading provider of MRO services in Asia.

MTU's second facility in Asia is also planning to expand its capacities by as much as 60%. Based near **Kuala Lumpur**, the ASSB joint venture with Lufthansa Technik thus aims to capture some of the rising demand for repair services in the region.

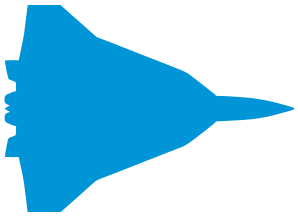
MRO: growth on all continents and across the entire portfolio

In the MRO segment, MTU is not only strengthening its global maintenance network but also enhancing the portfolio, for example with the inclusion of new engine programs such as the PW1000G family. Demand for repair and other services is also on the rise. For example, since its foundation in 2014, the revenues of leasing specialist MTU Maintenance Lease Services, a joint venture with Sumitomo, have risen on average by more than 100% annually – and this growth is set to accelerate further going forward.



NEFE: start of a new era in military aviation

In 2040, Germany and France are planning to launch a joint European fighter jet. MTU is ready – to play a key role in developing the engine, the Next European Fighter Engine (NEFE).



ENORMOUS POTENTIAL

1,100 engines

This is the figure at which experts put the market potential of the NEFE.

New challenges call for new solutions. This also applies to protecting European airspace. In future, this will be assured by a family of sub-systems composed of manned and unmanned platforms. A new combat aircraft program, the Next Generation Weapon System (NGWS), to be powered by a newly developed twin engine, the Next European Fighter Engine (NEFE), will form an essential component of this. It is planned to make the new system available from 2040 – as a replacement for both the multinational Eurofighter project and the Rafale in France.

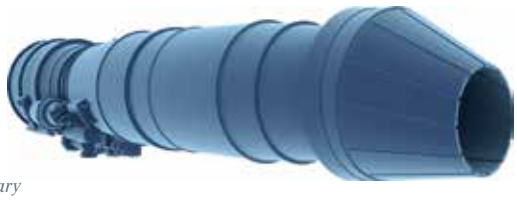
MTU possesses the technological expertise needed to develop and manufacture key components of this engine.

Revolutionary technology for a powerful engine

A powerful fighter jet needs a powerful engine. The demands are high: as well as factors such as robustness and high reliability, the focus is also on improving parameters such as the thrust-to-weight ratio. Low development and manufacturing costs, efficient maintenance, and long and plannable maintenance intervals are further considerations. MTU is ready to address these requirements and is already working on specific design elements of the engine. For example, the engine concept can be significantly optimized with the help of variable cycle engine (VCE) technology. This revolutionary technological step could make it possible to significantly reduce fuel consumption and decisively increase mission flexibility, among other benefits.

MTU INSIDE: HOW MTU CAN CONTRIBUTE ITS STRENGTHS TO THE NEFE

Low-pressure turbines ___ *MTU is the world's leading provider of low-pressure turbine technology in the commercial aviation sector, offering unrivalled levels of efficiency. Achieving higher efficiency also with military engines necessitates higher temperatures. MTU is already testing the requisite materials on an MTR 390, the engine used to power the Airbus Tiger helicopter.*

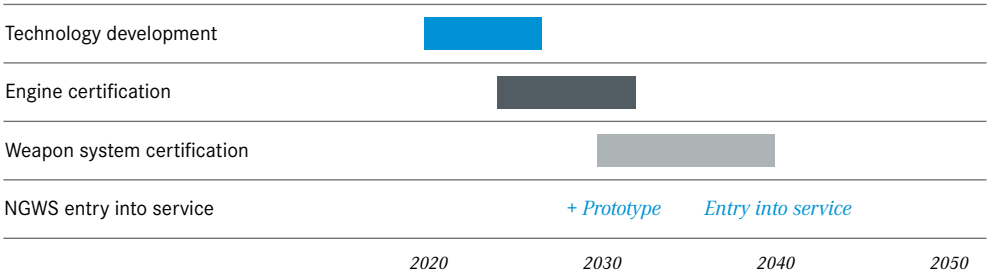


Compressors ___ *one of MTU's core competencies. Current flagship products developed by MTU's engineers are the compressors for the Eurofighter and A400M engines. The highlight: MTU builds compressors on the blisk principle, where disk and blades are manufactured as a single part.*

Advanced control units ___ *Thanks to real-time monitoring systems with analytical and forecasting capabilities, it is possible to identify and avoid damage at an early stage. The corresponding know-how is already flowing into various engine programs.*

Support ___ *across the entire lifecycle The new fighter aircraft will be in service for many years. Efficient service and maintenance concepts must therefore be given consideration from the start. MTU is addressing this with innovative repair techniques, with which it achieves long on-wing times, high availability and low lifecycle costs. Use of augmented reality techniques will further accelerate processes going forward.*

A powerful engine needs long lead times



With the plans for a new European combat aircraft, a new era is dawning: 2040 starts now. Because from the initial studies up until entry into service, a new fighter jet has a lead time of around 20 years. To ensure the weapons system is available from 2040, the foundations for the project must be officially laid as soon as possible. The main technology developments will then be wrapped up by around 2024 or 2026. Design, procurement of materials, assembly and performance of all engine certification tests will then follow up to 2031. Testing of the prototypes and military type certification of the fighter jet is planned from 2031 to 2040, so that deliveries can commence from 2040.

Collaborations: working together on the best ideas

MTU is an integral part of the German and European research landscape in the field of aviation. Working in cooperation with experts from universities and research institutions, the MTU team is instrumental in developing radical innovations for the coming decades.

Close cooperation with German research institutes and universities

MTU traditionally collaborates closely with all major research institutions in Germany. This produces a win-win situation: on the one hand, it gives the institutes' primary focus on fundamental research a more practically oriented tilt; on the other, MTU can draw on the scientists' excellent expertise when working on long-term projects.

The network relies on three pillars: trend analysis and development of visionary engine concepts at Bauhaus Luftfahrt; basic research at just a few top-notch institutes and universities; and regular exchange of experience with experts within and outside the aviation industry.

Bauhaus Luftfahrt _____
An internationally oriented think tank, Bauhaus Luftfahrt aims to develop innovative approaches for future air transport systems.

New DLR Institute _____
The German Aerospace Center (DLR) has built a test and simulation center for gas turbines (TESIG) in Augsburg.

Fraunhofer Institutes _____
Collaboration with various Fraunhofer Institutes throughout Germany is a main focal point of MTU's cooperative ventures.

Centers of competence _____ *MTU has established strategic alliances with research partners, the aim being to safeguard MTU's innovative capabilities over the long term and strengthen ties with the universities. MTU research partners include RWTH Aachen, the German Aerospace Center (DLR) in Cologne, TU Munich, UniBW Munich, University of Stuttgart, Leibnitz Universität Hannover and the Laser Zentrum Hannover.*

MTU and Fraunhofer IPT establish technology center for blisks

As the ramp-up of the current GTF engine generation continues, MTU has already started developing blisk prototypes for the next GTF generation at a dedicated technology center for blisks.

Under the cooperation agreement, MTU plans to shift the manufacture of blisk prototypes to the Fraunhofer Institute for Production Technology (IPT) in Aachen. This move will take the load off the production line in Munich.

A stake in all major EU programs

MTU is working continuously to develop new technologies. The company's research and development work is carried out in close co-operation with key players in the sector.

MTU is a key partner in all European research projects of note, including in particular the EU's Clean Sky, ENOVAL, LEMCOTEC and E-BREAK research programs.

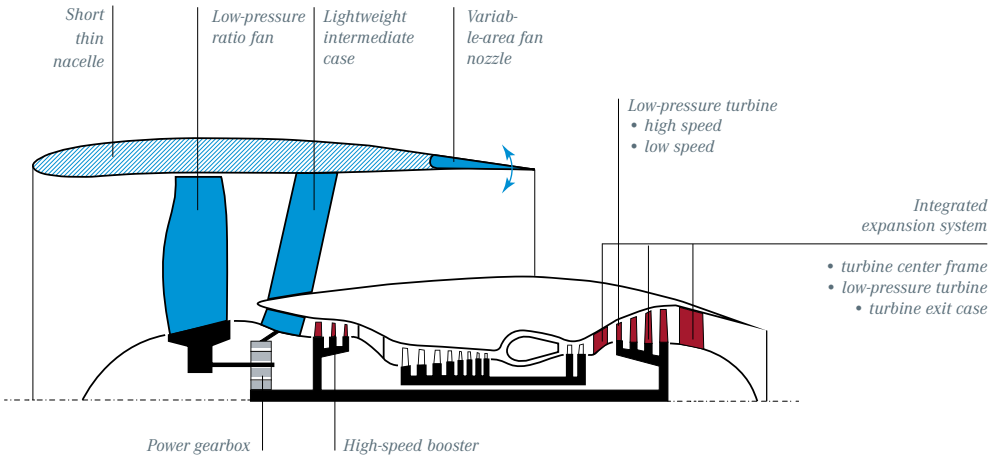
Clean Sky _____ *was initiated in 2008 and with more than 600 partners is the largest aviation technology research initiative undertaken by the European Union. The follow-on project is Clean Sky 2, which started in 2014 and in which MTU's participation includes an engine demonstrator.*

ENOVAL _____ *The main focus of ENOVAL up to the end of 2018 was to research technologies for reducing noise, fuel consumption and emissions in the low pressure system. In the ENOVAL project, MTU was responsible for the innovative low-pressure turbine technology.*

LEMCOTEC_____ *is an EU technology project with the ambitious goal of developing low-emission core-engine technologies. MTU's workshare involves the design, construction and testing of a new high-pressure compressor in two work packages.*

E-BREAK _____ *The European E-BREAK technology program is aimed at further reducing the fuel consumption and CO_2 emissions of future propulsion systems and extending their service lives (Engine Breakthrough Components and Subsystems). MTU is in charge of the engine monitoring sub-project.*

ENOVAL LOW-PRESSURE SYSTEM MODULES



Engines of the future are cleaner, quieter and more economical than today's engines. ENOVAL is an initiative of the Engine Industrial Management Group (EIMG). It completes the roadmap of the Level 2 (component validation) engine programs within the EU's 7th Framework Programme (FP7). ENOVAL complements the Level 2 projects LEMCOTEC and E-BREAK.

To our shareholders

Letter to our shareholders

Dear shareholders,

2018 was a highly successful year for MTU. We once again grew profitably – indeed, at such a pace that we revised our forecasts upward not once but twice in the course of the financial year and at the end of the day even surpassed the raised forecast targets. Thus 2018 was another record-breaking year for MTU, with revenues increasing to € 4.6 billion. The group's operating profit increased to € 671 million, while net income rose to € 479 million.

These results once again demonstrate that MTU's employees have a good handle on their tasks. My fellow members of the Executive Board and I have the greatest respect for the way in which they cope with the extremely high workload without compromising on quality or losing sight of future challenges. On behalf of the Executive Board, I would therefore like to take this opportunity to sincerely thank the entire workforce for their untiring efforts in the interests of MTU and its stakeholders. Together we shape an innovative corporate culture that manifests itself in futureproof products, optimally designed processes and projects for a successful future – in short, that opens the door for MTU to explore exciting new prospects.

Let us take a look at what we achieved within the scope of this process in 2018.

A number of new aircraft powered by engines in which MTU has a stake entered service with airline customers in the course of the year. In the commercial engine sector, these were the Embraer E190-E2 with Geared Turbofan™ engines and the Gulfstream G500 powered by the PW800. The T408 military engine has been in service in the Sikorsky CH-53K heavy-lift cargo helicopters operated by the United States Marine Corps since 2018.

The GE9X engine for the Boeing 777X long-haul airliner passed an important milestone in 2018 and demonstrated its capabilities during flight testing. In the business jets segment, the PW800 scored points with airline manufacturer Dassault, which has chosen the engine for its new Falcon 6X business jet. Furthermore, the first production version of Embraer's KC-390 military transport aircraft, which deploys the V2500, successfully completed its maiden flight.

These examples from the commercial and military OEM business are significant wayposts on the path to a successful future. We also unlocked further opportunities in 2018.

We not only successfully doubled the production volume of the PW1000G family of Geared Turbofan™ (GTF) engines, but also reinforced our capacity to handle future increases in GTF engine production.

At the same time, we are positioning ourselves as a reliable partner in new engine development programs – I am thinking here for example of the next generation of engines for short- and medium-haul aircraft. Our goal is to acquire a higher share in new programs than has previously been the case.

In the military engine business, we aim to leverage the export opportunities that the market offers – for example for the CH-53K heavy-lift cargo helicopter, which is currently also under discussion for Germany.

We are well-placed to secure a share in the engine to power the next generation of the European fighter jet and took advantage of the industry trade shows in Berlin and Farnborough in 2018 to present our concept.

Besides its OEM business, MTU is also well-positioned in the market for commercial maintenance services (MRO). We are pleased to report full shops at sites around the world in 2018.

To enable us to meet the high demand, we are continuously optimizing our services portfolio. Examples from 2018 include consolidating our gas turbine expertise under the new MTU Power brand, extending our V2500 maintenance network to include MTU Maintenance Canada and adding technical asset management to our services portfolio.

We are also substantially expanding our capacities: in the completed financial year, we got under way with the expansion of our sites in Ludwigsfelde, Rzeszów and Zhuhai.

We secured the future of our Chinese maintenance location by renewing the joint venture contract with China Southern up to 2051.

We also made preparations for the future maintenance of GTF engines by forging ahead with the creation of EME Aero in Poland, the world's largest and most advanced MRO shop for Geared Turbofan™ engines, in a joint venture with Lufthansa Technik. It is scheduled to start operations in late 2019.

In all measures that we implement, we take advantage of the opportunities that digitalization offers. The goal here is to make processes more efficient, optimize inventories and better connect the entire supply chain – not least with a view to hedging cash flows.

All this shows that we address the issues that are relevant for our company's success. We have competitive products and services, promising innovations for ensuring sustainable air traffic and a plethora of growth opportunities.

We intend to leverage these in 2019. MTU expects to see the strongest growth in the series production of commercial engines. Spare parts sales and the military engine business are also likely to increase. Organic growth is also predicted for the commercial maintenance segment. The bottom line is: we can, we intend to and we will continue growing.

On behalf of the entire Executive Board, I would like to thank you, our shareholders, for your support and the trust that, through your investment, you have placed in us. We would like to express our appreciation by proposing a renewed increase of the share dividend to € 2.85. I would also like to thank our customers and our partners for their loyalty and support. I look forward to many more years of profitable collaboration between all of you and MTU.

Sincerely yours

Reiner Winkler

The Executive Board

Reiner Winkler

Chief Executive Officer (CEO)
born 1961, appointed term: to September 30, 2024

Reiner Winkler has held the position of CEO of MTU Aero Engines AG since January 2014. His responsibilities include Human Resources, Strategy, Corporate Communications and Legal Affairs. From May 2005 to December 2017, Winkler was MTU's Chief Financial Officer – for the last four years in addition to his role as CEO. A graduate in business administration, on joining MTU in 2001 he was placed in charge of the finance, human resources and IT corporate departments.

Prior to that, Winkler was managing director finance and controlling at TEMIC Telefunken microelectronic GmbH. Further career milestones included posts with Daimler Benz AG and Siemens AG.

Peter Kameritsch

Chief Financial Officer (CFO) and
Chief Information Officer (CIO)
born 1969, appointed term: to December 31, 2020

Peter Kameritsch has been a member of the MTU Executive Board with responsibility for finance and IT since January 2018.

Kameritsch, who has degrees in physics and business administration, joined MTU in 1999. He has worked in various management positions in finance, investor relations and corporate strategy at various MTU locations. Before his appointment to the Executive Board, Kameritsch held the position of Senior Vice President, Finance.

Michael Schreyögg

Chief Program Officer (CPO)
born 1966, appointed term: to June 30, 2021

Michael Schreyögg joined the Executive Board in July 2013, taking responsibility for marketing/sales and MTU's commercial and military OEM programs. In this capacity, he oversees new engine and spare parts business with the OEM partners and military customers, as well as aftermarket service activities for airlines. Since 2018, responsibility for the MTU Maintenance sites has been added to his remit.

The graduate in mechanical engineering joined MTU in 1990. During his professional career, he headed various commercial and military engine programs before assuming overall responsibility for the company's defense programs from 2008.

Lars Wagner

Chief Operating Officer (COO)
born 1975, appointed term: to December 31, 2020

Lars Wagner was appointed as MTU's Chief Operating Officer in January 2018. He oversees the areas of technology and development, procurement, production, assembly and quality assurance.

Wagner has a university background with a degree in mechanical engineering and an MBA. He was named MTU's Executive Vice President, OEM Operations in July 2015, having previously held a number of management positions with Airbus, including international assignments, most recently in Hamburg.

The MTU share

Turbulent stock markets in 2018

The German DAX index started 2018 with an all-time high of almost 13,600 points. In early February, it fell below the 13,000 points mark and continued to move sideways into the fall. The trade tensions between the USA and China, the forthcoming Brexit negotiations and the budget dispute between the EU and Italy resulted in renewed share price losses at the beginning of October. The DAX continued its downward trend and from early October remained permanently below 12,000 points. In the third quarter of 2018, Germany's economic output shrank for the first time since 2015. The ECB held firm on its decision and left its main refinancing rate unchanged at 0% in 2018. The postponement of the Brexit negotiations had an unfavorable effect on the capital market. Toward the end of the year – on December 27, 2018 – the DAX bottomed out at 10,382 points. On the last trading day of 2018, the DAX closed on 10,559 points - down by around 18% on the previous year.

Germany's MDAX, the index comprising 60 of the country's midcap companies including MTU, was significantly more stable in the first nine months of the financial year; however come the fall, it, too, lost considerably in momentum. The MDAX closed the year at 21,588 points, a decline of 18% year on year.

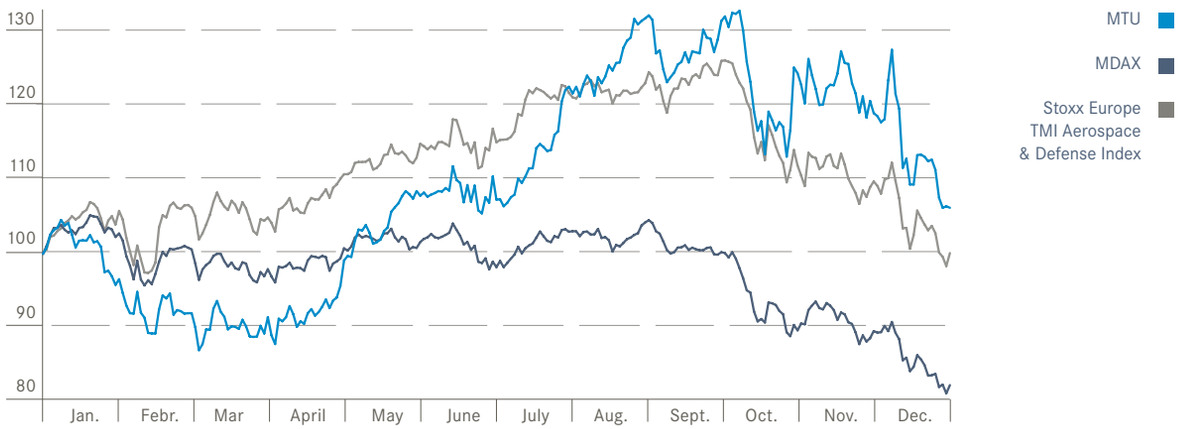
The Stoxx Europe TMI Aerospace & Defense Index, which apart from the stocks of Airbus Group, Safran and Rolls-Royce also includes the MTU share, showed a strong share price performance into the fall. However, toward the end of the year, this index also weakened. The Stoxx Europe TMI Aerospace & Defense Index remained stable over the year at 758 points.

MTU share at an all-time high

After the successful year on the stock exchange in 2017, the MTU share started 2018 at € 150.20. At the beginning of the year – reflecting the development on the DAX and MDAX – a phase of falling prices followed, with the MTU share reaching its low for the year of € 130.30 on March 2. By June, the share had rallied back significantly, and with the upward revision of the forecast on publication of the half-year report on July 26, a further rise in the share price set in. On October 4, the MTU share reached its high for the year of € 197.30, also marking an all-time high since the company's IPO in 2005. Thus in 2018, MTU for the first time boosted its market capitalization to over € 10 billion. Following the publication of MTU's nine-month figures, a second upward revision of the full-year earnings forecast and the announcement that CEO Reiner Winkler had renewed his contract for a further five years, the market reacted very positively and although the overall market suffered heavy losses,

the MTU share remained stable. The analysts maintained their buy or hold recommendations for the MTU share and refreshed their upside targets. Growing concerns about a possible economic downturn led to increased pressure on the share price in December. The MTU share closed out 2018 at € 158,40, after gaining 6 % over the year and thus, as in 2017, performing notably better than the MDAX (-18 %) and comparable companies (Stoxx Europe TMI A&D Index 0 %).

[T4] MTU share performance in 2018 compared with stock market indices (baseline Dec. 31, 2017 = 100)



Significant share price gains since the IPO

The MTU share was first listed on the stock market on June 6, 2005. Its issue price was € 21. It was admitted to the MDAX soon afterward, on September 19, 2005. By the end of 2016, the share price had passed the € 100 mark, and went on to pass the € 190 mark in 2018. The MTU share has thus multiplied in value by more than 800 % since the IPO.

[T5] MTU share indicators year on year

		2018	2017
Highest quoted price[1]	€	197.30	153.65
Lowest quoted price[1]	€	130.30	110.50
Initial quoted price[1]	€	149.30	110.70
Year-end quoted price[1]	€	158.40	149.40
Annual performance[2]	%	+6	+36
Market capitalization at year end	€ million	8,237	7,769
Average daily trading volume	€ million in '000 shares	23 143	20 158
Earnings per share	€	8.67	6.90
Dividend per share	€	2.85 [3]	2.30
Dividend payout rate[4]	%	31	29
Dividend yield[5]	%	1.8	1.5

[1] Xetra closing price.
[2] Based on Xetra year-end share price (Dec. 31).
[3] Proposal.
[4] Dividend payout as a percentage of net income adjusted.
[5] Net dividend yield relative to Xetra year-end closing price (Dec. 31).

Dividend

At the Annual General Meeting to be held on April 11, 2019, the Executive Board and the Supervisory Board intend to propose a dividend payment of € 2.85 per share for the financial year 2018. The dividend for 2017 was € 2.30. MTU thus continues to pursue its earnings-oriented dividend policy. Investors can expect to receive their dividend payment on April 16, 2019. The dividend payout ratio calculated as a percentage of MTU's net income adjusted is 31%.

Trading volume

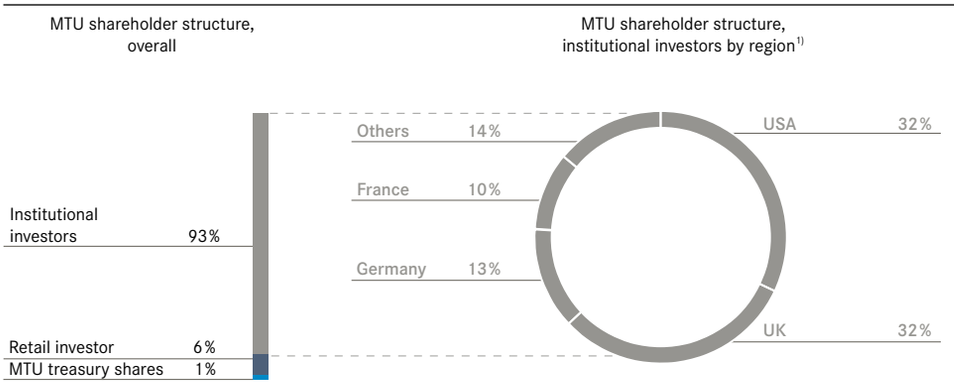
In 2018, the average number of shares that changed hands each day through Xetra trading and the floor trading systems was 143,000, compared with 158,000 shares per day in 2017. The maximum number of shares traded was 371.530 on December 21, 2018. In monetary terms, the average daily trading volume amounted to around € 23 million (2017: € 20 million), placing MTU 11th in the ranking of MDAX companies at the end of 2018 (2017: 12th place). In terms of market capitalization, MTU ranked 3rd, with outstanding shares valued at € 8.2 billion (2017: 6th place).

Shareholder structure

At December 31, 2018, 99% of MTU shares were in free float and around 0.6% were held by the company as treasury shares. Of the free-floating shares, some 93% were held by institutional investors and 7% by retail investors. The majority of institutional investors are based in the UK, the USA, Germany and France. At December 31, 2018, the stock market authorities were in possession of notifications pursuant to Section 21 (1) of the German Securities Trading Act (WpHG) from the following institutional investors, each of whom holds more than 3% of the company's voting rights:

- Massachusetts Financial Services Company, Boston, USA (4.93%) – notification dated September 26, 2018
- The Capital Group Companies, Los Angeles, USA (15.22%) – notification dated August 21, 2018
- Euro Pacific Growth Fund, Boston, USA (5.10%) – notification dated August 9, 2018
- BlackRock Inc., Wilmington, USA (5.68%) – notification dated July 19, 2018

[T6] Shareholder structure



[1] Approximation based on top 50 shareholders.
Source: SID, August 2018.

Analysts

At the end of December 2018, 28 analysts were reporting regularly on MTU. Buy recommendations were issued by 11 of these financial institutions, while 13 gave MTU stocks a hold rating and 4 recommended selling (2017: 9 “buy”, 14 “hold”, 4 “sell”). The average upside target was € 187.

[T7] The following financial institutions report regularly on MTU:

Alpha Value Research	Exane BNP Paribas	Morgan Stanley
Bankhaus Lampe	Goldman Sachs	Nord LB
Barclays	Hauck & Aufhäuser	ODDO Securities Research
Berenberg Bank	HSBC	Pareto (formerly Equinet)
Bernstein Research	Independent Research GmbH	Société Générale
BoA Merrill Lynch	Investec	UBS
Citi Global Markets Research	JPMorgan Cazenove	Vertical Research
Commerzbank	Kepler Cheuvreux	Warburg Research
Deutsche Bank	Landesbank Baden-Württemberg	
DZ Bank	Main First	

Investor relations activities

With 26 roadshows in all the key financial centers of Europe and the USA, MTU continued to raise its market profile in 2018. The company also took part in 17 international investor conferences, including the Commerzbank German Investment Seminar in New York, Kepler Cheuvreux’s German Corporate Conference in Frankfurt and Goldman Sachs’ European Industrials Conference in London. In addition, numerous investors visited MTU at its headquarters in Munich: in total, some 1,000 investors made use of these opportunities for face-to-face contact with MTU in 2018. A key platform for dialog with shareholders was once again the MTU Annual General Meeting held in Munich on April 11, 2018. It was attended by shareholders representing around 72 % of the share capital with voting rights (2017: 70 %). Around 80 analysts and investors accepted the invitation to attend the group’s annual Investor and Analyst Day, which was held in London on November 30, 2018. Main topics at the event were, among others, the growth potential in the commercial and military engine business as well as the drivers of growth in the OEM and MRO segments.

MTU scored highly in Institutional Investors’ annual All-Europe Executive Team ranking, winning 3rd place among the aerospace and defense companies in the categories “Best Investor Relations Program” in the estimation of sell-side analysts and “Best Analyst Day.”

The Investor Relations section of the MTU website (*www.mtu.de*) provides all relevant information. You are also welcome to contact the IR team by calling +49 (0)89 14 89-8473.

Corporate Governance

Corporate governance report

MTU sets great store by responsible corporate management, which is why the company complies with all the recommendations of the German Corporate Governance Code (GCGC). The corporate governance report pursuant to Section 3.10 of the GCGC qualifies as the corporate governance statement required under Section 289a of the German Commercial Code (HGB) and thus forms part of the combined management report of the MTU Group and MTU Aero Engines AG.

Responsible corporate management

The term “corporate governance” stands for the practice of administering and controlling a company in accordance with the principles of responsibility and long-term value creation. MTU Aero Engines AG sees good corporate governance as a natural responsibility that embraces every area of the company. That comprises mutual trust and efficient collaboration between the Executive Board and the Supervisory Board, respect for the shareholders’ interests and open and transparent communication with all stakeholders. As a company with global operations, MTU acts in compliance with the relevant national and international standards. In Germany, where the company has its headquarters, these standards are laid down principally in the Stock Corporation Act (AktG), in the Co-Determination Act (MitbG) and in the GCGC. In the financial year just passed, the Executive Board and Supervisory Board closely studied the GCGC, the latest version of which was published on February 7, 2017.

As part of the corporate governance statement pursuant to Section 289a of the German Commercial Code (HGB), which constitutes the corporate governance report according to Section 3.10 of the GCGC, the Executive Board and Supervisory Board of MTU Aero Engines AG hereby make the following declaration of conformity:

Declaration of conformity with the German Corporate Governance Code by the Executive Board and Supervisory Board of MTU Aero Engines AG, pursuant to Section 161 of the German Stock Corporation Act (AktG)

The Executive Board and the Supervisory Board of MTU Aero Engines AG declare that the recommendations of the Government Commission on the German Corporate Governance Code, as published in the amended version of February 7, 2017 by the Federal Ministry of Justice in the official section of the Federal Gazette, have been and are being complied with in their entirety.

Munich, December 2018

For the Executive Board

Reiner Winkler
Chairman

For the Supervisory Board

Klaus Eberhardt
Chairman

The practice of corporate management

Accepting responsibility – not only for our products and processes, employees, customers and partners, but in equal measure for the environment and society as a whole – forms an integral part of MTU's corporate culture. MTU is committed to sustainable development, and its contribution in this area goes above and beyond the minimum legal requirements. The focus of this social commitment falls on environmental protection, human resources policy and community outreach projects in the neighborhood of MTU sites. These commitments are publicly documented on the *MTU website at www.mtu.de under Company > Corporate Responsibility.*

The company has formulated a code of conduct, which constitutes a binding standard to be observed by all employees. The code of conduct can be downloaded from the *company's website at www.mtu.de under Company > Compliance > Code of Conduct*.

MTU attaches great importance to maintaining an open, ongoing dialog with its target groups. The company communicates with these groups via many channels, including the intranet and internet, company brochures, employee and customer magazines, as well as in person at events. The goal of this communication is to generate broad public acceptance.

MTU insists on the finest quality for its products and services. Compliance with quality standards is verified by government agencies and through internal and external audits. The quality standards are published on the *MTU website at www.mtu.de under Engines > Quality.*

Trust-based cooperation among governing bodies

MTU is a stock corporation organized under German law. Its governing bodies are the Executive Board, the Supervisory Board and the Annual General Meeting. The close cooperation between the Executive Board and the Supervisory Board is based on trust, and they share information with each other in a reliable and regular manner. The Annual General Meeting, in particular, offers shareholders the opportunity to present questions to MTU executives and to exercise their voting rights.

Working procedures of the Executive Board

In managing MTU, the Executive Board's goal is to create, on its own responsibility and in the company's interest, sustainable added value, taking into account the interests of its shareholders, employees and other stakeholders. The Executive Board works as a team, with its members bearing joint responsibility. The members of the Exec-

utive Board regularly discuss important measures and events within their respective remits. Their qualifications and professional experience differ and complement each other. The company's Executive Board consisted of four members in 2018. The Supervisory Board of MTU Aero Engines AG approved the resolution to extend the appointment of the company's CEO Reiner Winkler by a further five-year period up to September 30, 2024. The resolution was passed unanimously at the Supervisory Board meeting on October 24, 2018.

The Supervisory Board is briefed by the Executive Board in a regular, timely and comprehensive manner on the situation of the company – in particular on strategy, the status of planning, the achievement of targets, the company's risk situation and its risk management activities. The Executive Board coordinates decisions of a strategic nature with the Supervisory Board, ensures that such decisions are implemented and discusses the progress made. Once a month, the Supervisory Board receives written reports on the company's earnings, financial situation and net asset position. Any deviations from the planned operational performance are explained in detail to the Supervisory Board. Furthermore, the chair of the Supervisory Board is briefed regularly and in person on the company's current situation, significant business transactions and important pending decisions.

The Executive Board also receives regular reports on compliance, i.e. on the measures taken to comply with laws and regulations as well as with company guidelines.

Important Executive Board decisions, in particular those concerning the budget, require the approval of the Supervisory Board. More information on these matters is provided in this Annual Report in the *Report of the Supervisory Board.* The Executive Board's rules of procedure, along with the list of transactions by MTU Aero Engines AG requiring Supervisory Board approval, can be viewed on the *company website at www.mtu.de under Investor Relations > Corporate Governance.*

Working procedures of the Supervisory Board

In line with statutory requirements, the Supervisory Board comprises six shareholder representatives and six employee representatives. It appoints the Executive Board, oversees the latter's work and provides advisory support. Decisions of consequence for the company require the approval of the Supervisory Board. All Supervisory Board members are qualified for these tasks and properly perform their mandated duties. In compliance with the GCGC, only one former member of the Executive Board of MTU Aero Engines AG, namely Prof. Dr.-Ing. Klaus Steffens, sits on the Supervisory Board; the GCGC recommends no more than two. The Supervisory Board is entrusted with gauging the independence of its own members, whereby as a matter of principle it considers the employee representatives as independent. This condition is deemed to be fulfilled when the majority of the members of the Supervisory Board may be regarded as independent. In its present composition, this applies to all members of the Supervisory Board. Given the nature of MTU's business model and the 30- to 40-year lifecycle of its engine programs, which entail very high initial capital expenditure, the Executive Board and the Supervisory Board consider long-serving members of the Supervisory Board to be an especially valuable asset to the company and do not take the view that they must necessarily be deemed insufficiently independent after a tenure of 12 to 15 years based on this fact alone. It is thus ensured that the Executive Board receives independent advice and monitoring both at plenary meetings of the Supervisory Board and at meetings of its committees.

The Supervisory Board's rules of procedure make provision for its members to form committees. MTU's Supervisory Board has four committees, details of which can be found in the *Report of the Supervisory Board.*

The Supervisory Board's rules of procedure contain binding provisions for dealing with conflicts of interest. Such conflicts are to be disclosed and, where appropriate, may result in termination of the member's mandate. In addition, the Supervisory Board must explicitly state such potential conflicts of interest in the nomination proposals it makes to the Annual General Meeting. In 2018, no consulting agreements, contracts for services or similar contractual agreements existed between the members of the Supervisory Board and MTU Aero Engines AG or any of its subsidiaries. Neither in this, nor any other area did any conflicts of interest arise that required disclosure.

The Supervisory Board has defined concrete objectives for its composition and drawn up a profile of skills and expertise for the entire board, which it judges satisfactorily met at the present time. This profile will form the basis of all future nominations presented for approval by the Annual General Meeting. The profile of skills and expertise is published on the *MTU website.*

In the financial year 2018, directors' and officers' liability insurance was in effect for the MTU Executive Board and Supervisory Board members. The cover includes a deductible amounting to 10% of the loss incurred, up to a maximum of 1.5 times the board member's annual fixed compensation.

Compensation for the members of the Executive Board and Supervisory Board is established in accordance with clear, transparent criteria, which are described in this Annual Report in the *Management compensation report.*

Diversity

As the diversity of MTU's workforce is a decisive factor in the company's success, it is a topic to which MTU attaches great importance. In particular, MTU's human resources policy focuses on ensuring that the criteria of internationality and the fair representation of women are respected.

Pursuant to Section 111 (5) of the German Stock Corporation Act (AktG), the supervisory boards of companies that are listed or subject to the Co-Determination Act are required to set target quotas for women on their supervisory and executive boards. In addition, Section 6 (4) of the German Stock Corporation Act (AktG) obliges the Executive Board to set a target quota for women in the two echelons of management directly below the Executive Board.

Diversity also has an important role to play for the Supervisory Board as regards its own composition. In compliance with both the German Stock Corporation Act and the GCGC, the supervisory boards of listed companies subject to the Co-Determination Act must comprise at least 30 % women and at least 30 % men. The Supervisory Board has four female members, Dr. Christine Bortenlänger, Anita Heimerl, Heike Madan and Prof. Dr. Marion A. Weissenberger-Eibl, so that both the employees and the shareholders have two women representing their interests on the board. As a company with global operations, MTU has a keen interest in ensuring that the members of its corporate bodies have an international background, which is why the Supervisory Board has set itself the goal that at least one of its members should meet this criterion. The MTU Supervisory Board already includes members who trained in other countries or have spent substantial portions of their careers abroad, and the company intends to ensure that the members of the Supervisory Board continue to contribute their international experience going forward.

The Supervisory Board takes the above-mentioned goals into account when submitting nomination proposals to the Annual General Meeting. The same applies to the Nomination Committee, which is responsible for preparing the vote of the Supervisory Board. Since the main criterion for any nomination proposal is still the company's interest, the Supervisory Board shall propose the candidates that best meet the requirements.

The Supervisory Board's rules of procedure already contain an age-limit provision for Supervisory Board members, in accordance with which members must relinquish their seats after the Annual General Meeting that follows their 72nd birthday. Moreover, a general limit of four terms of office has been set for serving on the Supervisory Board.

The Supervisory Board also places value on fostering diversity in appointments to the Executive Board. The members of the latter have diverse qualifications and work experience, which contribute to their work on the board. In accordance with the provisions of the German Stock Corporation Act (AktG) and the German Corporate Governance Code (GCGC), in 2017 the Supervisory Board fixed a target quota of 25 % for women members of the Executive Board, to be achieved by 2022.

Given the management and supervisory-board structure of the MTU companies in Germany – namely a sole managing director and a supervisory board consisting of either three of twelve members – a target of 0 % was set in 2017 for the number of women members. However, the proportion of women on the Supervisory Board of MTU Maintenance Hannover GmbH currently stands at 8.33 %. At management level – which comprises tier-1 (OFK), tier-2 (FK) and tier-3 (EFK) managers – the Executive Board has set a quota of 13 % for women in management positions at the MTU sites in Germany, which it aims to achieve by the end of 2022.

MTU is continuing to pursue its goal of raising the number of women in its workforce, not only in management but at all levels of the hierarchy. Every area of the company is called upon to work actively toward achieving this corporate objective. The company has long-established measures in place to increase the share of women in management and is continually honing and enhancing these. They include, for instance, career counseling for women with potential as well as various mentoring programs.

Other measures address both men and women and are designed to improve work-life balance. They include part-time management posts, job sharing and teleworking.

Financial reporting

MTU prepares its consolidated financial statements and its interim reports in accordance with the International Financial Reporting Standards (IFRSs) on the responsibility of the Executive Board. The separate financial statements of the parent company are compiled in accordance with the provisions of the German Commercial Code (HGB). An internal system of controls coupled with the

application of uniform principles of accounting ensures that the earnings, financial situation, net asset position and cash flows of all group companies are accurately presented. In addition, MTU has a differentiated system in place to identify and monitor business and financial risks.

Risk management and control system

The Executive Board is responsible for ensuring that an appropriate risk management and control system is in place. This system is described under the heading "Internal control and risk management system" in the *combined management report.* The Executive Board reports to the Supervisory Board in a regular and timely manner on existing opportunities and risks, and how they are developing. The Audit Committee of the Supervisory Board deliberates on risk management. In accordance with Section 107 (3) of the German Stock Corporation Act (AktG), as amended by the German Accounting Law Modernization Act (BilMoG), the Audit Committee is explicitly responsible for monitoring the effectiveness of the risk management system, the internal control and auditing systems, the financial reporting process and the audit of the financial statements, and, in particular, for assessing the auditors' independence.

Compliance

The corporate culture at MTU sets great store by the values of trust and mutual respect. Nevertheless, the risk can never be entirely ruled out that unauthorized behavior of isolated individuals might lead to contravention of the law. MTU does everything in its power to minimize this risk as far as possible, and is committed to preventing acts of misconduct, such as corruption, in the first place through regular targeted training measures, and to uncovering and pursuing any such acts that are committed.

The observance of legal and ethical rules and principles plays a central role in this respect. These and other aspects of compliance, such as the responsible handling of insider information, are documented in a code of conduct drawn up and introduced jointly by the MTU Executive Board and the Group Works Council. This code of conduct embodies MTU's corporate culture and reflects its resolve to comply strictly with the stipulations of the relevant laws and internal regulations. It is a company-wide guide to ethical business relations.

Compliance is an important aspect of all management functions at MTU. For example, all managers must verify that each and every member of their staff has read and understood the code of conduct and is abiding by its rules. Reinforcement is provided by internal training courses.

MTU has established the position of a Compliance Officer, who is a member of corporate management and reports directly to the Executive Board. This person's duties include identifying and evaluating legal and reputational risks. Where necessary, the Compliance Officer recommends additional compliance rules to the Executive Board. Above and beyond this, the Compliance Officer coordinates the measures taken in specific cases of suspected non-compliance. In agreement with the Works Council, the company has set up an internal compliance office that staff, customers and suppliers may contact if they suspect unethical conduct.

Status reports on the Compliance Officer's activities are presented at meetings of the Supervisory Board's Audit Committee. The Audit Committee then informs the plenary meetings of the Supervisory Board via a summary of its own meetings. The Supervisory Board's Audit Committee oversees the Executive Board's compliance activities. This includes proposing new rules for incorporation in the compliance guidelines and monitoring the measures and training programs implemented by the Compliance Board.

A full information service

In keeping with the principles of good corporate governance, MTU issues a regular flow of comprehensive, timely information on the company's activities and any major developments in its business situation to shareholders, shareholder associations, financial analysts, the media and other interested parties. MTU strives to ensure that all stakeholders are kept informed in equal measure. The company publishes a full range of information on its *website at www.mtu.de.* It publishes quarterly reports on its business activities, and any new developments likely to have a significant impact on the MTU share price are disclosed in the form of ad hoc releases in accordance with statutory requirements.

Information is also posted on the MTU website whenever members of the Executive Board or Supervisory Board or related persons have purchased or sold MTU shares or share-based derivatives. Section 19 of the European Market Abuse Regulation stipulates that this group of persons must disclose such transactions if and when their value reaches or exceeds € 5,000 within a single calendar year.

Management compensation report

The management compensation report describes the principles applied when establishing the compensation to be awarded to members of the Executive Board and Supervisory Board of MTU Aero Engines AG, and states the amount and composition of that compensation. The management compensation report follows the provisions of Section 314 (1) no. 6 of the German Commercial Code (HGB), German Accounting Standard DRS 17 "Reporting on the remuneration of members of governing bodies," the recommendations of the German Corporate Governance Code (GCGC), and the International Financial Reporting Standards (IFRSs).

Principles of the compensation system for members of the Executive Board

At the proposal of the Personnel Committee, which is independent in the meaning of the GCGC, the Supervisory Board decides on a system of compensation for the members of the Executive Board, including the main components of their contracts such as the amount and composition of the total compensation, which includes non-performance-related and performance-related components. The Personnel Committee reviews the appropriateness and the alignment with the market of the management compensation at regular intervals. This includes compiling regular comparisons of MTU and selected peer companies with the support of an independent compensation expert. This benchmarking is conducted on a sector-specific basis by taking into account 21 companies from the industrial and capital goods sector which are listed in the DAX and MDAX stock indexes. A separate expert opinion was commissioned for the CEO's compensation. The Personnel Committee concluded from these comparisons that MTU's Executive Board compensation lies within the average bandwidth for these peer companies.

Developed with the support of independent external compensation experts, the present management compensation system is oriented toward the company's positive and sustainable development. The remuneration awarded to the members of the Executive Board is therefore composed of non-performance-related and performance-related components, particularly in the form of a long-term incentive. This ensures that corporate management is optimally aligned with the long-term interests of the company and its investors. The management compensation system is thus aligned with market conditions and was introduced in its current form with effect of the financial year 2016.

Structure of the total compensation

[T8] Structure of the compensation system (total target direct compensation)

Non-performance-related components	~ 40 %	Basic salary	Fixed compensation Fringe benefits
Performance-related components / variable compensation	~ 60 %	Short-term incentive (STI)	~ 40 % of the variable portion of the compensation Key characteristics: Distribution based on goal achievement as regards EBIT adjusted and free cash flow Limitation 0 – 180 % (Extraordinary performance bonus/malus (in accordance with the GCGC) of up to 20 %)
		Restricted Stock Plan (RSP) long-term incentive (LTI)	~ 60 % of the variable portion of the compensation Key characteristics: Distribution based on 3-year goal achievement as regards EBIT adjusted and free cash flow Limitation 0 - 180 % Awarded in MTU shares (vesting period 4 years)

Non-performance-related components

The non-performance-related compensation (basic salary), which makes up around 40 % of the total compensation, is paid on a monthly basis and consists of the fixed compensation and fringe benefits. The latter comprise taxable reimbursements of expenses and the noncash benefit deriving from payments in kind such as insurance premiums and the use of a company car for business and private purposes, including any taxes on such benefits paid by the company.

Performance-related components

The performance-related compensation makes up around 60 % of the total compensation and consists of a short-term incentive (STI) plan and a long-term incentive (LTI) in the form of the Restricted Stock Plan (RSP).

Short-term incentive (STI)

A short-term incentive (STI) plan has been established for members of the Executive Board. Payments under this plan represent around 40 % of the performance-related management compensation.

The actual payout depends on the achievement of two equally weighted performance criteria at group level – EBIT adjusted and free cash flow.

The targets to be achieved in the respective financial year to ensure payment of 100 % of the short-term incentive are set annually in advance by the Supervisory Board, taking the operational business planning figures into account. In addition, an entry threshold is set at 70 % of the target level for each performance metric which, if achieved, corresponds to an STI entitlement of 50 %. Should this threshold not be met, no STI shall be payable. Similarly, the maximum award is limited to 180 % which is payable if the maximum achievement level of 115 % is reached in respect of the targets set for each of the two performance metrics. Between the entry threshold, the 100 % level and the maximum achievement limit, the entitlement is interpolated using a straight-line method. The effective STI entitlement is calculated on the basis of the arithmetical mean of the achievement of the two performance targets. As stipulated in the GCGC, the Supervisory Board is entitled to take each Executive Board member's individual performance into account by adjusting the STI entitlement for the respective financial year by up to 20 % (bonus/malus), based on the individual performance determined by the Supervisory Board. In this regard, the Supervisory Board resolved in March 2011 generally not to apply a bonus or malus regulation. Accordingly, the STI entitlement was not adjusted in 2018 or in 2017.

Long-term incentive (LTI)

A performance-related long-term incentive is awarded in the form of the Restricted Stock Plan (RSP). This compensation component is share-based and represents around 60 % of the variable portion of the total compensation. The RSP is awarded in the form of a cash settlement, subject to income tax, the full net amount of which the respective member of the Executive Board must immediately reinvest in MTU shares subject to disposal restrictions. The shares awarded under this plan must be held for a vesting period of four years.

To strengthen the long-term incentive effect of this compensation component, the value of these RSP shares at the grant date is adjusted according to a long-term

performance target. The latter is calculated by taking the arithmetical mean of the STI entitlements established for the three financial years preceding the year in which the RSP shares were granted. It is capped at a maximum of 180 %. In the case that a new Executive Board member joins the company, their multi-year performance level for the missing years is established by assuming an STI entitlement of 100 %.

Beyond that, the employment contracts of the Executive Board members do not stipulate any share ownership guidelines. Nevertheless, the share ownership guidelines* applied by a limited number of other MDAX-listed companies were fulfilled by the CEO of MTU in 2018 and 2017.

Value of performance-related components

Short-term incentive (STI)

The performance targets set by the Supervisory Board for the 2018 STI were € 610.0 million for EBIT adjusted (actual EBIT adjusted in 2018: € 671.4 million) and € 180.0 million for free cash flow (actual free cash flow in 2018: € 202.9 million).

The achievement of the two key performance indicators at group level was 110.07 % (2017: 115.54 %) for EBIT adjusted and 112.72 % (2017: 137.36 %) for free cash flow. The overall achievement was thus 111.40 % (2017: 126.45 %), resulting in an STI entitlement of 160.80 % (2017: 180.00 %).

Long-term incentive (LTI)

The value of Restricted Stock Plan (RSP) shares at the grant date is derived in the reporting period from the fixed amount of the total compensation allocated for this purpose and the multi-year performance target reached. The latter was calculated for each Executive Board member in 2018 by taking the arithmetical mean of the STI entitlements established for the financial years 2015, 2016 and 2017.

The following numbers of MTU shares (with a vesting period of four years from the date of acquisition) were acquired by Executive Board members under the terms of the RSP:

[T9] Purchased RSP shares

Executive Board members	Year	Number of shares	Purchase price per share in €	Vesting period until
Reiner Winkler	**2018**	**4,460**	**143.30**	**April 30, 2022**
	2017	4,339	130.55	April 30, 2021
Peter Kameritsch [1]	**2018**	**1,941**	**143.30**	**April 30, 2022**
	2017			
Michael Schreyögg	**2018**	**2,976**	**143.30**	**April 30, 2022**
	2017	2,896	130.55	April 30, 2021
Lars Wagner [1]	**2018**	**1,941**	**143.30**	**April 30, 2022**
	2017			

[1] Member of the Executive Board since January 1, 2018.

* According to an analysis of the 50 MDAX-listed companies by an independent consultant in 2017, only 8 of them implemented share ownership guidelines. The strictest rules concerning share ownership quotas are applied by 2 companies, whose CEOs are required to invest at least 200 % of their annual basic salary in shares of the company they direct.

The following table shows the basis for establishing the multi-year achievement level in respect of the Restricted Stock Plan (RSP):

[T10] Entitlements granted in respect of variable compensation (in %)

	2018	2017	2016	2015	2014
STI	160.80	180.00	153.81	170.61	149.17
RSP / LTI	168.14	157.86	138.51		

Compensation of individual members of the Executive Board

Benefits granted (target figures) for 2018 (GCGC)

In line with the recommendations of the German Corporate Governance Code (GCGC) (model table), the following table shows benefits granted for the financial years 2018 and 2017 based on 100 % goal achievement as well as the minimum and maximum amounts applicable for the financial year 2018:

The differences with regard to the recognized service cost or the recognized amount of pension provisions for two members of the Executive Board, Peter Kameritsch and Lars Wagner, result from differences in the actuarial treatment of their respective promised benefits under the MTU Pension Capital scheme for members of the Executive Board of MTU Aero Engines AG, which are otherwise materially comparable. The difference between the stated amounts results from the application of IAS 19, whereby the present value of pension provisions is accounted for using the diminishing balance method, based on the higher of the two amounts, taking years of service into account, and used as the basis for measuring the present value of acquired post-employment benefits. Given their long years of service with the MTU group, the post-employment benefits promised to Messrs. Winkler, Schreyögg and Kameritsch are measured using the diminishing balance method, whereas those for Lars Wagner are measured on the present value of the promised benefits.

[T11] Benefits granted

Reiner Winkler
Chief Executive Officer

Individual items in €	2018	2018 (min)	2018 (max)	2017
Fixed compensation	787,500	787,500	787,500	750,000
Fringe benefits[1]	25,400	25,400	25,400	27,163
Total	**812,900**	**812,900**	**812,900**	**777,163**
STI	567,000		1,224,720	540,000
RSP / LTI	777,000		1,398,600	740,000
Total fixed and variable compensation	**2,156,900**	**812,900**	**3,436,220**	**2,057,163**
Service cost in accordance with IAS 19 [2]	668,202	668,202	668,202	225,211
Total compensation (GCGC)	**2,825,102**	**1,481,102**	**4,104,422**	**2,282,374**

Peter Kameritsch
Chief Financial Officer and Chief Information Officer
from January 1, 2018

Individual items in €	2018	2018 (min)	2018 (max)	2017
Fixed compensation	360,000	360,000	360,000	
Fringe benefits[1]	19,195	19,195	19,195	
Total	**379,195**	**379,195**	**379,195**	
STI	225,000		486,000	
RSP / LTI	315,000		567,000	
Total fixed and variable compensation	**919,195**	**379,195**	**1,432,195**	
Service cost in accordance with IAS 19 [3]	1,918,064	1,918,064	1,918,064	
Total compensation (GCGC)	**2,837,259**	**2,297,259**	**3,350,259**	

Michael Schreyögg
Chief Program Officer

Individual items in €	2018	2018 (min)	2018 (max)	2017
Fixed compensation	525,000	525,000	525,000	500,004
Fringe benefits[1]	34,395	34,395	34,395	31,043
Total	**559,395**	**559,395**	**559,395**	**531,047**
STI	325,500		703,080	310,000
RSP / LTI	483,000		869,400	460,000
Total fixed and variable compensation	**1,367,895**	**559,395**	**2,131,875**	**1,301,047**
Service cost in accordance with IAS 19	116,468	116,468	116,468	116,834
Total compensation (GCGC)	**1,484,363**	**675,863**	**2,248,343**	**1,417,881**

Lars Wagner
Chief Operating Officer
since January 1, 2018

Individual items in €	2018	2018 (min)	2018 (max)	2017
Fixed compensation	360,000	360,000	360,000	
Fringe benefits[1]	15,110	15,110	15,110	
Total	**375,110**	**375,110**	**375,110**	
STI	225,000		486,000	
RSP / LTI	315,000		567,000	
Total fixed and variable compensation	**915,110**	**375,110**	**1,428,110**	
Service cost in accordance with IAS 19 [3]	383,060	383,060	383,060	
Total compensation (GCGC)	**1,298,170**	**758,170**	**1,811,170**	

[1] Fringe benefits include charges to taxable income covering personal use of company vehicles amounting to € 88,166 (2017: € 61,445) and premiums for insurance policies taken out on behalf of members of the Executive Board amounting to € 5,934 (2017: € 5,404).

[2] Including past service cost on account of an improved commitment from January 1, 2019.

[3] Including past service cost on account of a new commitment and improved commitment from January 1, 2019.

[T12] Prerequisites for achieving the maximum amounts of variable compensation awarded in 2018

One-year variable compensation	
STI	Target achievement of EBIT adjusted 115% (STI entitlement 180%) and
	Target achievement of free cash flow 115% (STI entitlement 180%) and
	extraordinary performance bonus (in accordance with the GCGC) of up to 20%
Multi-year variable compensation	
RSP / LTI	STI entitlement in each of the 3 years prior to grant date 180%.

Compensation for the financial year 2018 under the German Commercial Code (Section 314 (1) no. 6a HGB) and allocation in the reporting period (GCGC)

The members of the Executive Board were awarded total compensation determined under the German Commercial Code (HGB) amounting to €7.5 million (2017 €7.5 million) for their activities on the board in the financial year 2018. Of this amount, €2.1 million (2017: €1.8 million) was non-performance-related and €5.4 million (2017: €5.7 million) was performance-related.

The table below shows the total compensation for the individual members of the Executive Board for the years 2018 and 2017 as defined by Section 314 (1) no. 6a HGB, and, in accordance with the German Corporate Governance Code (GCGC) recommendations (model table), the allocation of fixed and variable compensation for the financial years 2018 and 2017 as well as the service cost (benefit expense) for the pension plan:

[T13] Total compensation (HGB) / allocation (GCGC)

Executive Board members	**Reiner Winkler** Chief Executive Officer		**Peter Kameritsch** Chief Financial Officer and Chief Information Officer since January 1, 2018		**Michael Schreyögg** Chief Program Officer		**Lars Wagner** Chief Operating Officer since January 1, 2018	
in €	**2018**	2017	**2018**	2017	**2018**	2017	**2018**	2017
Fixed compensation	787,500	750,000	360,000		525,000	500,004	360,000	
Fringe benefits[1]	25,400	27,163	19,195		34,395	31,043	15,110	
Total	**812,900**	**777,163**	**379,195**		**559,395**	**531,047**	**375,110**	
STI [2]	911,736	972,000	361,800		523,404	558,000	361,800	
RSP / LTI	1,306,448	1,168,164	529,641		812,116	726,156	529,641	
Deferred STI 2 [3]		414,583				287,905		
Total fixed and variable compensation (Total compensation Section 314 (1) no. 6a HGB)	**3,031,084**	**3,331,910**	**1,270,636**		**1,894,915**	**2,103,108**	**1,266,551**	
Service cost in accordance with IAS 19 [4]	668,202	225,211	1,918,064		116,468	116,834	383,060	
Total compensation (GCGC)	**3,699,286**	**3,557,121**	**3,188,700**		**2,011,383**	**2,219,942**	**1,649,611**	

[1] Fringe benefits include charges to taxable income covering personal use of company vehicles amounting to € 88,166 (2017: € 61,445) and premiums for insurance policies taken out on behalf of members of the Executive Board amounting to € 5,934 (2017: € 5,404).

[2] The amount reported for the one-year variable compensation corresponds to the amount promised for the financial year 2018 to be paid out in 2019 after adoption of the annual financial statements.

[3] Awarded under the management compensation system in place until the end of financial year 2015. See under "Subsequent effects of the compensation system up until December 31, 2015."

[5] Including past service cost on account of a new commitment and improved commitment from January 1, 2019.

Members of the Executive Board did not receive any compensation for mandates on boards of MTU group companies, nor were they granted any loan facilities by the company in 2018 or 2017.

Subsequent effects of the management compensation system in place up to December 31, 2015

The management compensation system was modified with effect from the financial year 2016. The objective was to make the compensation system easier to understand by reducing its complexity, and thus increasing its transparency. However, deferred components awarded in respect of the multi-year performance-based variable compensation under the old compensation system must also be taken into account. The tables showing the total compensation (HGB) / allocation (GCGC) of the individual Executive Board members therefore also include deferred components from the financial year 2015. The impacts of this are described in the following. For a full description of the previous compensation system in place until the end of 2015, please refer to the management compensation report in the Annual Report 2015.

Deferred STI payment

Up to and including the financial year 2015, only 50 % of the STI was paid out in the calendar year following the financial year in which it was awarded, the deferred component in two equal portions over the following two financial years (deferred STI 1 and 2). The ultimate amount of the deferred STI depended on the target achievement attained in respect of the two key performance indicators at group level (EBIT adjusted and free cash flow) in the respective financial years prior to the payment of the deferred STI. In exceptional cases, a bonus or malus determined at the discretion of the Supervisory Board of up to 20 % for a given financial year would also have applied in line with GCGC guidelines.

In accordance with the original commitment, the remaining deferred STI components for 2015 were paid as agreed. Accordingly, in addition to the STI allocated and granted for the respective year, the tables showing the total compensation (HGB) / allocation (GCGC) of the Executive Board members for the financial years 2018 and 2017 also show deferred STI entitlements and allocations relating to 2015.

Rules when terminating the contracts of members of the Executive Board

The members of the Executive Board are insured under a defined benefit plan. The benefits payable to members of the Executive Board under this plan correspond to those of their peers in comparable companies.

Retirement and survivors' pensions

The members of the Executive Board earn company pension entitlements in accordance with the "MTU Pension Capital" plan, which constitutes the current post-employment benefits plan for members of the Executive Board of MTU Aero Engines AG. The goal of the plan is to provide a pension amounting to 60 % of each member's basic salary after 15 years of service on the Executive Board. When this plan was introduced on January 1, 2010, the vested benefits that each member of the Executive Board had earned up until December 31, 2009 under the previous plan were transferred to the new plan in the form of initial units. This entitlement represents the benefit payable at age 60 under the old plan, adapted to reflect the ratio between the actual number of years of service with the company and the number of years from start of service with the company until age 60. The initial units transferred to the new plan correspond to the current cash value of the pension converted into a lump sum.

Once this amount had been determined, a pension account was opened for each member of the Executive Board to which further capital units are credited annually. The annual capital units are calculated on the basis of an individual contribution and an age-dependent factor, with the latter taking into account an interest rate of 6 % per annum up to the age of 60. The contribution period is as a rule capped at 15 years of service on the Executive Board, or at age 60, whichever comes first. As of the age of 61, the pension account earns interest at an annual rate of 4 % until such time as the pension is drawn (= bonus amount). The accrued capital units plus the units initially transferred to the account plus any bonus amounts credited to the account together make up the pension capital available to finance post-employment benefits. If a member of the Executive Board dies before reaching age 60, 50 % of the benefits that he/she would otherwise have earned up to that age are added to the accrued balance on the pension account – taking into account the permissible contribution period.

As a general rule, the pension capital is paid as a single lump sum. However, at the request of the Executive Board member and subject to the company's approval, the pension capital may be drawn either in ten installments (with the amassed pension capital being increased by 4 % before payment of the installments) or as a lifelong pension with annual increments of 1 %. In any insured event, the pension account is topped up to the level of benefits the insured party would have reached under the previous plan (guaranteed capital). Pension benefits do not become payable until such time as an insured event occurs (i.e. on reaching pensionable age, or in the event of disability or death), even if the insured party leaves the Executive Board. The pension entitlement cannot be forfeited once the initial contribution has been paid.

Reiner Winkler had already been promised under the previous pension plan that his years of service with former group companies would count toward his pension.

Details of the above-mentioned obligations and benefits are shown in the following table:

[T14] Existing post-employment benefit entitlements

Members of the Executive Board in €	Initial transfer amount [1]	Guaranteed capital [2]	Annual contribution	End of contribution period	One-time payment
Reiner Winkler	1,625,140 [3]	2,510,788	400,000	August, 1, 2021 [4]	8,537,538 [5]
Peter Kameritsch	461,573	461,573	226,027 [6]	April 1, 2029	4,324,204
Michael Schreyögg	365,627	365,627	215,478	August, 1, 2026	4,801,945
Lars Wagner	207,344	207,344	211,965 [6]	January 1, 2033	6,791,104

[1] Credit for past service up to date of changeover to new system. Reiner Winkler: December 31, 2009; Michael Schreyögg: July 1, 2013; Peter Kameritsch and Lars Wagner: January 1, 2018

[2] Level of benefits to which the insured party would have been entitled under the previous pension plan.

[3] Reiner Winkler was promised a special transfer amount of € 575,065 in 2010 in connection with the changeover of his pension entitlements to the new system.

[4] As part of the contract extension in 2018, the contribution period was extended to age 60.

[5] With 4% p.a. interest cost, the one-time payment at the end of the settlement period on September 30, 2024 will amount to €9,511,228.

[6] Due to the salary increase for members of the Executive Board resolved by the Supervisory Board in the 2018 reporting period, which takes effect from January 1, 2019, the contributions for Peter Kameritsch and Lars Wagner will be increased. The annual contributions for Peter Kameritsch and Lars Wagner in 2018, prior to this salary increase, amounted to € 144,145 and € 143,340 respectively.

The differences in the annual contributions to the MTU pension accounts result from the remaining periods of service until the end of the respective contribution period, from the respective age-dependent factors, and from the different salary amounts eligible for pension contributions.

The following table shows the service cost for the financial years 2018 and 2017, and the corresponding carrying amounts of pension provisions recognized for members of the Executive Board in accordance with both IFRSs and the German Commercial Code (HGB):

[T15] Allocations to pension provisions and total amounts recognized

Members of the Executive Board in €	Year	Service cost (IFRS)	Service cost (HGB)	Carrying amount of pension provisions at Dec. 31 (IFRS)	Carrying amount of pension provisions at Dec. 31 (HGB)
Reiner Winkler	**2018**	**668,202** [2]	**246,519**	**7,620,475**	**6,890,376**
	2017	225,211	200,390	6,694,772	6,093,190
Peter Kameritsch [1]	**2018**	**1,918,064** [3]	**1,647,618**	**3,274,661**	**2,746,169**
	2017				
Michael Schreyögg	**2018**	**116,468**	**98,026**	**3,477,192**	**3,051,934**
	2017	116,834	92,286	3,348,230	2,766,611
Lars Wagner [1]	**2018**	**383,060** [3]	**293,705**	**687,282**	**522,105**
	2017				
Total	**2018**	**3,085,794**	**2,285,868**	**15,059,610**	**13,210,584**
Total	**2017**	**342,045**	**292,676**	**10,043,002**	**8,859,801**

[1] Member of the Executive Board since January 1, 2018.

[2] Including past service cost on account of an improved commitment from January 1, 2019.

[3] Including past service cost on account of a new commitment and improved commitment from January 1, 2019.

The pension obligations toward former members of the Executive Board in accordance with International Accounting Standards (DBO) amounted to € 16,262,628 (2017: € 7,968,694).

Disability pensions

Under the new pension rules of January 1, 2010, if a member of the Executive Board is disabled before reaching the age of 60, 50% of the benefits to which he/she would normally have been entitled up to the maximum age limit are added to the balance on the pension account at the time of disablement. The amount credited is based on the contributions paid in the last year of employment. This arrangement also applies if the insured party dies before reaching the age of 60.

Severance payments on premature termination of contracts for members of the Executive Board

Members of the Executive Board are entitled to receive a severance payment if MTU prematurely terminates their employment contract. This severance package comprises pro-rata amounts of the board member's basic salary, STI entitlement and Restricted Stock Plan (RSP) benefits covering the period up to the date on which his/her contract would normally have expired. The total amount of the severance payment is capped at twice the departing board member's total annual compensation. If the employment contract is terminated by MTU for cause, no severance package is payable. In such cases, MTU also has the right to demand repayment of the tranche of RSP shares granted in the financial year in which the contract was terminated (claw-back). No other claw-back regulations are applied because the German Stock Corporation Act (Section 93 AktG) already provides for damage claims against members of the Executive Board who violate their duties.

Severance payments on premature termination of contracts for members of the Executive Board in the event of a change of control or substantial changes in the ownership of MTU Aero Engines AG

In accordance with the contracts for members of the Executive Board in force as of January 1, 2016, a change of control is deemed to have occurred if, pursuant to Section 22 of the German Securities Trading Act (WpHG), a shareholder directly or indirectly acquires a majority of the voting rights and this results in significant disadvantages for members of the Executive Board. Significant disadvantages exist in particular if the member of the Executive Board is dismissed, their duties and responsibilities significantly change or if the Executive Board member is asked to agree to a reduction in salary or premature termination of their contract. In such cases, Executive Board members are accorded special rights of termination, which must be exercised within six months, with three months' notice to the end of the month. If a member of the Executive Board makes use of these special termination rights, or if the Executive Board member's contract is terminated by mutual agreement within nine months of the change of control, the board member is entitled to a severance package comprising all outstanding compensation components covering the period up to the date on which their contract would normally have expired. When calculating the amount of the severance payment, a target achievement level of 100 % is assumed for the variable compensation components. The maximum amount of the severance payment is capped at three times the total annual compensation.

Supervisory Board compensation

The rules governing Supervisory Board compensation are laid down in the articles of association of MTU Aero Engines AG. Such compensation is established relative to the size of the company and the duties and responsibilities of the respective members.

Pursuant to Article 12 of the articles of association of MTU Aero Engines AG, members of the Supervisory Board receive a fixed annual payment of € 50,000, payable at the end of the financial year. This sum is tripled in the case of the chair of the Supervisory Board and multiplied by one and a half in the case of the deputy chair. In addition to the fixed annual payment, members serving on one of the Supervisory Board's committees receive an additional € 10,000 and a further € 20,000 if they chair a committee. Further, members of the Supervisory Board receive an attendance fee of € 3,000 for each meeting of the Supervisory Board and its committees, subject to an upper limit of € 3,000 per day. The attendance fee is halved for meetings convened by the chair or deputy chair that take place via telephone or video conference. Expenses incurred in connection with the exercise of their office are reimbursed, as is the value-added tax payable on the fees.

The members of the Supervisory Board do not receive any share-based compensation.

The following compensation was awarded to the individual members of the Supervisory Board of MTU Aero Engines AG for the financial years 2018 and 2017 respectively:

[T16] Supervisory Board compensation

in €	2018[1]				2017[1]			
Supervisory Board member	Fixed annual payment	Committee member fees	Attendance fees	**Total compensation**	Fixed annual payment	Committee member fees	Attendance fees	Total compensation
Klaus Eberhardt (Supervisory Board and Personnel Committee chairman) [3] [4]	150,000.00	50,000.00	27,000.00	227,000.00	150,000.00	50,000.00	27,000.00	227,000.00
Josef Mailer (Supervisory Board deputy chairman) [2] [3] [5]	75,000.00	20,000.00	27,000.00	122,000.00	75,000.00	20,000.00	24,000.00	119,000.00
Dr. Joachim Rauhut (Audit Committee chairman)	50,000.00	30,000.00	24,000.00	104,000.00	50,000.00	30,000.00	24,000.00	104,000.00
Thomas Bauer (until April 11, 2018)	14,027.78		6,000.00	20,027.78	50,000.00		15,000.00	65,000.00
Michael Behé (until April 11, 2018) [5]	14,027.78		6,000.00	20,027.78	50,000.00		15,000.00	65,000.00
Dr. Wilhelm Bender (until April 11, 2018)	14,027.78		6,000.00	20,027.78	50,000.00		15,000.00	65,000.00
Dr. Christine Bortenlänger (since April 11, 2018)	36,111.11		12,000.00	48,111.11				
Thomas Dautl	50,000.00		15,000.00	65,000.00	50,000.00		15,000.00	65,000.00
Dr.-Ing. Jürgen M. Geißinger [2] [4]	50,000.00	20,000.00	18,000.00	88,000.00	50,000.00	20,000.00	15,000.00	85,000.00
Angelo Gross (since April 11, 2018) [5]	36,111.11		12,000.00	48,111.11				
Anita Heimerl (since July 17, 2018) [5]	22,777.78		9,000.00	31,777.78				
Dr. Martin Kimmich [2] [5]	50,000.00	10,000.00	18,000.00	78,000.00	50,000.00	10,000.00	15,000.00	75,000.00
Heike Madan [3] [5]	50,000.00	10,000.00	24,000.00	84,000.00	50,000.00	10,000.00	24,000.00	84,000.00
Prof. Dr.-Ing. Klaus Steffens	50,000.00		15,000.00	65,000.00	50,000.00		15,000.00	65,000.00
Prof. Dr. Marion A. Weissenberger-Eibl	50,000.00		15,000.00	65,000.00	50,000.00		15,000.00	65,000.00
Total	**712,083.34**	**140,000.00**	**234,000.00**	**1,086,083.34**	**725,000.00**	**140,000.00**	**219,000.00**	**1,084,000.00**

[1] Amounts do not include VAT.
[2] Member of the Personnel Committee.
[3] Member of the Audit Committee.
[4] Member of the Nomination Committee.
[5] These employee representatives have declared that they will donate their Supervisory Board compensation to the Hans-Böckler-Stiftung, in accordance with the guidelines of the Confederation of German Trade Unions.

Report of the Supervisory Board

Klaus Eberhardt
Chairman of the supervisory board

Activities of the Supervisory Board

In this report, the Supervisory Board provides information in accordance with Section 171 (2) of the German Stock Corporation Act (AktG) on its activities in the financial year 2018 and on the results of its review of the annual financial statements and consolidated financial statements. In 2018, the Supervisory Board carried out with due care the control and consultation duties with which it is entrusted by law and under the terms of the company's articles of association and its own rules of procedure.

The Supervisory Board regularly advised the Executive Board on the running of the company, continually supported and monitored all executive business activities, and assured itself that the Executive Board's dealings were proper and lawful. The Supervisory Board was informed and consulted in a direct and timely manner on all decisions of consequence for the company. The members of the Supervisory Board were briefed by the Executive Board in a regular, timely and comprehensive manner on the situation of the company, and received written reports every month on the company's earnings, financial situation and net asset position as well as on important business transactions. The Supervisory Board was also informed in detail of any new plans.

The Supervisory Board met with the Executive Board to discuss strategy issues and all major projects. After careful deliberation and examination, the Supervisory Board endorsed the strategic orientation of the company. The Supervisory Board passed resolutions on all transactions for which its approval is required in accordance with law, the company's articles of association or the Executive Board's rules of procedure after reviewing and discussing them with the Executive Board.

As in previous years, the Supervisory Board devoted special attention to MTU's system of internal controls in 2018, Above all the company's risk management system, its auditing practices and the conformity of its corporate governance system with the relevant legal provisions. The Supervisory Board examined these aspects with reference to the documents submitted to it and in dialog with the Executive Board, coming to the conclusion that the company has effective systems in place, in particular an effective internal control and risk management system in relation to the accounting process.

The Supervisory Board's compliance monitoring activities are supplemented by those of the Audit Committee, which has a special responsibility in this respect. The internal auditors and managers responsible for compliance regularly present their findings to the Audit Committee

and report to it on the latest developments in the field of compliance.

Meetings of the Supervisory Board

During the financial year 2018, the Supervisory Board convened five ordinary meetings. No telephone conferences were held. All Supervisory Board members attended all meetings of the Supervisory Board and of the committees of which they are members. The attendance rate was thus 100%. Between official meetings, the chairman of the Supervisory Board was regularly briefed on the company's current situation, significant business transactions and important pending decisions. This entailed regular meetings with the Executive Board, consulting with the latter on strategy, the status of planning, the progress of business, the company's risk situation and system of risk management as well as compliance.

At its meetings, the Supervisory Board discussed the business performance of MTU and all its affiliated companies with the Executive Board. The Supervisory Board thoroughly reviewed the allocation of the group's net profit for the financial year 2017 and approved the Executive Board's profit distribution proposal. Accordingly, a dividend payment of €2.30 per entitled share was proposed to the Annual General Meeting. A further question dealt with by the Supervisory Board concerned the appointment of an external auditor. Following the recommendation of the Audit Committee, the Supervisory Board proposed that Ernst & Young GmbH Wirtschaftsprüfungsgesellschaft, Munich, should be appointed to audit the financial statements and consolidated financial statements and to review the half-yearly financial reports for the financial year 2018. The Annual General Meeting approved this proposal by a majority of 99.97%.

At its meetings, the Supervisory Board also discussed business developments in the OEM segment, the funding for the PW1100G-JM campaigns and the business review of two major engine programs as well as the financing of the new EME Aero joint venture in Poland. Another topic discussed at length was digitalization at MTU.

The Supervisory Board moreover approved the resolution to extend the appointment of the company's CEO Reiner Winkler by a further five-year period up to September 30, 2024. This resolution was passed unanimously at the Supervisory Board meeting on October 24, 2018.

Other issues closely examined by the Supervisory Board were the operational business plans and the budget for 2019, the amount of the short-term incentive (STI) payable to the members of the Executive Board for the financial year 2017, definition of the targets and bandwidths for the award of STI payments to Executive Board members for 2018, and compliance with the German Corporate Governance Code.

Corporate governance

The Supervisory Board is convinced that the success of the company is based on good corporate governance. For this reason, the Supervisory Board again closely studied the application and implementation of the German Corporate Governance Code in 2018, taking it as a yardstick to measure the efficiency of its own activities. It analyzed the diversity of its own composition, especially with regard to the fair representation of women.

In addition, the Supervisory Board explicitly stated that, in the nomination proposals it makes to the Annual General Meeting, it takes into account the principles concerning the avoidance of conflicts of interest and will continue to do so. In submitting nomination proposals, the Supervisory Board will disclose any personal ties or business relations the candidates may have with the company, its governing bodies and/or major shareholders. This was also the case in respect of the nominations proposed in 2018.

The Supervisory Board deems all of its members to be independent; this expressly applies to the employee representatives and likewise to Prof. Dr. Steffens, who ceased to be a member of MTU's executive management a considerable time ago, in 2004. Consequently, all Supervisory Board committees also consist exclusively of independent members. The members of the Supervisory Board take part in training measures on their own initiative, and also receive specialized training from MTU. Cooperation between the Supervisory Board and the Executive Board, and among the members of the Supervisory Board, was judged to be of a very high quality in the financial year 2018. No conflicts of interest arose between MTU and any member of its Executive Board or Supervisory Board.

In a joint declaration with the Executive Board dated December 13, 2018, pursuant to the requirements of Section 161 of the German Stock Corporation Act (AktG), the Supervisory Board states that MTU Aero Engines AG complies with all the recommendations of the German Corporate Governance Code. MTU's declaration of conformity is reproduced in the *Corporate governance section* of this Annual Report together with a more detailed description of the company's corporate governance system; the declaration has also been posted on the MTU website.

Committee meetings

By convention, the Supervisory Board has three committees equally representing the employees and the shareholders of the company: the Audit, the Personnel and the Mediation Committee – the latter formed to comply with Section 27 (3) of the German Co-Determination Act (MitbG). Each of these committees presents regular reports on its activities at the plenary meetings of the Supervisory Board.

A Nomination Committee, which meets on an ad hoc basis, was set up pursuant to the recommendations of the German Corporate Governance Code. The Nomination Committee did not convene in the financial year 2018. The task of the Nomination Committee is to find suitable candidates for election to the Supervisory Board. The members of this committee are Klaus Eberhardt (chair) and Dr. Jürgen M. Geißinger.

The Personnel Committee, which among other things deals with Executive Board employment contracts, including compensation and the recommendation of candidates, comprises Klaus Eberhardt (chair), Dr. Jürgen M. Geißinger and the two employee representatives Josef Mailer and Dr. Martin Kimmich. The Personnel Committee convened three times in 2018, discussing among other things the amount of the short-term incentive (STI) payable to members of the Executive Board for the financial year 2017, definition of the goals for the STI payments for 2018, the Supervisory Board's efficiency audit, and recommendations to the Supervisory Board concerning the appointment of Executive Board members and their compensation. In addition, the Supervisory Board discussed and approved the reappointment of the company's incumbent CEO Reiner Winkler for a further five-year period up to September 30, 2024.

The Mediation Committee, whose members are identical with those of the Personnel Committee, did not have to convene in 2018.

The members of the Audit Committee are Dr. Joachim Rauhut (chair), Klaus Eberhardt, Heike Madan and Josef Mailer. The Audit Committee convened six times in 2018 with an attendance rate of 100%. It focused on reviewing the annual financial statements, the consolidated financial statements and the combined management report of the MTU group and MTU Aero Engines AG as well as the company's financial situation and the annual and half-year reports and quarterly statements.

Further, the Audit Committee discussed the additional services provided by the auditors, and the granting of the audit mandate. The Audit Committee specified the key areas for the audit of the 2018 annual financial statements and concluded the audit contract with Ernst & Young Wirtschaftsprüfungsgesellschaft. In addition, the committee obtained the auditor's statement of independence pursuant to Section 7.2.1 of the German Corporate Governance Code and also monitored the auditor's independence. Furthermore, the procedure for procuring the provision of non-audit services by the auditors was reviewed and affirmed and a cap imposed on the fees for such services.

To aid the committee members in their tasks, they and all other members of the Supervisory Board were supplied with copies of the reports prepared by Ernst & Young concerning the auditing of the annual financial statements and consolidated financial statements as well as the combined management report. These documents were thoroughly reviewed in the presence of Ernst & Young. As a result, the committee recommended that the Supervisory Board should adopt the financial statements, approve the combined management report and consent to the Executive Board's profit distribution proposal.

In accordance with statutory requirements, the Audit Committee monitored the accounting process, the accounting-related internal control and risk management system and the internal auditing system, which it judged to be effective. It received regular reports on the company's compliance management as well as from the company's internal auditors.

Adoption of the annual financial statements, the approved consolidated financial statements and the management report

The annual financial statements, consolidated financial statements and combined management report of the MTU group and MTU Aero Engines AG for the financial year 2018 were audited and fully certified by the accounting firm Ernst & Young, Munich, whose appointment had been confirmed by the 2018 Annual General Meeting. The audit opinion was signed by Siegfried Keller and Markus Westermeier, who have audited MTU since 2014. The audit reports and documents to be reviewed were submitted in a timely manner to all members of the Supervisory Board. The Supervisory Board thoroughly reviewed the annual financial statements, consolidated financial statements and the combined management report including non-financial statement of the MTU group and MTU Aero Engines AG for 2018 and the Executive Board's profit distribution proposal on the basis of Ernst & Young's audit, on which the chair of the Audit Committee had presented a full report to the Supervisory Board.

The auditor attended the meeting of the Audit Committee of MTU Aero Engines AG on February 19, 2019, and the balance sheet meeting of the Supervisory Board on February 26, 2019, and presented the main findings of

the audit. The Supervisory Board reviewed the annual financial statements, consolidated financial statements, combined management report including the non-financial statement and the Executive Board's profit distribution proposal, and raised no objections. The company's annual financial statements and consolidated financial statements for the financial year 2018 as submitted by the Executive Board were approved at the Supervisory Board meeting on February 26, 2019. The annual financial statements are thereby adopted. The Supervisory Board agreed to the Executive Board's profit distribution proposal after giving due consideration to the interests of the company and its shareholders. Accordingly, a dividend payment of € 2.85 per entitled share was proposed to the Annual General Meeting.

Boardroom changes

Dr. Christine Bortenlänger was elected as a new member of the Supervisory Board (shareholder representative) by the Annual General Meeting 2018. She succeeds Prof. Dr. Wilhelm Bender, who stepped down after reaching the upper age limit.

Michael Behé and Thomas Bauer resigned from the Supervisory Board as employee representatives. They were replaced by Anita Meimerl and Angelo Gross.

The Supervisory Board would like to thank the entire Executive Board for its close and constructive cooperation, as well as all MTU employees and the works council for their successful work and the great commitment they showed in 2018. The Supervisory Board also thanks the departing members for their long years of dedicated, professional service on the MTU Supervisory Board. It is also grateful to all MTU's shareholders for the trust they place in the company.

Munich, February 26, 2019

Klaus Eberhardt
Chairman of the Supervisory Board

The Supervisory Board

Members of the MTU Supervisory Board and the additional mandates they hold on the supervisory board or a comparable controlling body of other business enterprises in Germany or abroad

Klaus Eberhardt
Chairman of the Supervisory Board
Independent consultant
Former CEO of
Rheinmetall AG, Düsseldorf

ElringKlinger AG

Josef Mailer
Deputy Chairman of the Supervisory Board
Chairman of the Group Works Council of
MTU Aero Engines AG, Munich
Chairman of the Works Council of
MTU Aero Engines AG, Munich

Thomas Bauer, until April 11, 2018
Full-time member of the Works Council of
MTU Aero Engines AG, Munich

Michael Behé, until April 11, 2018
Full-time member of the Works Council of
MTU Maintenance Hannover GmbH, Hannover
Member of the Group Works Council of
MTU Aero Engines AG, Munich

MTU Maintenance Hannover GmbH

Prof. Dr. Wilhelm Bender, until April 11, 2018
Independent consultant
Former CEO of Fraport AG,
Frankfurt/Main

FrankfurtRheinMain GmbH
International Marketing of the Region

Joint Stock Company "National Company"
Kazakhstan Temir Zholy

The Germany Funds:
- The Central Europe, Russia and Turkey Fund, Inc. (USA)
- The European Equity Fund, Inc. (USA)
- The New Germany Fund, Inc. (USA)

Dr. Christine Bortenlänger, from April 11, 2018
Executive Member of the Board of Deutsches
Aktieninstitut e.V., Frankfurt, Main

Covestro AG
Covestro Deutschland AG (Covestro Group)
OSRAM Licht AG
OSRAM GmbH (OSRAM Group)
TÜV Süd AG

Thomas Dautl
Director Supplier Quality and Development
MTU Aero Engines AG, Munich

Dr.-Ing. Jürgen M. Geißinger
Independent entrepreneur

Former CEO of Schaeffler AG,
Herzogenaurach

Hilotherm Holding AG (Switzerland)

Angelo Gross, from April 11, 2018
Member of the Group Works Council of
MTU Aero Engines AG, Munich
Deputy Chairman of the Works Council of
MTU Maintenance Hannover GmbH, Hannover

MTU Maintenance Hannover GmbH

Anita Heimerl, from July 17, 2018
Member of the Group Works Council of
MTU Aero Engines AG, Munich
Full-time member of the Works Council of
MTU Aero Engines AG, Munich

Dr. Martin Kimmich
IG Metall Trade Union Secretary, Munich office

Linde AG
Nokia Solutions and Networks Management GmbH

Heike Madan
Trade union company policy department, union workplace representatives and company policy division,
IG Metall, Frankfurt/Main

Dr. Joachim Rauhut
Independent consultant

Former member of the Executive Board of Wacker Chemie AG, Munich

B. Braun Melsungen AG
creditshelf AG (since June, 18, 2018)
J. Heinrich Kramer Holding GmbH
Stabilus S. A.

Prof. Dr.-Ing. Klaus Steffens
Independent consultant

Former President and CEO of MTU Aero Engines GmbH, Munich

Poppe & Potthoff GmbH

Prof. Dr. Marion A. Weissenberger-Eibl
Director of the Fraunhofer Institute for Systems and Innovation Research ISI in Karlsruhe and holder of the Chair of Innovation and Technology Management at the Karlsruhe Institute of Technology

HeidelbergCement AG (listed)
Rheinmetall AG

SUPERVISORY BOARD COMMITTEES

Personnel Committee
Klaus Eberhardt, Chairman
Dr.-Ing. Jürgen M. Geißinger
Dr. Martin Kimmich
Josef Mailer

Audit Committee
Dr. Joachim Rauhut, Chairman
Klaus Eberhardt
Heike Madan
Josef Mailer

Mediation Committee
Klaus Eberhardt, Chairman
Dr.-Ing. Jürgen M. Geißinger
Dr. Martin Kimmich
Josef Mailer

Nomination Committee
Klaus Eberhardt, Chairman
Dr.-Ing. Jürgen M. Geißinger

Combined management report

Combined management report

The management report of MTU Aero Engines AG and the group management report for the financial year 2018 have been combined in accordance with Section 315 (5) in conjunction with Section 298 (2) of the German Commercial Code (HGB).

The enterprise MTU

Business activities and markets

MTU Aero Engines AG, Munich, together with its consolidated group of companies, is Germany's leading engine manufacturer and one of the biggest international players in the industry. In the following, the MTU group is also referred to simply as MTU AG, MTU, or the group.

MTU's portfolio covers the entire lifecycle of commercial and military aircraft engines, and aero-derivative industrial gas turbines. The company's range of activities extends from development, manufacturing and marketing through to maintenance.

The company is a technological leader in low-pressure turbines, high-pressure compressors and turbine center frames as well as repair techniques and manufacturing processes. MTU is a key partner in all national and international technology programs of note and cooperates with the top names in the industry – GE Aviation, Pratt & Whitney and Rolls-Royce.

The group is also one of the world's leading providers of MRO services for commercial aero engines. In the military sector, it has been the leading company in the national market and lead industrial partner to the German armed forces for many decades.

OEM business (Original Equipment Manufacturing) and MRO business (Maintenance, Repair and Overhaul). The OEM segment covers new commercial engines, including spare parts, and the whole of the military sector.

The MRO segment comprises all commercial maintenance activities.

Group structure, locations and organization

Through its subsidiaries, joint ventures and equity investments, MTU has a strong presence in all key markets and regions worldwide. More information on MTU's shareholdings is provided in *Part I of the Notes to the consolidated financial statements (Accounting policies and principles).*

[T17] MTU Aero Engines worldwide

MTU Maintenance Canada
MTU Aero Engines North America
Vericor Power Systems
MTU Maintenance Dallas

MTU Aero Engines
MTU Maintenance Hannover
MTU Maintenance Berlin-Brandenburg
MTU Maintenance Lease Services
MTU Aero Engines Polska
EME Aero[1)]
AES Aerospace Embedded Solutions[1)]
Pratt & Whitney Canada Customer Service Centre Europe[1)]
Ceramic Coating Center[1)]

MTU Maintenance Zhuhai[1)]
Airfoil Services[1)]

[1)] Joint ventures.

[T18] Global MTU workforce

Number of employees	Dec. 31, 2018	Dec. 31, 2017	Change 2018 - 2017 Employees	Change 2018 - 2017 in %
Locations in Germany	8,176	7,500	676	9.0
International locations	1,555	1,346	209	15.5
Total workforce	**9,731**	**8,846**	**885**	**10.0**

Corporate strategy

MTU's corporate strategy is geared to profitable growth and customer satisfaction. The four target areas of MTU's growth strategy are:

A balanced product portfolio – Participation in rapidly growing new programs

MTU participates in rapidly growing and high-volume military and commercial engine programs, working with various partners in doing so. It optimizes its risk profile as well as growth opportunities through continuous participation in varying thrust classes and fields of application. MTU Aero Engines is currently focusing on ramping up production of Geared Turbofan™ engines for regional and medium-haul jets, which it has developed together with partners, and on developing GE's GE9X engine program for the Boeing 777X widebody aircraft, for which the market launch is scheduled for 2020. These programs complement MTU's excellent positioning in the MRO segment, as the company has secured itself a share in the future aftermarket service business through its stakes in these engine programs.

In the military engine business, the discussion surrounding a possible successor for the Tornado became more concrete. Simultaneously, preparations are currently under way to design a successor to the Eurofighter in Germany and the Rafale in France. In early February 2019, MTU Aero Engines, Munich, signed an agreement with Safran Aircraft Engines, Gennevilliers, France, signaling the two companies' intention to take a leading role in the development, manufacture and maintenance of the engine for this next-generation fighter jet.

Under the terms of this partnership, Safran Aircraft Engines will be responsible for engine design and integration, while MTU Aero Engines will take the lead role in maintenance and in-service support. The responsibility for components of the engine will be divided between MTU and Safran, with MTU taking charge of the high- and intermediate-pressure compressors and the low-pressure turbine, while Safran will be in charge of the combustor, the high-pressure turbine and the afterburner. The already established joint venture Aerospace Embedded Solutions, Munich, under the lead of Safran Aircraft Engines and in its role as engine integrator, will take responsibility for the engine control system and associated software. The two partners aim to establish a Franco-German partnership in which both parties have an equal workshare and are supported in equal measure by funding agencies in France and Germany.

Cutting-edge technologies – Maintaining and expanding technological leadership

MTU is currently extending its technological leadership by focusing on the development of new high-temperature materials and modern manufacturing technologies such as additive processes. In combination with optimized cyclic processes, the company is thus able to achieve even greater efficiency in the medium term with its core modules – the low-pressure turbine, high-pressure compressor and turbine center frame – and therefore greater profitability and environmental friendliness, while simultaneously reducing component weight.

Concurrently, MTU is also cooperating with research institutes and industrial partners on assessing revolutionary engine concepts and demonstrating their potential from the early development stages, with the aim of achieving the goals of the Flightpath 2050 research and innovation initiative, launched jointly by the EU Commission and the aerospace industry.

The digitalization of products, services and value creation processes is also growing in importance. This can be seen, for instance, in the extensive use of simulation techniques in all areas of development through to the virtual engine.

Enhanced competitiveness – Increased productivity accompanied by a reduction in capital tie-up

MTU encourages a culture of continuous improvement in order to secure its competitiveness. The focus here is on optimizing structures, processes and capital tie-up in all areas of the company. Digitalization and automation technologies (Industry 4.0) play a key role here.

The goal is to continue to optimize MTU's supply chain and its production and service network in terms of delivery capability, quality and costs.

Innovative corporate culture – Motivated employees in a creative environment

Highly motivated, skilled workers are crucial to the successful growth of the MTU group. MTU's corporate culture places emphasis on personal development and achievement coupled with a strong sense of social responsibility.

The trend toward digitalization is set to change the work environment as we know it along with tried-and-tested management methods. More scope and greater responsibility for employees as well as short decision paths are key elements of an innovative corporate culture. All employees are encouraged and empowered to contribute their own ideas and translate them into new products and services as well as innovative business models and improved processes.

The company promotes cultural and individual diversity as well as flexible working conditions and high-quality basic and further training opportunities for its workforce.

MTU is confident that long-term-oriented action, targeted investments and continuous development of the corporate culture will enable the company to achieve its strategic objectives.

Group-internal control system

MTU is managed with reference to the key performance indicators adopted by the Executive Board. These performance metrics are derived from the operational business plans and provide the underpinnings for a method of corporate management that is directed toward sustainable and profitable growth. An efficient planning and control system and an incentive-based management compensation system are in place to help bring about the decisions that create a suitable environment for implementing corporate strategy.

[T19] Performance indicators – prior-year data adjusted

in € million	2018	2017	Change 2018 - 2017 in € million	Change 2018 - 2017 in %
Revenues	4,567.1	3,897.4	669.7	17.2
EBIT adjusted	671.4	572.5	98.9	17.3
EBIT margin adjusted (in %)	14.7	14.7		
Free cash flow	202.9	151.1	51.8	34.3

The value-driving key performance indicators EBIT adjusted, revenues and free cash flow delimit the range within which MTU operates in terms of profitability, growth and liquidity.

A definition of EBIT adjusted, which is the most important of these KPIs, is provided in the section *Operating results (under Reconciliation of adjusted performance indicators).* Another indicator monitored by the company is the EBIT margin adjusted, which expresses the relationship between EBIT adjusted and revenues.

The purpose of optimizing cash flow is to help the group maintain its financial strength going forward. MTU determines its free cash flow by combining its cash flow from operating activities with its cash flow from investing activities and eliminating components of the latter (non-recurring cash flows) that lie outside the control of operations management and do not form part of the group's core activities. This adjustment concerns non-recurring cash outflows in the form of acquisition payments for shares in engine programs, payments in connection with interest-bearing loans related to financing agreements, and financial assets held for the purpose of liquidity management.

[T20] Free cash flow – prior-year data adjusted

in € million	2018	2017	Change 2018 - 2017 in € million	Change 2018 - 2017 in %
Cash flow from operating activities	594.7	460.9	133.8	29.0
Cash flow from investing activities	–336.1	–340.8	4.7	1.4
Non-recurring cash flows	–55.7	31.0	–86.7	<-100
Free cash flow	**202.9**	**151.1**	**51.8**	**34.3**

Research and development

Economic environment and goals

An increasingly mobile society, diminishing natural resources and a rising awareness of the environment all call for innovative solutions – especially when it comes to aircraft engines. MTU has established technological leadership in its core competencies of low-pressure turbines, high-pressure compressors, turbine center frames, and high-tech manufacturing processes and repair techniques. This provides a solid basis for refining existing engines and developing entirely new ones.

MTU's medium- to long-term goals in the development of new commercial engines fully comply with the voluntary commitment made by the European aviation industry and research community, who formulated ambitious targets for air traffic in 2050 in their Strategic Research and Innovation Agenda (SRIA):

[T21] Long-term goals [1)]

	SRIA 2020	SRIA 2035	SRIA 2050
CO_2 emissions - air traffic	–43%	–60%	–75%
CO_2 emissions - engines	–20%	–30%	–43%[2)]
NOx emissions - mainly engines		–84%	–90%
Noise - mainly engines		–55%	–65%

[1)] Changes compared with base year 2000, per passenger-kilometer

[2)] Given comparable improvements in aircraft and engines

The main focus of MTU's R&D activities is to improve overall engine efficiency as a means of reducing both fuel consumption and emissions. This can be done by lowering the fan-compression ratios/increasing the bypass ratios, thereby improving thrust efficiency, increasing temperatures and overall pressure ratios to improve thermal efficiency, and enhancing component efficiency. What is more, in aviation reducing weight also significantly influences fuel consumption. Key components in this respect are MTU's low-pressure turbine and high-pressure compressor, which feature high pressure ratios, low weight and high efficiency ratios, and the heavily loaded turbine center frame. Enhancing these technologies is an ongoing task for MTU.

MTU's Claire (Clean Air Engine) technology program covers all the technology that, in the long term, will need to be developed in order to achieve reductions in CO_2 and noise emissions.

The first stage is the Geared Turbofan™ (GTF), which was developed in partnership with Pratt & Whitney and entered series production in early 2016 for the Airbus A320neo. The GTF reduces fuel consumption and hence carbon dioxide emissions by around 16 % *(see also Commercial engine programs).*

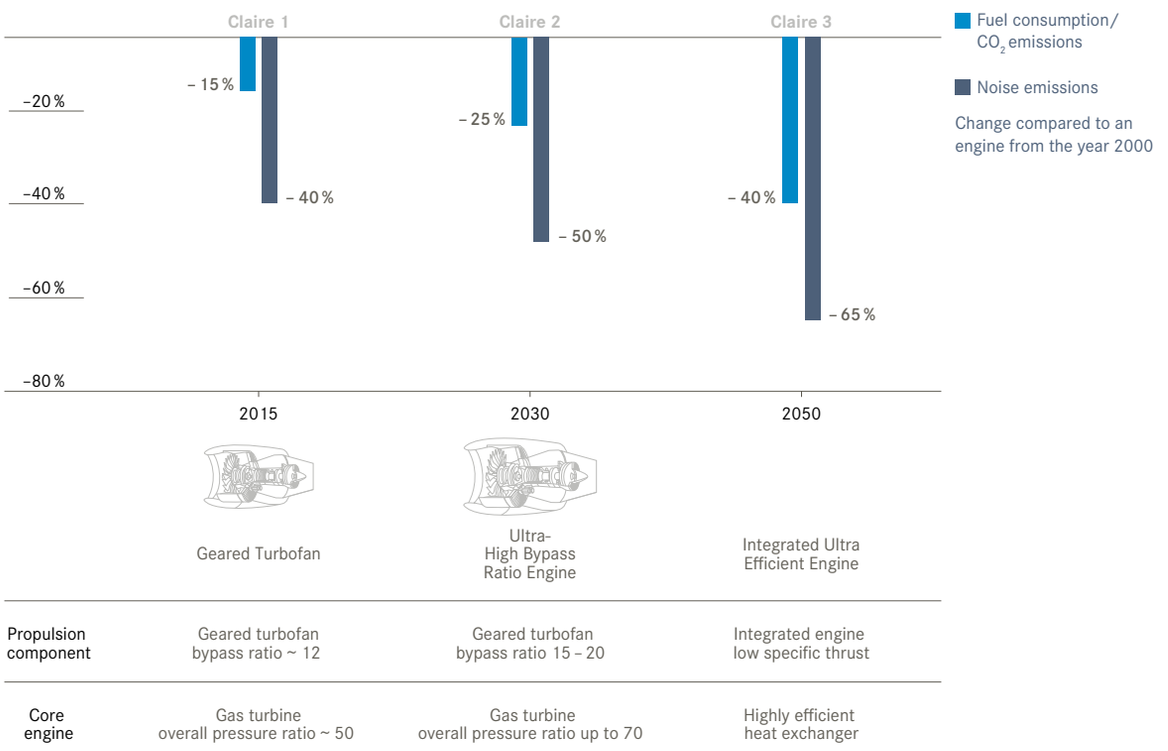
Proof-of-concept studies for the next stage show that further improvements are possible on the basis of the Geared Turbofan™ engine configuration. The engineers want to achieve an even lower fan compression ratio, for instance, and further improve thermal efficiency by means of higher temperature and pressure ratios. The goal is to cut fuel consumption and carbon dioxide emissions by 25 % each and to halve noise emissions.

The third stage of the Claire program will see the introduction of revolutionary new features. MTU is pursuing three concepts for which the company launched the first projects in 2018:

- Heat engines featuring innovative cyclic processes beyond conventional gas turbines, which promise to significantly improve the core engine's thermal efficiency.
- Electro-hybrid propulsion systems that allow greater scope in the design and operation of aircraft and engines, with the potential to significantly reduce CO_2, NOx and noise emissions.

The main focus of interest with these concepts is rapid demonstration and validation of the feasibility of critical technologies. Thus, for the purpose of demonstrating and testing a hybrid-electro propulsion system in the area of commuter transport, MTU envisages cooperating with Siemens and the German Aerospace Center (DLR). The project partners plan to use a modified Dornier Do 228 as the test platform for validating the concept's potential.

[T22] MTU'S Claire (Clean Air Engine) technology program



Technologies for key engines of the future

Commercial engine programs

The most significant innovation in the area of aircraft engines in recent decades is the Geared Turbofan™ (GTF) engine developed by MTU in cooperation with Pratt & Whitney. Unlike conventional turbofans, in which the fan and low-pressure turbine run at the same speed on a single shaft, the GTF links the two components using a reduction gear. This allows the fan with its larger radius to rotate more slowly, and at the same time the low-pressure turbine to rotate faster. Consequently, lower fan pressure ratios and therefore higher bypass ratios are achieved, thereby improving thrust efficiency, increasing the efficiency of the fan and the low-pressure turbine, while cutting fuel consumption and carbon dioxide emissions by 16 % each and bringing about a substantial reduction in the effective perceived noise level by 20 EPNdB, bringing it well below certification level. What is more, the engine is lighter because its low-pressure turbine and low-pressure compressor require fewer stages. In the GTF project, MTU is responsible for developing and manufacturing the high-speed low-pressure turbine, the front half of the high-pressure compressor and four brush seals. MTU also assembles 30 % of the production engines for the Airbus A320neo, carries out acceptance tests and is a partner in the MRO network.

In the 2018 financial year, the certification of the Embraer E190-E2 regional jet powered by the PW1900G engine by the aviation authorities in Brazil (ANAC), the USA (FAA) and Europe (EASA) was the most important milestone in the GTF engine program. In addition, in the United States the FAA issued certificates for the PW1500G engines that power the Airbus A220 (formerly known as the Bombardier C Series) for flight routes more than 180 minutes' flying time from the next airport (ETOPS 180).

Geared Turbofan™ engines have already been chosen by four different aircraft manufacturers. With firm orders and options for just short of 10,000 units placed by the end of 2018, the GTF promises to be a major commercial success.

[T23] MTU - GTF engine programs

Engine	MTU program share	Aircraft manufacturer	Aircraft type
PW1100G-JM	18%	Airbus	A320neo
PW1200G	15%	Mitsubishi	MRJ
PW1400G-JM	18%	Irkut	MS-21
PW1500G	17%	Airbus	A220
PW1700G	15%	Embraer	E-Jet E175-E2
PW1900G	17%	Embraer	E-Jet E190-E2 / E195-E2

Based on the same core engine but without a reduction gear, the PW800 family of engines is a variation of the Geared Turbofan™ engine. The PW814 is the first member of the PW800 engine family to go into volume production: in September 2018, the first Gulfstream G500 long-haul business jet was handed over to the customer.

MTU has secured a significant share in the market for high-thrust engines for long-haul jets. As a partner in General Electric's GE9X program for the new Boeing 777X, the company is responsible for the development and manufacture of the extremely demanding turbine center frame. In March 2018, the GE9X successfully completed its maiden flight on a Boeing 747 that had been converted into a flying test bed, thus marking the start of a flight test campaign scheduled to last several months.

Military engine programs

The TP400-D6 for the Airbus A400M military transporter is the most powerful turboprop engine in the Western world. MTU supplies the entire intermediate-pressure section, as well as parts of the control and monitoring system, which were developed in cooperation with French partner Safran Aircraft Engines. Volume production of the TP400-D6 covers manufacturing the MTU components, final assembly of the entire engine and execution of acceptance tests at the Ludwigsfelde location. As part of its maintenance and repair services for the German Air Force, MTU also carries out dismantling and reassembly of engines, including acceptance tests.

The T408 (formerly GE38) is the first U.S. military program in which MTU has been involved right from the development phase. The T408-1B engine powers the CH-53K heavy-lift cargo helicopter that Sikorsky has developed for the United States Marine Corps. The United States Marine Corps has given the go-ahead for the airframe and engine to be manufactured under a low rate initial production contract. In 2018, the first helicopters were delivered to the Marine Corps.

The EJ200 engine powers the Eurofighter and is in service with numerous air forces. Currently, the option is being examined of developing a midlife update for the Eurofighter to enhance its functional capabilities. If so, this will involve re-engineering the EJ200 engine and incorporating the latest advanced technologies. However, no firm decision has yet been taken by the participating nations.

Component technologies
MTU has built up a technological lead in the fields of low-pressure turbines, high-pressure compressors and turbine center frames that it aims to further increase. In order to do so, it has to continue further developing these technologies.

In early 2018, MTU launched a series of new technology projects under the auspices of the German federal government's aviation research program. The spotlight is on refining the compressor with newly designed inner rings. For the turbine and the turbine center frame, MTU is seeking to use 3D-optimized hot gas distribution. Simultaneously, new lightweight materials such as ceramics and innovative high-temperature single-crystal materials will make turbines lighter and more efficient.

Further efficiency improvements can be achieved by optimizing the complete compressor system, consisting of low-pressure compressor, inter-compressor duct (ICD) and high-pressure compressor, rather than by optimizing each component individually. To this end, MTU has established a test set-up as part of the Clean Sky 2 initiative. The rig measures the duct flow in the ICD in unprecedented detail.

MTU has supported construction of a product-oriented 2.5-stage axial compressor at RWTH Aachen, which was commissioned in summer 2018. This experimental compressor has modern 3D-profiled blading and is set to have a lasting place in MTU's technology validation process. For the second generation of Geared Turbofan™ engines, MTU has already successfully examined new blading concepts with improved efficiency and a reduced blade chord.

In collaboration with TU Graz, extensive detailed measurements have been carried out on a turbine center frame connected to a high-pressure turbine. The studies allow better assessment of the impact of the high-pressure turbine and the turbine center frame on the low-pressure turbine, which will in turn result in improved integrated design of MTU components.

Digitalization
The trend toward digitalization and connected supply chains heralds the fourth industrial revolution, after the invention of the steam engine, the automated production line and the computer. People, machines, plants, logistics and products communicate and cooperate with each other, so that, for example, production now largely organizes itself. In cooperation with an interdisciplinary work group, MTU is defining its related demands and needs. In doing so, MTU examines the product's entire life cycle and value chain, from its conception to its development, manufacture and maintenance.

The use of simulation tools in materials design and product manufacturing is one of the focuses at MTU. The goal is to integrate these two processes using computer simulations, and to align all the parameters with each other in such a way that a component with the desired characteristics and features results. This method enables a large number of options to be tried out in a very short time, giving rise to significant cost savings and better product features. In early 2018, a series of projects were launched within the German federal government's aviation research program.

With the "Digital Twin" project, MTU has started to replicate physical engines and production facilities along the entire life cycle in models. This data can be used to simulate and validate engine architectures, optimize production processes and carry out predictive maintenance.

Manufacturing and maintenance technologies
Additive manufacturing processes are opening the way to new methods of production. These processes involve using a laser to melt successively applied, very thin layers of powder material and in this way build up entire components. MTU is one of the first companies to employ additive manufacturing in volume production, to make the borescope eyepieces used when inspecting PW1100G-JM engines. Preparations are underway to introduce this type of process to manufacture complex components such as seal support systems, center frame struts and bearing housings. The longer-term plan is to create new designs that would be either impossible or very costly to implement using traditional technology. One of the first applications is extremely low-weight brackets based on a bionic design concept. Since the beginning of 2018, all activities have been consolidated in a new department that examines new applications and construction methods, continuously refines manufacturing technology and industrializes the production chain.

Over the past several years, MTU has carved out a leading position as a manufacturer of blisk rotors for compressors. For the blisks made of nickel-based alloys,

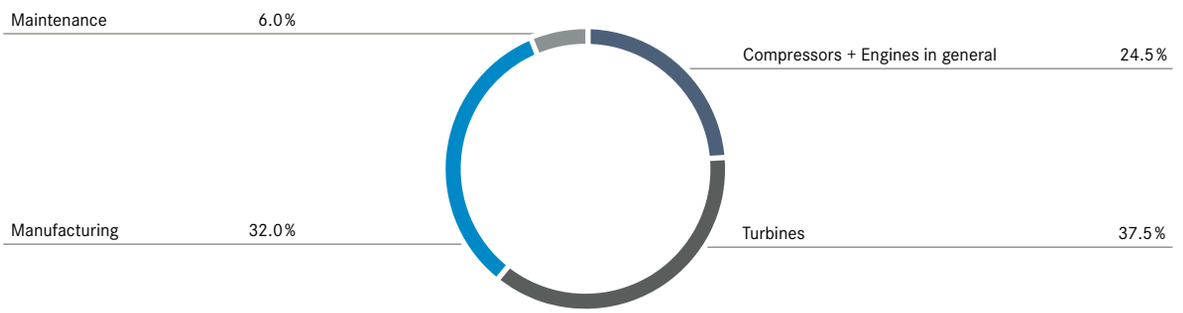
which are extremely difficult to process, and which are used in the aft stages of high-pressure compressors, MTU has developed a new electrochemical material-removal process (Precise Electrochemical Machining – PECM). By working with an extremely small inter-electrode gap, in the micrometer range, PECM accomplishes much greater reproduction precision, thus enabling the requisite extremely complex blade geometries to be manufactured. Projects have been initiated within the German federal government's aviation research program that specifically focus on improving the stability and cost-efficiency of manufacturing processes.

Older manufacturing techniques such as milling can also be further enhanced. Ceramic milling, for example, where the milling heads are made not of carbide, but of ceramic, makes machining of extremely hard nickel-chrome superalloys much easier. In ceramic milling, very high milling speeds are used that cause the metal to heat to a high temperature, bringing about a change in its physical state. The malleable metal can then be more easily machined.

Protecting technology assets (intellectual capital)

At December 31, 2018, MTU's portfolio of intellectual property (IP) rights contained 1,113 patent families (representing 3,595 individual patents). A patent family is a set of patents registered in various countries to protect a single invention. At the reporting date, this portfolio covered the following fields of technology:

[T24] Distribution of the group's intellectual property portfolio over MTU's various fields of technology



Cooperation in science and research

For decades, cooperation arrangements with universities and research institutions have formed a key component of MTU's research and development activities. For instance, specimen engines are made available to universities and colleges, and MTU experts hold lectures or act as mentors for students working on experimental projects or writing theses and dissertations for diplomas and doctorates; students are also given support while carrying out their assignments and preparing their final thesis presentations. In addition, MTU honors outstanding achievements by awarding the annual Heilmann prize to a young scientist meriting recognition for achievements in engine technology.

Strategic alliances have been established with research partners in order to strengthen ties between universities and industry, and to safeguard MTU's innovative capabilities. In recent years, these partnerships with leading German universities and research institutions have been consolidated, and six centers of competence focusing on specific areas of research have been set up with the aim of optimizing collaboration. In October 2018, a new DLR Institute for testing and simulation of gas turbines was opened in Augsburg, which will become part of MTU's center of competence for propulsion systems. It will accommodate the virtual engine digital research and development platform and a unique testing center for validation of new engine solutions. Based in Munich, Bauhaus Luftfahrt is a visionary think tank with an international dimension that pursues novel, unconventional, holistic and interdisciplinary research. It brings industry and science together under one roof, focusing primarily on exploring the socioeconomic, political and ecological aspects of aviation, designing visionary aircraft, unearthing promising technologies for the future and devising knowledge management strategies.

In November 2018, MTU invited 40 high-caliber representatives from MTU's centers of competence as well as partner universities and research institutes to Munich to participate in a technology partner forum that showcased MTU's technology work and new engine concepts. These intensive discussions will lay the foundation for new joint research.

Capital expenditure on research and development

[T25] Research and development expenses

			Change 2018 - 2017	
in € million	2018	2017	in € million	in %
Commercial engine business (OEM)	186.6	182.3	4.3	2.4
Military engine business (OEM)	9.5	13.1	–3.6	–27.5
Commercial maintenance business (MRO)	5.1	4.3	0.8	18.6
Total research and development expenditure	**201.2**	**199.7**	**1.5**	**0.8**
. / . Customer-funded R&D expenditure	23.9	31.9	–8.0	–25.1
Company-funded R&D expenditure	**177.3**	**167.8**	**9.5**	**5.7**
Expenditure meeting recognition criteria for intangible assets				
. / . Commercial engine business (OEM)	80.2	90.7	–10.5	–11.6
. / . Commercial maintenance business (MRO)	1.4	0.5	0.9	>100
Amortization of capitalized development costs	15.3	14.2	1.1	7.7
R&D expenditure impact on EBIT adjusted	**111.0**	**90.8**	**20.2**	**22.2**
Thereof amounts accounted for as revenue or cost of sales	50.3	39.1	11.2	28.6
Thereof amounts accounted for as research and development expenses	60.7	51.7	9.0	17.4

Research and development expenditure in the reporting period totaled € 201.2 million, which is slightly higher than in the previous year. At 4.4 %, total research and development expenditure as a percentage of revenues was slightly lower than the 2017 figure of 5.1 %, reflecting the change in revenues.

The greater part of the externally funded R&D expenditure, which amounted to € 23.9 million (2017: € 31.9 million) relates to public grants for research and development of more fuel-efficient and quieter engines.

Company-funded development expenditure originates from the group's own resources. If such expenditure meets the criteria for capitalization as an internally generated intangible asset, it is removed from the income statement and reported in the balance sheet as development assets or, in the case of acquired development costs (payment of consideration) as other assets. Capitalized development costs are amortized on a straight-line basis over the estimated economic life of the product. Company-funded expenditure is disclosed in *Note 3 to the consolidated financial statements (Research and development expenses).*

The expenditure meeting recognition criteria for intangible assets of € 80.2 million (2017: € 90.7 million) posted in the OEM segment (commercial and military engine business) relates especially to the GTF, GE9X and PW800 engine programs.

The amortization expense on capitalized development costs recognized under cost of sales relates principally to the PW1000G family of engines.

Business environment

Macroeconomic factors

As in the previous year, the global economy grew by 3.0 % overall in 2018, compared with 3.1 % in 2017.

The United States economy continued to experience an uptrend, with growth receiving a boost from substantial tax cuts by the U.S. government. In 2018, the U.S. economy grew by 2.9 % compared with 2.2 % in 2017.

The economy in the Eurozone has lost momentum slightly since the beginning of 2018: Growth slowed to 1.8 % in 2018 compared with 2.5 % in 2017. This downward adjustment reflects the impact of trade tensions, political uncertainty and rising energy prices.

China's economic performance was impaired by slower rates of capital expenditure and consumer spending, with the trade dispute between China and the USA also beginning to have an impact. The Chinese economy recorded growth of 6.6 % in 2018, slightly down on the 2017 figure of 6.9 %.

The price of a barrel (159 liters) of North Sea Brent crude oil averaged U.S. $ 71 over the year , which is a significant increase compared with the oil prices in recent years (2017: U.S. $ 54). Prices have been forced up by an increased demand for oil driven by strong economic growth, coupled with the U.S. sanctions against Iran. At year's end, the extensive derogations from the Iran sanctions led once again to falling oil prices.

Microeconomic factors in the aviation industry

The airlines developed positively in 2018. Strong demand for passenger air travel and for air freight, together with increased capacity utilization on aircraft, were among the reasons behind this trend.

The International Air Transport Association, IATA, reported an increase in global passenger traffic of 6.5 % for 2018. Growth in demand varied from region to region – rising by 5.0 % in North America, by 6.4 % in Europe and by 8.5 % in Asia.

The global fleet grew by 5.0 % in 2018 (source: Fleetanalyzer). Expanding markets, rising passenger numbers and a positive economic climate encouraged airlines to continue investing in fleet modernization and maintenance. Of this year's deliveries of 1,900 new aircraft, around one half have replaced existing aircraft (source: IATA). In this way, the global active fleet is becoming increasingly cost-efficient while at the same time generating lower emissions per passenger-kilometer. IATA calculated industry-wide net income of U.S. $ 32 billion for 2018.

This decline compared with 2017 (U.S. $ 38 billion) is accounted for by higher kerosene prices and labor costs. 2018 was the fourth consecutive year in which the airlines surpassed the U.S. $ 30 billion profit mark.

Airbus and Boeing delivered 1,606 aircraft in 2018, a rise of 8 % over the previous year. The order backlog for aircraft seating 100 or more passengers remained stable compared with 2017, at around 13,800 aircraft. Assuming unchanged production rates, this represents a production workload of eight to nine years (source: Fleetanalyzer).

In 2018, 703 business jets were delivered to customers, up 4 % on 2017.

Overall assessment of the business environment

In 2018, the global economy grew by 3.0 %. The high demand for passenger air travel inspires confidence in the aviation industry that this growth will continue. Airbus and Boeing delivered 1,606 aircraft in 2018, up 8 % on the previous year. At 13,800 orders, the order backlog for aircraft seating 100 or more passengers remained at a very high level.

Financial situation

The following explanatory comments and analyses are based on the audited MTU consolidated financial statements for the financial years ending December 31, 2018 and 2017. The consolidated financial statements were drawn up in accordance with the International Financial Reporting Standards (IFRSs) issued by the International Accounting Standards Board (IASB), to the extent that these have been adopted by the European Union.

In accordance with IFRS requirements, new or revised/amended standards and interpretations were applied for the first time in the financial statements for 2018. Their effect on the group's financial situation, net assets and operating results is dealt with in more detail in the *Notes to the consolidated financial statements (under: Accounting standards and interpretations, and revised/amended accounting standards and interpretations, applied for the first time in 2018).*

The exchange rates used for converting the company's key foreign currencies into euros are the following official rates set by the European Central Bank:

[T26] Foreign currency exchange rates

Currency	ISO code	Rate at reporting date		Average rate	
		Dec. 31, 2018 1 euro =	Dec. 31, 2017 1 euro =	2018 1 euro =	2017 1 euro =
United States dollar	USD	1.1450	1.1993	1.1810	1.1297
Canadian dollar	CAD	1.5605	1.5039	1.5294	1.4647
Chinese yuan renminbi	CNY	7.8751	7.8044	7.8081	7.6290
Polish zloty	PLN	4.3014	4.1770	4.2615	4.2570

Operating results

Group

Changes due to application of IFRS 15

MTU has been applying the new standard IFRS 15, Revenue from Contracts with Customers as of its effective date of January 1, 2018. The prior-year figures for 2017 in the combined management report were therefore adjusted. For information on the resulting changes in reporting practice, please refer to *Part I of the Notes to the consolidated financial statements (Accounting policies and principles).*

Order backlog

MTU's order backlog consists of firm customer orders that commit the group to delivering products or providing services, plus the contractual value of service agreements. At December 31, 2018, the order backlog (after consolidation) amounted to € 17.6 billion (2017: € 14.9 billion). The increase was due in particular to new orders and service agreements for the new Geared Turbofan™ program.

[T27] Consolidated income statement – prior-year data adjusted

			Change 2018 - 2017	
in € million	2018	2017	in € million	in %
Revenues	**4,567.1**	**3,897.4**	**669.7**	**17.2**
Cost of sales	–3,715.8	–3,186.5	–529.3	–16.6
Gross profit	**851.3**	**710.9**	**140.4**	**19.7**
Costs by function	–231.1	–189.7	–41.4	–21.8
Earnings before interest and tax (EBIT)	**620.2**	**521.2**	**99.0**	**19.0**
Financial result	–12.9	–43.1	30.2	70.1
Earnings before tax	**607.3**	**478.1**	**129.2**	**27.0**
Income taxes	–154.0	–119.4	–34.6	–29.0
Net income	**453.3**	**358.7**	**94.6**	**26.4**
Basic earnings per share in €	8.67	6.90	1.77	25.7
Diluted earnings per share in €	8.10	6.46	1.64	25.4

Revenues

The growth in group revenues in 2018 is principally due to the evolution of the MRO segment (commercial maintenance business). Revenues in this segment (before consolidation) rose by € 514.5 million from € 2,285.3 million in the previous year to € 2,799.8 million. The reason for this increase in MRO revenues is the continuing very high demand for maintenance services, which has been met by expanding capacity, especially at the company's Hannover location. Revenues (before consolidation) also increased in the OEM segment (commercial and military engine business), growing by € 299.1 million from € 1,734.8 million in 2017 to € 2,033.9 million, as the result of greater demand in the commercial engine business (spare parts as well as new engine sales and maintenance services from combined contracts in which they are sold as a package).

Cost of sales and gross profit

The rise in the cost of sales is accounted for by the increase in the business volume. However, compared with the growth in revenues, the cost of sales increased at a proportionately slightly lower rate. This resulted in an improved gross margin, which represents the ratio of revenue less cost of sales to revenue and amounted to 18.6 % in 2018 (2017: 18.2 %). The main factor responsible for this change was the implemented product mix in both the MRO and OEM segments.

Reconciliation of adjusted performance indicators

The purpose of reconciliation is to eliminate the effect of non-recurring items and events on the key performance indicators used to measure how successfully the group is controlling its operating activities. The adjusted performance indicators also facilitate a true comparison over time and between MTU and other companies.

MTU utilizes the following adjusted performance indicators in its financial reports: adjusted earnings before interest and tax (EBIT adjusted), EBIT margin adjusted, and net income adjusted. The International Financial Reporting Standards (IFRSs) do not stipulate any requirements concerning such indicators, which should be viewed as supplementary to the performance indicators reported in accordance with IFRSs.

In order to further facilitate comparison, adjustments have been applied to eliminate the effects on EBIT of income and expense items resulting from the purchase price allocation and the increase in the company's stake in the IAE-V2500 engine program. As of January 1, 2004, MTU passed into the ownership of Kohlberg Kravis Roberts & Co. Ltd. (KKR), following the investment company's purchase of 100 % of the MTU shares from the

then DaimlerChrysler AG. In the context of the acquisition, assets, liabilities and contingent liabilities were identified in accordance with IFRS 3 and measured at fair value. Since then, the identified intangible assets, in particular, have led to considerable amortization expenses. These expenses are referred to collectively as "effects of purchase price allocation." Another effect on EBIT eliminated by means of adjustments is MTU's purchase in 2012 of additional shares in the IAE-V2500 engine program. This resulted in the recognition of an acquired program asset (reported as "IAE-V2500 stake increase") that will be accounted for as a reduction of revenue over its estimated economic life of 25 years.

Similarly, the effect of non-recurring items is eliminated from earnings before tax. In a first step, the interest result and the interest portion included in the measurement of plan assets and provisions for pensions and similar obligations, as stated in the financial result on other items, are added to EBIT adjusted. Further adjustments are then made to remove the effects of all other components of the financial result on other items, in particular those that are influenced by the U.S. dollar exchange rate, such as instruments used to hedge against currency risk.

The adjusted amount of earnings before tax is used to determine the adjusted amount of net income. The normalized income tax expense is calculated on the basis of the expected average tax rate for the group (for the financial year 2018: 29%). The profit/loss of companies accounted for using the equity method does not form part of the tax basis.

[T28] Reconciliation of the consolidated income statement – prior-year data adjusted

	2018			2017		
in € million	As reported	Non-recurring items	After adjustments	As reported	Non-recurring items	After adjustments
Revenues	**4,567.1**		**4,567.1**	**3,897.4**		**3,897.4**
Cost of sales	–3,715.8		–3,715.8	–3,186.5		–3,186.5
thereof depreciation / amortization due to purchase price allocation / IAE-V2500 stake increase		51.2	51.2		51.3	51.3
Gross profit	**851.3**	**51.2**	**902.5**	**710.9**	**51.3**	**762.2**
Research and development expenses	–60.7		–60.7	–51.7		–51.7
Selling expenses	–115.1		–115.1	–102.2		–102.2
General administrative expenses	–83.6		–83.6	–76.8		–76.8
Other operating income and expenses	–17.2		–17.2	–2.9		–2.9
Profit / loss of companies accounted for using the equity method	43.8		43.8	42.4		42.4
Profit/loss of equity investments	1.7		1.7	1.5		1.5
Earnings before interest and tax (EBIT)	**620.2**	**51.2**	**671.4**	**521.2**	**51.3**	**572.5**
Financial result	–12.9	–1.6	–14.5	–43.1	23.5	–19.6
Earnings before tax	**607.3**	**49.6**	**656.9**	**478.1**	**74.8**	**552.9**
Income taxes	–154.0	–23.8	–177.8	–119.4	–28.6	–148.0
Net income	**453.3**	**25.8**	**479.1**	**358.7**	**46.2**	**404.9**

Earnings before interest and tax (EBIT)

In 2018, the cost of sales increased at a slightly lower rate than revenues. Other costs by function, on the other hand, increased at a higher rate than revenues. The overall effect remained positive, however, because the amount of costs by function is significantly lower than that of cost of sales. Earnings before interest and tax (EBIT) consequently improved by € 99.0 million (19.0%) compared with the previous year. The EBIT margin rose by 0.2 percentage points to 13.6% (2017: 13.4%). Adjusted earnings before interest and tax (EBIT adjusted) increased by € 98.9 million, which is 17.3% higher than in 2017. The EBIT margin adjusted remained at 14.7%.

Financial result

MTU's financial result improved by € 30.2 million in the financial year 2018 resulting in a net expense of € 12.9 million (2017: a net expense of € 43.1 million).

This improvement is mainly due to foreign currency measurement effects. Another contributing factor was the lower interest expense on corporate bonds and notes.

Earnings before tax (EBT)

Especially the company's good operating performance had a positive impact on earnings before tax. Overall, EBT rose by € 129.2 million to € 607.3 million (2017: € 478.1 million).

Income taxes

Income taxes amounted to € 154.0 million in the financial year 2018 (2017: € 119.4 million). The effective group tax rate, calculated on the basis of earnings before tax, was 25.4 % (2017: 25.0 %). Information on the reconciliation of the expected tax expense to the actual tax expense is provided in *Note 10 to the consolidated financial statements (Income taxes).*

Net income (NI)

Net income increased by € 94.6 million (26.4 %) to € 453.3 million (2017: € 358.7 million) and, correspondingly, net income adjusted by € 74.2 million (18.3 %) to € 479.1 million (2017: € 404.9 million).

Consolidated statement of comprehensive income

In the consolidated statement of comprehensive income, net income amounting to € 453.3 million (2017: € 358.7 million) is reconciled with the total comprehensive income for the period of € 364.0 million (2017: € 512.8 million).

The main income and expense item recognized directly in other comprehensive income in the reporting period, net of deferred taxes, was the fair value loss on hedging instruments amounting to € 83.2 million (2017: fair value gain of € 151.0 million).

Earnings per share

Basic earnings per share amounted to € 8.67 (2017: € 6.90). In view of the recognition of the maximum number of exercisable share conversion options in respect of the convertible bond issued in 2016, diluted earnings per share amounted to € 8.10 (2017: € 6.46).

Net profit available for distribution and dividend

For an explanation of how the net profit available for distribution is determined on the basis of the German GAAP annual financial statements, please refer to *Part VII of the Notes to the consolidated financial statements.* It is planned to propose to the Annual General Meeting on April 11, 2019 that a dividend of € 2.85 (2017: € 2.30) per share be distributed for the financial year 2018. This corresponds to a total dividend payment/distribution amount of € 147.2 million (2017: € 118.4 million).

OEM segment

Revenues

The company's revenues in the OEM segment increased to € 2,033.9 million, compared with € 1,734.8 in 2017.

Revenues in the commercial engine business increased by € 312.9 million (24.3 %) to € 1,602.8 million. The engines that generated the largest shares of these revenues in 2018 were the V2500 and the PW1100G-JM for the A320 and A320neo family and the GEnx for Boeing's 787 Dreamliner and 747-8.

Revenues in the military engine business were slightly lower than in 2017, decreasing by € 13.8 million (3.1 %) from € 444.9 million to € 431.1 million. The main source of these revenues in the reporting period were the EJ200 engine for the Eurofighter and the RB199 engine for the Panavia Tornado and the TP400-D6 for the A400M military transporter respectively.

[T29] Revenues and EBIT adjusted (OEM) – prior-year data adjusted

			Change 2018 - 2017	
in € million	2018	2017	in € million	in %
Revenues	**2,033.9**	**1,734.8**	**299.1**	**17.2**
Cost of sales	–1,484.8	–1,264.8	–220.0	–17.4
Gross profit	**549.1**	**470.0**	**79.1**	**16.8**
Gross margin in %	27.0	27.1		
EBIT adjusted	**431.4**	**378.1**	**53.3**	**14.1**
EBIT margin adjusted in %	21.2	21.8		

Adjusted earnings before interest and tax (EBIT adjusted)

Operating profit benefited in particular from the implemented product mix, especially from the increase in revenues from spare parts sales relating to the V2500 program and increased demand for spare parts for older GE Aviation and Pratt & Whitney engine types. These effects outweighed the impact resulting from the ramp-up of the new engine programs, in particular the PW1100G-JM. Overall, adjusted earnings before interest and tax (EBIT) improved by € 53.3 million (14.1 %) compared with the previous year, while the EBIT margin decreased slightly by 0.6 percentage points to 21.2 % (2017: 21.8 %). Earnings before interest and tax (EBIT) grew in line with adjusted earnings before interest and tax (EBIT adjusted), improving year on year from € 329.3 million in 2017 to € 382.6 million in 2018. For information on adjustments to earnings, please see the reconcilation of EBIT to EBIT adjusted in the section entitled *"Operating results".*

Capital expenditure

Capital expenditure on intangible assets amounted to € 71.8 million (2017: € 68.5 million) and mainly concerned capitalized development costs for the GTF engines and for the GE9X and PW800 programs. Capital expenditure on property, plant and equipment amounted to € 127.5 million (2017: € 116.4 million) and related principally to other equipment, operational and office equipment and construction in progress required in respect of the expansion of production capacities for the Geared Turbofan™ programs. Expenditure on program assets and acquired development costs amounted to € 59.5 million (2017: € 45.5 million), mainly in connection with the PW800, GE9X and the GTF engine family.

Employees

The average number of employees in the OEM segment increased by 431 to 5,905 (2017: 5,474).

MRO segment

Revenues

MTU's revenues in the commercial maintenance business (before consolidation) increased by € 514.5 million (22.5 %) to € 2,799.8 million (2017: € 2,285.3 million). The key revenue driver was the V2500 engine for the A320, followed by the CF34 that powers diverse business and regional jet applications.

[T30] Revenues and EBIT adjusted (MRO) – prior-year data adjusted

in € million	2018	2017	Change 2018 - 2017 in € million	Change 2018 - 2017 in %
Revenues	**2,799.8**	**2,285.3**	**514.5**	**22.5**
Cost of sales	–2,498.5	–2,045.5	–453.0	–22.1
Gross profit	**301.3**	**239.8**	**61.5**	**25.6**
Gross margin in %	10.8	10.5		
EBIT adjusted	**239.7**	**194.4**	**45.3**	**23.3**
EBIT margin adjusted in %	8.6	8.5		

Adjusted earnings before interest and tax (EBIT adjusted)

Adjusted earnings before interest and tax (EBIT adjusted) improved by € 45.3 million (23.3 %) compared with the previous year, due to the positive development of revenues with an almost unchanged gross margin. The EBIT margin rose by 0.1 percentage points to 8.6 % (2017: 8.5 %). In line with the development of adjusted earnings before interest and tax (EBIT adjusted), earnings before interest and tax (EBIT) improved from € 191.9 million in 2017 to € 237.3 million in 2018. Information on the adjustment of earnings data is provided under the heading Reconciliation of adjusted performance indicators in the section on *"Operating results"*.

Capital expenditure

Capital expenditure on intangible assets and property, plant and equipment increased by € 15.8 million to € 73.5 million (2017: € 57.7 million). This increase was mainly due to capacity-related new and replacement purchases, which led to an increase in other equipment, operational and office equipment and construction in progress. Another area in which MTU continues to expend capital is the growing business of short-term engine leasing. Expansion of MRO capacity at EME Aero, a joint venture with Lufthansa Technik, also continued apace in 2018. Information about capital expenditure on financial assets is provided below, under the heading *Financial position.*

Employees

In order to cope with the high workload at the MRO locations, the average number of employees in the MRO segment was increased by 346 to 3,486 (2017: 3,140).

Financial position

Principles and objectives of financial management

The main objectives of financial management are to ensure that the group always has access to adequate liquidity, to avoid financial risks, and to diversify sources of financing in the interests of flexibility. In order to ensure the company's liquidity and reduce risks, MTU makes use of various internal and external funding sources with differing maturities.

Liquidity forecasts are based on the group's operational and strategic planning, flanked by a monthly rolling (short-term) liquidity forecast.

The cash flow from operating activities in the operating segments represents the group's main source of liquidity. Moreover, MTU utilizes a cash pooling system to transfer the surplus liquidity of individual group companies to other group companies whose cash flow does not cover their funding requirements. This reduces external borrowing requirements and the associated interest expense. MTU also makes use of a variety of internal and external funding instruments to assure its liquidity, including company pension plans, corporate bonds, loan agreements with banks and lease arrangements. For information on the company's capacity to raise funds through authorized and conditional capital increases, please refer to *Note 24 to the consolidated financial statements (Equity).*

Financing instruments

The banking policy, procedures for the approval of banking relationships, loan agreements, liquidity and financial asset management, and the management of currency and interest rate risks are set down in the treasury principles. It is a basic principle of the group that its lines of credit are administered at corporate level by the treasury department.

The group maintains good business relationships with a number of different partner banks, and in this way avoids being too strongly dependent on a single institution. The banking partners are required to have a long-term credit rating of at least investment grade.

[T31] Significant external financing sources

Financing instruments	Maturity date	Currency	Interest rate
Registered bond	June 12, 2028	Euro	Fixed
Convertible bond	May 17, 2023	Euro	Fixed
Note purchase agreement	March 27, 2021	Euro	6-month Euribor + margin
Revolving credit facility	October 28, 2023	Euro	Euribor rate + margin
Money market facility	money at call	Euro	Fixed
Finance lease agreements	December 31, 2025	Euro	Fixed

The availability of these financial resources is unrestricted. MTU's revolving credit facility, which is only utilized in part, grants the company even greater scope in its financing activities.

The factors considered when choosing financing instruments include flexibility, credit terms, the profile of maturity dates, and borrowing costs. In keeping with standard banking practice, the main sources of financing include covenants requiring the company to ensure that its performance indicators remain within defined limits. MTU complied with the contractual obligations arising from such covenants at December 31, 2018 and at the end of every quarter of that year. Further information on financing instruments is provided in *Note 28 to the consolidated financial statements (Financial liabilities).* For information on significant agreements relating to a change of control subsequent to a takeover bid, please refer to the section entitled *Disclosures in connection with the takeover directive.*

The risk report and Note 36 to the consolidated financial statements (Financial risks) provide information on MTU's approach to the financial risks inherent in credit arrangements and valuation processes, methods used to hedge interest-rate and currency risks, and methods of dealing with price-change, non-payment and liquidity risks.

As in previous years, MTU did not engage in any transactions in 2018 involving off-balance-sheet financial instruments such as the sale of receivables in connection with asset-backed securities or obligations toward special-purpose entities – with the exception of operating leases and sale-and-leaseback agreements.

Net financial debt

Net financial debt serves as an indicator of the MTU group's financial situation and is defined as the difference between gross financial debt and current financial assets. MTU's net financial debt increased moderately by € 27.0 million (3.3 %) compared with the amount at December 31, 2017.

[T32] Net financial debt – prior-year data adjusted

			Change 2018 - 2017	
in € million	Dec. 31, 2018	Dec. 31, 2017	in € million	in %
Corporate bonds and notes	100.2	100.0	0.2	0.2
Convertible bond	482.5	478.5	4.0	0.8
Financial liabilities to banks	54.4	108.2	–53.8	–49.7
thereof: Note purchase agreement	30.1	30.1		
thereof: Revolving credit facility	14.5	77.9	–63.4	–81.4
thereof: Other liabilities to banks	9.8	0.2	9.6	>100
Loans from third parties	34.7	18.2	16.5	90.7
Finance lease liabilities	10.0	11.5	–1.5	–13.0
Financial liabilities arising from new stakes in engine programs	350.4	370.5	–20.1	–5.4
thereof: Financial liabilities arising from the IAE-V2500 stake increase	301.9	320.0	–18.1	–5.7
Gross financial debt	**1,032.2**	**1,086.9**	**–54.7**	**–5.0**
less:				
Cash and cash equivalents	99.0	106.1	–7.1	–6.7
Loans to third parties	59.7	133.5	–73.8	–55.3
Loans to related companies	19.5	20.3	–0.8	–3.9
Financial assets	**178.2**	**259.9**	**–81.7**	**–31.4**
Net financial debt	**854.0**	**827.0**	**27.0**	**3.3**

Bonds and notes

MTU AG issued a registered bond on June 12, 2013 for a total nominal amount of € 100.0 million. The registered bond matures on June 12, 2028 and is subject to interest of 3.55 % p.a., payable in arrears on June 12 of each year, for the first time on June 12, 2014. The registered bond, net of transaction costs and including a discount of € 2.7 million, is measured at amortized cost.

In the event of a change of control, every bondholder is entitled to declare due part or all of his/her security instrument holding for the nominal amount plus any accrued interest. A change-of-control event occurs if a qualifying rating is lowered in the course of the change of control. This condition is deemed to be met if (1), during the change-of-control period, a rating previously granted by a rating agency to MTU or to its security instrument is withdrawn or is changed to below investment grade (equivalent to or higher than Baa3 (Moody's) or BBB- (Fitch or S&P)), or if (2), at the time of the change of control, no investment grade rating has been awarded by a rating agency to MTU or to its security instrument, and no investment-grade rating is issued for the security in question within the change-of-control period.

Convertible bond

With effect of May 17, 2016, MTU Aero Engines AG issued a convertible bond in the form of a preferential unsecured debenture, for a total nominal amount of € 500.0 million. This bond is convertible into new and/or existing registered non-par-value shares in the issuing company. The convertible bond has an original maturity of 7 years and is divided into units of € 100,000. It bears a nominal interest rate of 0.125 % per annum, payable annually in arrears.

Bondholders have been entitled to convert their certificates into common shares of MTU Aero Engines AG since June 27, 2016. The initial conversion price was set at € 124.7701, which represents a premium of 50 % above the reference rate at the bond issue date.

Under the terms of issue of the convertible bond, MTU has the right to recall the issued bond units at their nominal value (plus accrued unpaid interest) at any time

on or after June 16, 2020, subject to a period of notice of minimum 30 days and maximum 60 days, either (i) if the quoted price of the common share rises to or above 130 % of the applicable conversion price or (ii) if no more than 20 % of the nominal value of the convertible bond issue is outstanding. In such case, and within the above-mentioned period of notice of minimum 30 days and maximum 60 days, the bondholders have the right to demand that MTU converts their investment into shares, rather than a cash consideration.

Financial liabilities to banks

Note purchase agreement

MTU Aero Engines AG issued a note purchase agreement on March 28, 2014 for a total nominal amount of € 30.0 million and with a maturity date of March 27, 2021. The note purchase agreement has a variable interest rate corresponding to the 6-month Euribor rate plus a percentage margin. The initial interest rate amounts to 1.72 %. The interest is calculated and paid twice a year, in March and September.

Revolving credit facility

At December 31, 2017, the company had access to a revolving credit facility of € 600.0 million with five banks, which ran until October 28, 2022. The term of this line of credit was extended by an additional year in 2018 and now runs until October 28, 2023. A total of € 51.1 million had been drawn down under this facility at December 31, 2018, € 36.6 million of which in the form of guarantees in favor of third parties (2017: draw-downs totaling € 90.6 million, of which € 12.7 million in the form of guarantees). The remaining available amount of € 548.9 million (2017: € 509.4 million) ensures the group's financial flexibility in the medium term. Any credit utilized is subject to interest at the customary market reference rates plus an additional margin. The unused amount of the revolving credit facility is subject to a loan commitment fee.

Sundry other liabilities to banks

Sundry other liabilities to banks relate to loan commitments in connection with MTU's share in a trade agreement concluded in 2018 with a manufacturer of business jets.

Loans from third parties

As in the previous year, loans from third parties relate to a release of obligation granted in connection with the premature termination of a maintenance contract originally concluded on the basis of successive payments over the duration of the contract.

Finance lease liabilities

Finance lease liabilities represent obligations under finance lease arrangements that are capitalized and amortized using the effective interest method. For information on their accounting treatment and a summary of the corresponding capitalized lease assets, please refer to *Part I of the Notes to the consolidated financial statements (Accounting policies and principles) and Note 15 (Property, plant and equipment).*

Financial liabilities arising from IAE-V2500 stake increase

The purchase price agreement signed by MTU in the financial year 2012 in order to increase its stake in the V2500 engine program by five percentage points to 16 % made it necessary among other things to recognize a deferred financial liability contingent upon the number of flight hours performed over the next 15 years by the fleet of V2500 engines in service at the time of the stake increase. The nominal volume of this liability at December 31, 2018 was U.S. $ 387.8 million (2017: U.S. $ 437.9 million). This liability under contracts extending to mid-2027 is part of a hedging relationship in respect of revenues generated in U.S. dollars.

Financial liabilities arising from new stakes in engine programs

The financial liabilities arising from new stakes in engine programs mainly relate to program-lifetime-related payments for the acquisition of shares in commercial engine programs, in particular the PW1000G, the PW800 and the GEnx, which are deemed to represent financing agreements in view of their long-term nature.

Capital expenditure

[T33] Capital expenditure by class of asset – prior-year data adjusted

			Change 2018 - 2017	
in € million	2018	2017	in € million	in %
Intangible assets	73.3	69.3	4.0	5.8
Property, plant and equipment	199.5	173.3	26.2	15.1
Financial assets	173.3	189.6	–16.3	–8.6
Program assets and acquired development costs	59.5	45.5	14.0	30.8
Total capital expenditure	**505.6**	**477.7**	**27.9**	**5.8**

Capital expenditure on intangible assets

Capital expenditure on intangible assets in 2018 includes an amount of € 68.7 million (2017: € 66.8 million) relating to self-created assets resulting from development work on engine programs in which MTU holds a stake. Detailed information on capital expenditure on intangible assets is provided in *Note 14 to the consolidated financial statements (Intangible assets).*

Capital expenditure on property, plant and equipment

Additions in the 2018 financial year mainly comprise capital expenditure on equipment, operational and office equipment totaling € 71.2 million (2017: € 90.8 million) and advance payments and construction in progress amounting to € 102.4 million (2017: € 84.5 million) and relate to the expansion of production capacity at the MTU locations in Munich, Hannover and Rzeszów, Poland. Further information on capital expenditure on property, plant and equipment is provided in *Note 15 to the consolidated financial statements (Property, plant and equipment).*

Capital expenditure on financial assets

Capital expenditure on financial assets, which totaled € 173.3 million in 2018, includes an amount of € 157.4 million (2017: € 129.0 million) relating to additions for companies accounted for using the equity method. These additions mainly concern the establishment of EME Aero, the joint venture launched together with Lufthansa Technik, and expenditure in connection with MTU's stake in the IAE-PW1100G engine leasing company. The remaining amounts relate in particular to loans extended for aircraft financing. Further information on financial assets is provided in *Note 16 to the consolidated financial statements (Financial assets).*

Capital expenditure on program assets and acquired development costs

Capital expenditure on program assets and acquired development costs mainly relates to the GTF engine family and the GE9X and PW800 engine programs. Further information on other assets is provided in *Note 17 to the consolidated financial statements (Acquired program assets, capitalized development costs and other assets).*

Liquidity analysis

One of MTU's key performance indicators is free cash flow, which it determines by combining its cash flow from operating activities with its cash flow from investing activities. Because the latter includes certain components (non-recurring cash flows) that lie outside the control of operations management and do not form part of the group's core operating activities, corresponding adjustments are applied. The free cash flow of € 202.9 million (2017: € 151.1 million) therefore excludes these non-recurring cash flows, otherwise included in cash flow from investing activities. The items in question are payments made to acquire stakes in engine programs amounting to € 23.4 million (2017: 10.1 million) and cash-in related to interest-bearing loans in connection with aircraft and engine financing agreements amounting to € 79.1 million (2017: cash-out of € 45.9 million). Adjustments in 2017 also included disinvestments of financial assets held for the purpose of liquidity management amounting to a negative adjustment of € 25.0 million. Such adjustments were not required in 2018.

[T34] Consolidated cash flow statement (abridged) – prior-year data adjusted

			Change 2018 - 2017	
in € million	2018	2017	in € million	in %
Cash flow from operating activities	594.7	460.9	133.8	29.0
Cash flow from investing activities	–336.1	–340.8	4.7	1.4
+ Non-recurring cash flows	–55.7	31.0	–86.7	<-100
Free cash flow	**202.9**	**151.1**	**51.8**	**34.3**
- Non-recurring cash flows	55.7	–31.0	86.7	>100
Cash flow from financing activities	–262.7	–332.9	70.2	21.1
Translation differences	–3.0	–3.5	0.5	14.3
Change in cash and cash equivalents	**–7.1**	**–216.3**	**209.2**	**96.7**
Cash and cash equivalents at the beginning of the reporting period	106.1	322.4		
Cash and cash equivalents at the end of the reporting period	99.0	106.1		

Cash flow from operating activities

The cash inflow from operating activities in 2018 amounted to € 594.7 million, which was € 133.8 million (29.0 %) higher than the 2017 figure of € 460.9 million. The main contributing factors to this positive result in 2018 were the strong growth in revenues and earnings, which significantly outweighed the amount of working capital tied up in production resources for the ramp-up of new programs, as well as strong business in the MRO segment.

Cash flow from investing activities

The cash outflow from investing activities in the financial year 2018 amounted to € 336.1 million (2017: € 340.8 million). Capital expenditure on intangible assets recognized in the income statement amounted to € 72.1 million (2017: € 68.2 million), and mainly comprised development costs for the PW1000G family and the PW800 program. Capital expenditure on property, plant and equipment, excluding the proceeds from disposals, amounted to € 184.4 million, compared with € 166.5 million in 2017. This increase is consistent with the expansion of MTU's production capacity. The net gain/loss on financial assets was mainly due to capital contributions in respect of equity investments and the repayment of loans provided under aircraft financing agreements. Expenditure on program assets and acquired development costs amounted to € 48.4 million (2017: € 64.8 million) and relates especially to the GTF family, GE9X and PW800 engine programs.

Cash flow from financing activities

In the financial year 2018, MTU had a net cash outflow from financing activities of € 262.7 million (2017: € 332.9 million). This cash flow results mainly from the repayment of financial liabilities and the dividend payment for the financial year 2017.

Change in cash and cash equivalents

The amount of cash and cash equivalents decreased slightly by € 7.1 million from € 106.1 million in 2017 to € 99.0 million. The reason for this moderate change is that the increased cash inflow from operating activities was matched almost entirely by cash outflows from investing and financing activities.

Net assets

Changes in balance sheet items

[T35] MTU consolidated balance sheet – prior-year data adjusted

	Dec. 31, 2018		Dec. 31, 2017		Change 2018 - 2017	
in € million	in € million	in %	in € million	in %	in € million	in %
Assets						
Non-current assets						
Intangible assets and property, plant and equipment	1,872.0	27.3	1,768.0	28.4	104.0	5.9
Other assets	1,843.9	26.9	1,773.8	28.5	70.1	4.0
Total non-current assets	**3,715.9**	**54.2**	**3,541.8**	**56.9**	**174.1**	**4.9**
Current assets						
Inventories	995.8	14.6	845.1	13.6	150.7	17.8
Receivables / Sundry other assets	2,040.1	29.8	1,732.2	27.8	307.9	17.8
Cash and cash equivalents	99.0	1.4	106.1	1.7	–7.1	–6.7
Total current assets	**3,134.9**	**45.8**	**2,683.4**	**43.1**	**451.5**	**16.8**
Total assets	**6,850.8**	**100.0**	**6,225.2**	**100.0**	**625.6**	**10.0**
Equity and liabilities						
Equity	**2,144.2**	**31.3**	**1,841.3**	**29.6**	**302.9**	**16.5**
Non-current debt						
Provisions	900.9	13.2	885.2	14.2	15.7	1.8
Liabilities	1,001.4	14.6	970.4	15.6	31.0	3.2
Total non-current debt	**1,902.3**	**27.8**	**1,855.6**	**29.8**	**46.7**	**2.5**
Current debt						
Provisions / Income tax liabilities	213.0	3.1	201.6	3.2	11.4	5.7
Liabilities	2,591.3	37.8	2,326.7	37.4	264.6	11.4
Total current debt	**2,804.3**	**40.9**	**2,528.3**	**40.6**	**276.0**	**10.9**
Total equity and liabilities	**6,850.8**	**100.0**	**6,225.2**	**100.0**	**625.6**	**10.0**

Assets

In the financial year 2018, additions to intangible assets amounted to € 40.2 million (2017: € 24.9 million). This increase was mainly due to development costs in connection with engines from the GTF engine family and the PW800 and GE9X engine programs, which were offset by the corresponding scheduled amortization.

The increase in property, plant and equipment of € 63.8 million (2017: € 63.0 million) relates principally to capital expenditure on other equipment, operational and office equipment and construction in progress required in respect of the expansion of production capacities at MTU's locations in Germany and Poland.

The increase in other non-current assets was primarily attributable to the positive development of business and additional injections of capital to companies that are accounted for using the equity method in the group's consolidated financial statements. The injections of capital serve to finance the growing engine leasing business. A negative effect on assets resulted from the repayment of sales-financing loans alongside a general decline in the fair value of hedging instruments. With a view to reducing foreign exchange risks, a portfolio of U.S. dollar forward foreign exchange contracts was in place at the end of 2018 with a term to February 2020 and a nominal value of U.S. $ 1,660.0 million.

In the reporting period, the carrying amount of inventories increased across the board, with raw materials and supplies increasing by € 68.3 million to € 422.3 million (2017: € 354.0 million), finished products and work in progress increased by € 82.0 million to € 553.6 million (2017: € 471.6 million) and advance payments by € 0.4 million to € 19.9 million (2017: € 19.5 million). Altogether, inventories accounted for 14.6 % (2017: 13.6 %) of net assets, a higher proportion than that in 2017. The sales to inventory ratio was 5.0 (2017: 4.4).

The carrying amount of trade receivables increased to € 1,051.2 million (2017: € 914.5 million). Compared with the level at December 31, 2017, contract assets, net of the corresponding contract liabilities, increased by € 231.5 million to € 864.3 million. Other current assets include an amount of € 43.2 million reflecting payments recoverable from the tax authorities in respect of taxes (2017: € 31.3 million).

Cash and cash equivalents decreased slightly. This item accounted for 1.4 % (2017: 1.7 %) of total assets at the reporting date.

Equity

[T36] Changes in equity – prior-year data adjusted

in € million	2018	2017
Balance at January 1	**1,841.3**	**1,375.1**
Other comprehensive income		
Financial instruments designated as cash flow hedges	–83.2	151.0
Fair value gains and losses on equity investments	2.5	
Actuarial gains and losses on plan assets and pension obligations	–4.0	12.8
Translation differences arising from the financial statements of international entities	–4.6	–9.7
Net income	453.3	358.7
Dividend payment to shareholders of MTU Aero Engines AG	–118.4	–97.6
Impact of application of new financial reporting standards	7.2	
Issue of treasury shares under the Restricted Stock Plan	4.5	3.6
Sale of treasury shares under the MAP employee stock option program	16.3	14.3
Investment by minority shareholders	29.3	33.1
Total change in group equity	**302.9**	**466.2**
Balance at December 31	**2,144.2**	**1,841.3**

Positive changes in equity

Positive changes in equity in 2018 principally included an amount of € 453.3 million attributable to net income (NI) (2017: € 358.7 million).

Negative changes in equity

Negative changes in equity in 2018 mainly include an amount of € 118.4 million for the dividend payment to shareholders of MTU Aero Engines AG for the financial year 2017 (2017: dividend payment of € 97.6 million for the financial year 2016) and an amount of € 83.2 million resulting from the decrease in the fair value of hedging instruments (2017: increase in the fair value of hedging instruments of € 151.0 million).

Liabilities

Among the items of non-current debt, non-current pension provisions increased by € 5.6 million from € 847.6 million in 2017 to € 853.2 million in 2018.

Non-current liabilities comprised non-current gross financial debt amounting to € 879.8 million (2017: € 889.0 million), contract liabilities of € 27.0 million (2017: € 16.9 million), and deferred tax liabilities amounting to € 8.4 million at December 31, 2018 (2017: € 16.9 million). Non-current liabilities represented 14.6 % of total liabilities at December 31, 2018, which is a slightly lower proportion than that in 2017.

The combined total of equity and non-current debt increased in the financial year 2018 by € 349.6 million to € 4,046.5 million (2017: € 3,696.9 million). This means that 108.9 % (2017: 104.4 %) of the company's non-current assets are financed through available, medium- to long-term funds.

The provisions recognized under current debt include pension provisions amounting to € 25.8 million (2017: € 23.1 million), which is slightly above the previous year's level, income tax liabilities, which increased from € 2.9 million to € 9.9 million, and other provisions of € 177.3 million, which were € 1.7 million higher than in 2017. Current debt also includes refund liabilities to customers amounting to € 1,506.2 million (2017: € 1,155.3 million), trade payables amounting to € 230.6 million (2017: € 307.1 million), contract liabilities amounting to € 549.0 million (2017: € 555.7 million), gross financial debt of € 228.5 million (2017: € 242.1 million) and sundry other identifiable obligations.

The debt to equity ratio increased year on year by 1.7 percentage points to 31.3 % (2017: 29.6 %).

Financial performance indicators

At MTU's Capital Market Day in December 2017, the group provided an initial outlook on its expected business development in 2018. These expectations were confirmed in the forecasts issued on February 21, 2018, in connection with annual results for 2017.

The forecasts included moderate growth in EBIT adjusted and a similar rate of growth for net income adjusted. MTU's forecast for free cash flow was that the cash conversion rate, defined as free cashflow divided by net income adjusted, would lie in the low to mid-double-digit percentage range.

A more specific forecast was issued in July 2018 on the basis of the half-year interim report. In this report, MTU forecast that revenues would reach approximately € 4,200 million, EBIT adjusted approximately € 640 million, and net income adjusted approximately € 450 million.

At the time of the third-quarter report, there were indications that earnings would improve further. As a consequence, while the revenue forecast was revised upward to € 4,400 million, the EBIT adjusted forecast was raised by € 20 million to € 660 million and that for net income adjusted by € 20 million to € 470 million.

[T37] Forecast and actual results

in € million	Actual 2018	Forecast 2018 dated October 25, 2018	Forecast 2018 dated July 26, 2018	Forecast 2018 dated February 21, 2018	Actual 2017	Change 2018 - 2017 in %
Revenues	4,567.1	approx. 4,400	approx. 4,200	Increase between 10 and 15%	3,897.4	17.2
Adjusted earnings before interest and tax (EBIT adjusted)	671.4	approx. 660	approx. 640	Moderate growth	572.5	17.3
Net income adjusted	479.1	approx. 470	approx. 450	Growth in line with EBIT adjusted	404.9	18.3
Free cash flow	202.9	Cash conversion rate between 40 and 50%	Cash conversion rate between 40 and 50%	Cash conversion rate in the low to mid-double-digit percentage range	151.1	34.3

Revenue forecast

On February 21, 2018, the Executive Board forecast that revenues in 2018 would increase by a percentage in the low to mid teens (revenues 2017: € 3,897.4 million). In the half-year report published on July 26, 2018, this forecast was specified at € 4,200 million. In response to the better-than-expected operational performance, the revenue forecast was again revised upward to € 4,400 million on publication of the figures for the third quarter on October 25, 2018. At year end, revenues amounted to € 4,567.1 million, which is higher than the forecast figure of € 4,400 million. The main reasons for this result were stronger growth in the MRO segment in U.S.-$ terms and a slightly better-than-expected exchange-rate development.

Earnings forecast

MTU's initial forecast for EBIT adjusted was that this key performance indicator should increase moderately. On July 26, 2018, the group issued a more concrete forecast of approximately € 640 million. This forecast was revised upward on October 25, 2018, to € 660 million, in light of the third-quarter results showing a further improvement in the company's business prospects. Year-end EBIT adjusted amounted to € 671.4 million, thus exceeding the revised forecast.

The Executive Board initially forecast that net income adjusted in 2018 would grow in line with EBIT adjusted. On July 26, 2018, the group issued a more concrete forecast of approximately € 450 million, and subsequently raised it on October 25, 2018 to € 470 million, in line with the corresponding increase in the forecast for operating profit (EBIT adjusted). At December 31, 2018, net income adjusted amounted to € 479.1 million, which is slightly higher than the predicted result.

Free cash flow

In 2018, as in 2017, MTU expected that increases in its operating income would compensate for higher capital expenditure. Based on these assumptions, the Executive Board's forecast for free cash flow issued on February 21, 2018 was that the cash conversion rate would lie in the low to mid-double-digit percentage range. A revised, more concrete forecast of between 40 and 50% was issued on July 26, 2018, when the half-year interim report was published. In the interim report for the third quarter published on October 25, 2018, this forecast was confirmed, based on the expectation of a slightly higher net income adjusted. This target was met at December 31, 2018, with a free cash flow of € 202.9 million. The ratio between free cash flow and EBIT adjusted came to 42%, thus improving year on year as expected (2017: 37%).

Overall assessment of business performance in 2018

2018 was yet another record-breaking year for MTU. Revenues increased to € 4,567.1 million, which is 17.2 % higher than in the previous year (2017: € 3,897.4 million). Both the MRO segment, with growth of 22.5 %, and the OEM segment, with growth of 17.2 %, contributed to this increase in revenues, before intersegment consolidation.

2018 was yet another year of intensive capital expenditure for MTU, with the company continuing to invest in commercial engine development across all thrust classes and building up its production capacity at locations in Germany and abroad.

MTU's operating profit reached a new record high in 2018, boosted in particular by the strong growth in the MRO segment and a favorable product mix in the OEM segment. EBIT adjusted amounted to € 671.4 million (2017: € 572.5 million), while the EBIT adjusted margin remained at the previous year's level of 14.7 %.

The free cash flow results were equally gratifying, rising to € 202.9 million (2017: € 151.1 million) despite major capital expenditure on development projects and the expansion of capacity at the locations in Germany and abroad.

The forecasts issued at the beginning of the year, which were later revised upward, were thus not only achieved but even surpassed. Revenues in both operating segments were higher than had been forecast at the beginning of the year, leading to a corresponding improvement in earnings.

Non-financial statement

The present MTU Aero Engines non-financial statement provides information on important non-financial topics for the 2018 financial year. This is a condensed non-financial statement in accordance with Sections 289b et seq. and Sections 315b et seq. of the German Commercial Code (HGB), which contains disclosures relating to MTU Aero Engines AG as the parent undertaking as well as information relating to the MTU group. The group structure is described in the *combined management report in the section headed "The enterprise MTU ".*

In addition, each summer the company publishes a separate sustainability report for the previous financial year in accordance with the international reporting standards of the Global Reporting Initiative (GRI).

Business model

The enterprise MTU and the business model are described in the *combined management report in the section headed "The enterprise MTU ".*

Framework

The key topics for the non-financial statement were identified by the corporate responsibility (CR) coordinators in the relevant departments, in collaboration with the central CR steering committee, or CR Board. They based their choice on the topics featured in the sustainability report that MTU deemed to be relevant for the company and its stakeholders. The factors considered when assessing the relevance of each topic included the social and environmental impacts of MTU's business activities, regulatory and legal issues and the requirements of stakeholder groups. The topics were also evaluated in terms of their relevance to MTU's business, for instance their impact on the group's reputation and on its profit and loss situation. As a result, eight topics were identified as relevant for inclusion in the present non-financial statement. An additional issue presented in the non-financial statement, pursuant to the German CSR Directive Implementation Act, is "product quality and flight safety." In the 2018 edition of the non-financial statement, "Responsible international trade" was added as a new aspect, while statements relating to the environmental aspect can be found under "Eco-efficient engines." The Executive Board and the Supervisory Board's Audit Committee were kept regularly informed about the materiality process.

[T38] Contents of the non-financial statement

Aspect pursuant to the German CSR Directive Implementation Act	Relevant Topics for MTU
Additional aspect	Product quality and flight safety
	Responsible international trade
Environmental aspect	Eco-efficient engines
Combating corruption and bribery	Prevention of corruption and bribery
Employees aspect	Occupational safety
	Employee development
	Diversity and equal opportunities
Respecting human rights	Respecting human rights

Corporate citizenship, supplier management and CO_2 emissions in production were rated in this process as not relevant for inclusion in the non-financial statement. MTU's management approaches for these topics are reported on in MTU's Sustainability Report.

The assessment of risks associated with the topics presented in the non-financial statement builds on the existing risk management system. These topics are additionally studied on a quarterly basis by the CR divisional coordinators and the CR Board for possible risks to the environment, society and the company's employees deriving from MTU's business activities, which are assessed by analogy with the existing opportunity and risk process on a scale referencing the likelihood of occurrence and the impact of the risk. MTU has established a separate risk assessment process and a separate reporting line for compliance issues, which are coordinated by the Compliance Board, or rather, since fall 2018, by the Compliance Officer.

The analysis did not reveal any reportable risks with a high likelihood of having a severe negative impact on the identified non-financial topics.

Due to the materiality concept of the German CSR Directive Implementation Act (relevant non-financial information for the business performance, operating results and position of the group as well as the impacts of its business activities on the aspects environment, employee, social issues, human rights and anti-corruption), which differs from the GRI guidelines, MTU did not apply any standard as a general framework when preparing the non-financial statement.

Product quality and flight safety

Quality and safety are of paramount importance in aviation and the corresponding framework conditions are strictly regulated. Legal requirements concerning the safe operation of flights are closely monitored by the aviation authorities. This is mirrored in the high importance MTU places on product quality and flight safety. The company must comply with the legal requirements imposed upon it as a development, manufacturing and maintenance organization in the aviation industry. MTU continuously evaluates the approval requirements for its business activities in order to obtain or keep the requisite aviation-authority licenses, approvals and certifications.

Quality and safety across the entire lifecycle

A group-wide integrated management system (IMS) ensures compliance with laws and internal regulations and clear assignment of responsibilities within the company. One principle of the IMS policy is that "Safety takes priority in what we do." The quality framework is enshrined in a management manual that is binding for all employees and managers across the group. Corporate Quality is a separate department directly subordinate to the Chief Operating Officer (COO) and reports quarterly to the Executive Board on quality aspects and flight-related incidents. MTU Safety Management in accordance with the International Civil Aviation Organization (ICAO) standard is part of the IMS and defines how to handle safety-related air-traffic events. Appropriate organizational structures and responsibilities, such as a Flight Safety Board and a flight safety manager, have also been established. High quality standards together with product safety and reliability are enshrined in the MTU Principles as important corporate objectives.

The strict regulatory quality and safety requirements must be complied with throughout the entire product lifecycle of an engine. MTU has therefore implemented processes designed to meet these requirements. For example, the aviation sector has strict rules governing documentation in order to verify the airworthiness of engines and their components. There must be no gaps in documentation for the entire product lifecycle. MTU also imposes the industry-specific requirements on its suppliers.

To ensure compliance with quality and safety requirements, MTU has implemented comprehensive monitoring and testing processes throughout the entire value chain. Components classified as critical undergo thorough tests and are monitored in the production process.

The implementation of MTU's IMS at the individual sites is validated and certified by independent and accredited external auditors.

High customer satisfaction as a corporate objective

MTU continuously monitors quality standards and, where necessary, initiates appropriate measures to achieve effective improvements. Providing customers and partners with safe and top-quality products and services helps to keep MTU's business competitive. MTU's corporate objectives for 2018 again focused on delivering customer satisfaction and high-quality products. As in 2017, the goal for 2018 was also to lower or at least keep the number of customer complaints stable at all locations. Sustainable measures will be implemented to meet these objectives.

In order to ensure uniformly high standards and document conformity with legal requirements, MTU routinely conducts internal and external audits of safety-relevant

issues. These audits are managed locally by the respective sites.

A defined process ensures that all customer complaints relating to sub-standard quality of delivered MTU products are followed up and analyzed, and appropriate measures are defined and implemented so as to permanently eliminate the cause of the defects. Success of these measures is closely monitored.

In a cross-divisional CIP project (CIP = Continuous Improvement Program), a team at the Munich site has since 2017 systematically analyzed complaints by key accounts over a defined two-year period for causes of failure, identified areas with potential for improvement and initiated concrete measures for the areas of action identified. On completion of the project in October 2018, the project managers examined the effectiveness of the measures taken.

Customer complaints are evaluated at the individual MTU locations, and in the majority of cases the number of complaints declined compared with 2017. At the Munich location, the number of customer complaints was higher than in the previous year, mainly as a result of the production ramp-up for the new Geared Turbofan™ engines of the PW1000G family. In the reporting period, 409 internal audits including certification audits (253 at the Munich location) and 125 external quality audits by customers or aviation authorities (37 at the Munich location) were conducted.

Group-wide exchange of knowledge among quality managers

MTU is continuously developing its quality management system, and regularly takes up suggestions arising for example from its collaboration in the Aero Engine Supplier Quality Group or from regular internal meetings of the quality managers at its various sites. In the 2018 reporting year, the focus was on the group-wide transfer of lessons learned and on reinforcing best-practice approaches. To this end, supplementary to their meetings the quality managers have established a regular exchange of knowledge across the entire MTU group, for example through conference calls.

Furthermore, the framework of rules is continuously revised. Several times a year, the company publishes its quality information newsletter, Q-Info, group-wide on the intranet aimed at raising awareness among employees. At MTU's largest maintenance site in Hannover, this is supplemented by the site-specific QM-Info newsletter. MTU also provides training on quality issues for managers and employees at the individual sites. A quality initiative has been established for the group's commercial maintenance network. By drawing on a detailed analysis of key quality indicators across all locations, this initiative aims to further develop various quality topics in accordance with the best-practice-sharing principle. The initiative consists of four projects (Quality in work scheduling processes, Quality in operations management processes, Supplier management, Quality KPIs and audit) in which, for example, standard procedures for the testing and acceptance of new maintenance processes (First Article / First Build Inspection) are being implemented.

Moreover, shop floor/office management at all of the group's production sites also supports continuous improvement. This allows employees and managers to exchange views on quality and other issues several times a week and initiate short-term measures if problems arise.

Responsible international trade

Trade compliance plays a vital role for MTU. The provisions of international trade legislation affect all business units and group companies, including their employees. Customs and export control laws govern which products, services and technical data MTU is permitted to sell or pass on to whom, for what purpose and where. Compliance with customs legislation and international trade regulations is explicitly stipulated in MTU's code of conduct.

Export control law prohibits doing business with specific countries or individuals, and the supply of sensitive goods, transfer of advanced technologies, provision of military services or payment of invoices without explicit authorization by the respective official bodies. This is intended in particular to prevent the proliferation of nuclear, biological and chemical weapons, the supply of military goods or goods that can be used for military purposes to crisis regions, support for blacklisted individuals and activities that violate human rights, and to protect sovereign security interests. Under customs regulations, MTU is required to furnish a precise description, detailed itemization and accurate declaration of the value of all goods intended for import or export. What is more, anti-boycott laws may prohibit individuals and entities from participating in international economic boycotts and restrict the dissemination of information relating to business activities or individuals.

To coordinate these tasks and ensure international trade regulations are adopted across the group, MTU has set up a central international trade department (functional responsibility and supervisory authority for export control, coordination of customs regulations), where necessary drawing on the support of external consultants. To

ensure compliance with international trade regulations, harmonized process standards have been introduced group-wide, which verify conformity with export control regulations and required authorizations prior to the dispatch of documents and components. The head of the international trade department reports disciplinarily to the head of purchasing and has a direct duty to report to the designated export manager (Chief Operating Officer (COO)).

In the financial year 2018, MTU continued to press ahead with developing the workflows and organizational structures within the international trade department. This included increasing the available resources, optimizing existing processes and institutionalizing reporting channels.

Eco-efficient engines

MTU is working on solutions to make flying more environmentally friendly, with a focus on reducing fuel consumption, CO_2 emissions and noise emissions of engines – factors it can directly influence with its high-pressure compressors and low-pressure turbines. The MTU Principles reflect this commitment to sustainable product development with reduced fuel consumption and noise emissions. There is a direct link between fuel consumption and CO_2 emissions. The latter are a contributing factor to climate change caused by aviation. Making engines more fuel-efficient therefore has high priority because it both saves resources and reduces the impact on global warming. The MTU code of conduct also contains guidelines on product development according to environmental criteria. MTU also contributes to the European industry and research sector's Strategic Research and Innovation Agenda (SRIA) and supports its climate change mitigation and noise reduction targets.

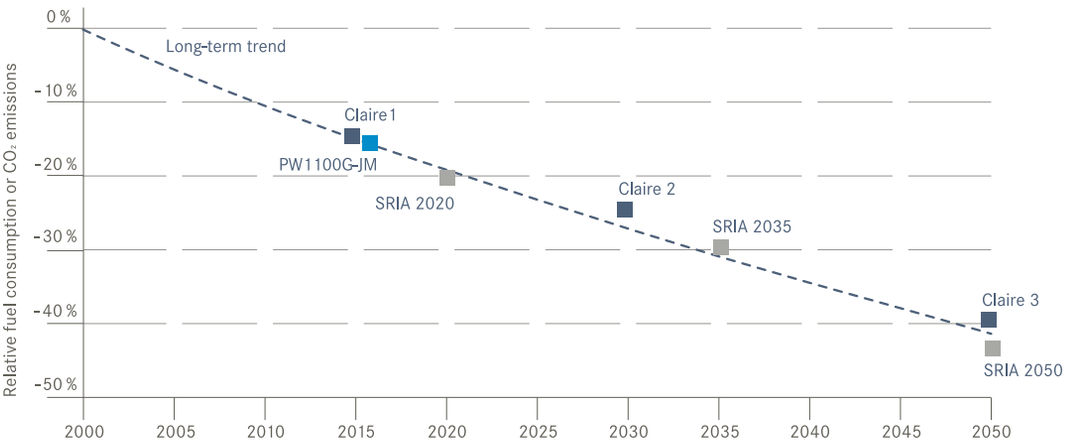
An Innovation Board regularly discusses all topics related to technology and innovation and initiates technology projects and studies. The Technology steering committee, of which the Chief Operating and Chief Program Officers are members, approves MTU's technology roadmap and is regularly updated on progress. MTU manages its product development in a multi-level technology and innovation process. Short-term product development is oriented toward concrete customer specifications on the basis of existing technologies; in the medium term (up to 15 years), advanced product designs are created from which technology requirements are derived and long term (up to 2050), a technology radar is used to develop pilot concepts and initiate enabling technologies. Product and technology development is concentrated at the Munich location, with some activities being carried out at MTU's sites in Hannover, Ludwigsfelde and Rzeszów.

MTU is committed to the principle of integrated environmental protection, which takes a precautionary approach to how the company's products impact the environment, and integrates insights from this into entrepreneurial decisions. MTU's technology and innovation process incorporates environmental and societal driving forces for aviation and derives its own targets for product development from them. The company identified stakeholders' expectations and negative impacts of air traffic on the environment and on society in 2018 for instance by

- Participating in various discussion forums, for example run by the Aviation Initiative for Renewable Energy in Germany (aireg e.V.), the Future Lab of the ILA Berlin Air Show or the German Federal Ministry of Transport's adaptive Mobility and Fuels Strategy (MKS 2018)
- Working on committees such as the German Aerospace Industries Association (BDLI) or the Advisory Council for Aviation Research in Europe
- Telephone interviews with selected representatives of relevant stakeholder groups (including customers, research institutes) in the context of the stakeholder dialog on sustainability.

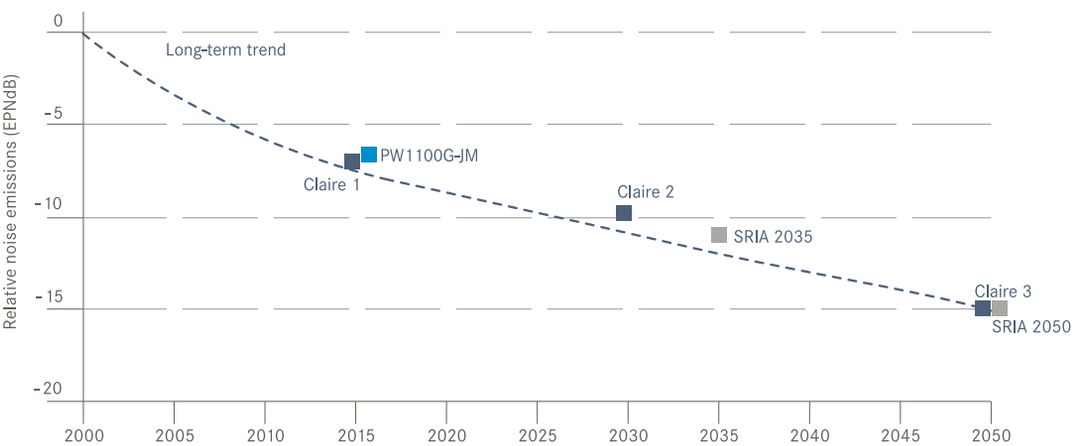
The aviation industry is characterized by long product cycles, with aircraft engines as a rule spending 30 years in service before they are decommissioned. Goals to produce more eco-efficient engines therefore have a long-term perspective and are established in memoranda of understanding by the aviation stakeholders (airlines, aviation industry, research, aviation authorities). In Europe, goals aimed at cutting fuel consumption as well as CO_2 and noise emissions are defined in the SRIA, which forms the basis for all national and European technology programs as well as for the MTU Clean Air Engine Agenda (Claire). With the Clean Air Engine Agenda, the internal roadmap for the development of engine programs, MTU has defined its own eco-efficiency targets through to 2050, which are derived from the SRIA goals. Due to the long-term approach to improving the aviation industry's environmental performance, no annual targets are set for eco-efficient engines or corresponding performance indicators collected.

[T39] Goals defined under the SRIA and Claire agendas to reduce fuel consumption and CO_2 emissions



The objectives of MTU's Claire program are based on those of the SRIA, in that they all relate to the engine's relative fuel consumption or CO_2 emissions per passenger-kilometer. Improvements in performance are measured relative to an engine representative of the state of the art in 2000. The PW1100G-JM (data provided by the OEM Pratt & Whitney) was chosen to illustrate the performance of the PW1000G family of engines in respect of these goals, because this engine is expected to generate the most sales within the family (based on the number of orders received up to the end of 2018). Kerosene is the only fuel approved for use in aircraft.

[T40] Goals defined under the SRIA and Claire agendas to reduce noise emissions



All targets refer to the noise emissions of the aircraft as a whole, with improvements measured by comparison with an aircraft corresponding to the state of the art in 2000. For the PW1000G family of engines achievement of these goals is demonstrated, for example, by the PW1100G-JM engine (in combination with the Airbus A320). Noise levels are expressed in EPNdB (Effective Perceived Noise Decibels) relative to the ICAO (International Civil Aviation Organization) Stage 4 noise limits, taking the average of the separate measurements at the three certification points: approach, take-off sideline and take-off flyover. A reduction in noise emissions of 10 EPNdB corresponds to a halving of the subjective noise perception.

MTU agenda for eco-efficient products: Claire Level 1
The PW1100G-JM engine from the PW1000G family of GTF engines entered service on scheduled routes at the beginning of 2016, only a few months later than originally planned. At this time, the new engine already reduced fuel consumption and CO_2 emissions by 16 % (according to data provided by OEM Pratt & Whitney), surpassing the goal of 15 % set for 2015, while with an average reduction of 6.7 EPNdB compared with the ICAO Stage 4 emission class, the Claire target of reducing noise emissions by 7.4 EPNdB was not quite met (according to the certification data). The new Geared Turbofan™ engine concept is developed and manufactured by MTU in cooperation with Pratt & Whitney. Versions have been designed for five aircraft platforms, with all applications successively going into production by 2020.

Milestones with respect to the implementation of Claire 1 in the financial year 2018:

/ Certification of the new Embraer E-Jet E190-E2 powered by the PW1900G Geared Turbofan™ engine by the aviation authorities in Brazil, the USA and Europe. This aircraft is one of several applications of this low-fuel, low-emissions and low-noise family of engines. Aircraft manufacturer Embraer claims that the fuel consumption of the E190-E2 is improved by as much as 17 %, while the certification attests a noise footprint of 6.7 EPNdB below the ICAO stage 4 limit.

Next climate goal 2030: Claire Level 2
The next MTU goal is set for 2030 and intends to reduce fuel consumption and the carbon footprint of future engines each by 25 % (change compared with an engine from the year 2000, per passenger kilometer). The target for noise emissions of aircraft and engine is a reduction of 50 % or ten decibels compared with the state of the art in the year 2000.

Claire Level 2 will be implemented on the basis of the Geared Turbofan™ engine which, in the next generation, will be refined into an ultra-high bypass engine, with the aim of lowering CO_2 and noise emissions. MTU is already working on the preliminary design of this engine. MTU develops the requisite technologies for this generation of engines within the national aviation research program LuFo and European technology programs. MTU has a stake in major research programs concerned with promoting the refinement of eco-efficient propulsion technologies in aviation. Different manufacturers and universities work together as partners in these research programs. The technologies are being further developed in the Clean Sky technology program, until they are mature enough to be applied in product development.

The European ENOVAL technology program in which MTU was involved was completed in 2018. In conjunction with the LEMOTEC and E-BREAK technology programs that were completed in 2017, this makes new engine technologies available that after final assessment of the ENOVAL project and depending on the application (short-, medium- or long-haul) are expected to cut fuel consumption and CO_2 emissions (per passenger-kilometer) by between 25 and 32 % compared with the state of the art in the year 2000. These fuel and CO_2 reductions represent a huge step toward the SRIA and Claire 2 targets of 20 and 25 % respectively. A higher level of technology readiness must be reached before the targets can be considered fully achieved. The technologies developed so far are not yet sufficiently advanced to fully attain the SRIA and Claire targets for 2020 and 2030 with regard to flight noise reduction.

Milestones with respect to the implementation of Claire 2 in the financial year 2018:

/ Start of numerous new technology projects within the national aviation research program (LuFo V-3) aimed at lowering fuel consumption through new aircraft concepts, enhanced compressor efficiency, new materials and more advanced simulation tools, and reducing noise through the use of more advanced methods to measure and calculate noise levels.
/ Entry into operation of a new product-oriented 2.5-stage axial compressor at RWTH Aachen to provide proof of concept of advanced compressor technologies such as high aspect ratio blading.

Engine concepts for 2050: Claire Level 3
Furthermore, MTU is already collaborating with universities on the next level of the Clean Air Engine Agenda for the year 2050 (Claire 3) in which it is planned to test new engine architectures. The company launched initial concrete projects in 2018 that pursue two different concepts:

/ Heat engines featuring innovative cyclic processes beyond conventional gas turbines, which promise to significantly improve the core engine's thermal efficiency.
/ Electro-hybrid propulsion systems that allow greater scope in the design and operation of aircraft and engines, with the potential to significantly reduce CO_2 and noise emissions

Milestones with respect to the implementation of Claire 3 in the financial year 2018:

- To evaluate and demonstrate proof of concept of innovative cyclic processes, MTU and partners have agreed on the work content of a technology project to be conducted as part of the national aviation research program.
- For the purpose of demonstrating and testing a hybrid-electro propulsion system in the area of commuter transport (passenger class up to 19 passengers), MTU plans to cooperate with Siemens and the German Aerospace Center (DLR). The project partners plan to use a modified Dornier Do 228 prop plane as the test platform for validating the concept's potential.

As well as supporting the development of eco-efficient propulsion systems, MTU also continued to promote efforts to spread the use of sustainable fuels with low carbon content in 2018 through aireg e.V. (Aviation Initiative for Renewable Energy in Germany). MTU established this initiative jointly with airlines, manufacturers and research institutes in order to consolidate activities and expertise in this area in Germany and acts in an advisory capacity.

Prevention of corruption and bribery

MTU condemns corruption of any kind, and all other forms of white-collar crime. The long-term success of any business is founded on compliance with applicable laws and regulations and the company's own internal guidelines. An enterprise-wide framework of compliance rules obliges employees and management to act with responsibility and integrity. These obligations include adhering to statutory requirements and internal regulations. The MTU Principles help MTU to act in a consistent and reliable manner and make compliance with the code of conduct and ethical principles mandatory. Group-wide guidelines also provide clear rules for day-to-day dealings with officials and when it is appropriate to accept business-related gifts. Further internal regulations concerning the prevention of corruption relate to hospitality, customer events, donations and sponsoring and the approval process for sales consultants.

As the final decision-making authority, the CEO is responsible for the company's business ethics and anti-corruption policy. In MTU's reorganized compliance management system, introduced in fall 2018, the corporate functions for ensuring the ethical conduct of business activities are the Compliance Board and the group-wide Compliance Officer. The main role of the Compliance Officer, who works closely with the Compliance Board, is to prevent corruption by further developing MTU's compliance system. The Compliance Board holds both regular and ad hoc meetings at the invitation of the Compliance Officer. The Compliance Officer submits quarterly reports to the Executive Board and the Supervisory Board's Audit Committee, which for its part informs the plenary meetings of the Supervisory Board. The Supervisory Board's Audit Committee oversees the Executive Board's compliance activities.

The company has instituted a global whistleblower system that allows employees and external stakeholders to report suspected cases of wrongful conduct to an ombudsman. The ombudsman forwards any such information to the Compliance Officer, who initiates appropriate action if such suspicions are confirmed.

MTU's goal is to prevent any possible forms of misconduct across the group (principle of zero tolerance). In the 2018 reporting period no suspected or confirmed cases of corruption were identified.

Memberships

MTU monitors its compliance management systems on the basis of the requirements of assurance standard IDW AssS 980 published by the Institute of Public Auditors in Germany (IDW) and the Good Practice Guidance on Internal Controls, Ethics, and Compliance issued by the Organization for Economic Cooperation and Development (OECD). The group is also a member of the following initiatives whose activities include the prevention of corruption and bribery:

- Aerospace and Defense Industries Association of Europe
- UN Global Compact
- TRACE International

Addressing compliance risks

To minimize compliance risks, the Compliance Officer inspects sales support consulting contracts for possible corruption risks before they are placed or renewed. The potential consultants are also reviewed by an independent provider of due diligence services. The corporate audit department conducts regular compliance audits in which it checks business processes and procedures for conformity to legal requirements and for adherence to internal guidelines. Raising awareness for corruption risk management is done first and foremost by organizing mandatory anti-corruption training courses for managers and for employees who hold specific positions, for example in sales. Staff training on the code of conduct with a focus on preventing corruption was offered in 2018 via the e-learning platform.

Monitoring and improvement
MTU is committed to continuously improving its compliance system and to this end initiated an external review in 2017. The company is now in the process of successively implementing the improvement measures resulting from the review and, based on those recommendations, restructured the compliance system in the 2018 reporting period. As part of this, the additional position of a group-wide Compliance Officer has been created and the compliance organization has been modified accordingly. From 2019, the Compliance Officer will replace the ombudsman as the point of contact for complaints and reports of suspected misconduct. The Compliance Officer will also be in charge of further developing the whistleblower system. In order to standardize this procedure, MTU began with the planning of an online reporting system in the 2018 reporting period. The company plans to introduce a new group-wide compliance reporting system in 2019, with standardized reporting procedures across the individual sites.

Occupational safety
MTU places a great deal of importance on the safety of its employees. Occupational safety and employee health are enshrined as one of the key principles of corporate social responsibility in MTU's code of conduct. Compliance with national statutory regulations on occupational safety is embedded in the code of conduct as a mandatory minimum standard for all international MTU subsidiaries. In addition, MTU has set up an internal standard that lays down generally valid parameters, rules and performance indicator definitions. Reports are submitted to the Executive Board on a quarterly basis by business units throughout the group. Occupational safety is organized and implemented at operational level within MTU at the individual locations. Occupational safety is the responsibility of the site managers and occupational safety officers are appointed at management level at each of the company's production sites. Local technical departments take action on occupational safety issues on site and report regularly to the site management. The workforce at the company's production sites in Germany, Poland and Canada is represented in locally organized occupational safety committees, the composition of which includes members of the works council.

Occupational safety forms part of MTU's IMS policy (integrated management system), and is regularly reviewed and improved. At each of the European production sites, workplace regulations that are mandatory for all employees contain important safety rules pertaining to accident prevention, fire protection and what to do in the event of workplace or commuting accidents.

MTU strives to minimize health and safety risks to its employees and third parties as far as possible, whilst also seeking to make continuous improvements. Workplaces are regularly assessed for any risks and hazards they present for employees so that appropriate measures can be implemented where necessary. With the aim to permanently reduce the number of accidents and reach a level of safety that aspires to prevent any accidents whatsoever, the local occupational safety officers record all accidents according to uniform criteria and investigate them together with the affected employees and their managers. Where the analysis reveals notable accident hotspots, the causes are investigated and appropriate steps taken to prevent a recurrence. In addition, the company has a system in place to record and evaluate near-misses at all production sites. MTU's occupational safety systems include regular safety training for all employees and the appointment of trained first responders. The local technical departments are continually carrying out prevention work at the company's sites through training sessions and information on occupational safety issues.

The occupational safety management systems in place at the German production sites are certified externally in accordance with the international Occupational Health and Safety Assessment Series (OHSAS) 18001 standard.

High standards of protection at MTU
High standards in occupational safety across the group are one of the company's annual corporate objectives, and 2018 was no exception. For each location, annual tolerance thresholds are additionally set for category-4 reportable workplace accidents (accidents that entail more than three days of absence). In 2018, measured across the MTU group as a whole, the number of reportable workplace accidents per 1,000 employees was 4.3 (3.9 for MTU AG). This standard of protection is high compared with the average for the German metal-working industry of 35 accidents per 1,000 employees (Wood and Metal Trade Association BG Holz- und Metall, 2017 data). For the group as a whole, the total number of reportable accidents in 2018 resulting in more than three days of absence was 42 (20 for MTU AG), which is higher than the 2017 figure of 33 (17 for MTU AG). This increase lies within the normal annual fluctuation range. The number of accidents increased in particular at the Munich and Ludwigsfelde locations in Germany. Since it was not possible to link all these incidents to one specific cause, future improvement measures will be focused on reinforcing employees' and managers' safety awareness, given that most of the reported accidents were due to human error. As in 2017, there were no fatal accidents at MTU in 2018. The accident statistics relate to the total

workforce, including trainees/apprentices, interns, pupils and students, and employees on fixed-term contracts (excluding temporary agency workers and employees from external companies).

Continuous enhancement of the safety culture
Occupational safety is organized at the level of the individual MTU locations. Proactive measures are derived from regularly updated risk assessments, routine workplace inspections and audits of production and management processes. All accidents are reported and evaluated; the accident analyses show that MTU's machines and plants have a generally very high level of technical and organizational safety, with the cause of many accidents being behavior-related. Occupational safety in 2018 again focused on promoting risk-aware behavior with the aim to continuously enhance the safety culture. This also involves a regular exchange of information and cross-audits in the production and specialist departments across the German locations.

At the end of 2017, MTU's Munich headquarters launched a "mission zero" campaign with a vision to aspire to a level of safety of zero accidents in the area of occupational safety. The company initiated additional measures within the context of this campaign in 2018, such as raising awareness for safe walking or the safe handling of cutting tools as part of the mandatory annual safety training for all employees. At the Hannover location, 2018 saw the launch of the campaign to improve behavior-oriented occupational safety entitled "Enhancement of the safety culture" under the responsibility of the senior management in Hannover and with a rollout at team level and the definition of common focal points for the individual areas. MTU Maintenance in Ludwigsfelde directed its focus in the period under review on evaluating workplace ergonomics in connection with the new shop construction and on implementing the risk assessment of psychological stress at the workplace that is already in place in Munich and Hannover. Local occupational safety measures at the international locations in 2018 included standardized safety walks in production (Vancouver, Rzeszów) and honoring the department with the best performance (Rzeszów) as well as an information campaign under the heading "My safe workplace" that recognizes the employees with the safest workplaces (Rzeszów).

Employee development
Qualified and motivated employees are indispensable for driving innovation and ensuring competitiveness in the technically demanding aviation industry. In many areas in which MTU is active, aviation authorities additionally prescribe qualification measures, such as mandatory training in human factors (errors caused by human failings) or for employees authorized to issue certification under aviation legislation. In addition to industry-specific vocational training, such as aircraft maintenance engineer, and dual courses of study aimed at building up knowledge over the long term, MTU supports and promotes employee training – this is a key principle of corporate social responsibility defined in the company's code of conduct. Promoting vocational training opportunities and avenues for personal development for employees and managers is also enshrined in the MTU Principles and group-wide HR strategy. The head of human resources is responsible for the training and development of employees group-wide. The Executive Board is kept informed about training indicators once a year through the education and training report, and occasionally discusses important training initiatives.

The great importance placed on training and development is reflected in a group-wide works agreement in Germany that guarantees access to training for all employees and requires management to conduct an interview with each employee once a year to discuss their training and development. The international locations also have their own regulations; at MTU Aero Engines North America, for example, each employee receives an annual development plan. At MTU's three sites in Germany, the works council is also involved in employee training in accordance with the German Works Constitution Act (Betriebsverfassungsgesetz) and has a say in the annual training and development program.

Employee development and lifelong learning help employees hone and develop their skills. Employees' training requirements are systematically reviewed on an annual basis. To this end, the training requirements of the workforce are established in a standard process either in a direct conversation (training interview) or in divisional/company-level interviews. After completion, training courses are evaluated in a personal meeting between the employee and their superior, or in some cases via a feedback form. Completed training and development courses are documented in a training history. Training officers can be consulted at any time for advice on needs-focused training.

Furthermore, a new online portal aims to provide a more modern approach to professional development for all employees in Germany. Thus, an e-learning portal set up in mid-2017 makes access to training more readily available to employees. In addition to web-based training, the IT tool gives employees the possibility to organize their own training program in consultation with their superior. The digital learning programs have so far received positive to very positive feedback from participants. The training

content was extended in 2018 and from 2019, the first training programs will be made available for non-German locations in English and Polish.

Management competencies fit for the future
One key area of focus in MTU's employee development policy is to anchor sustainable leadership skills in the management team, and in this way empower both managers and employees to contribute proactively to MTU's future success. This is also reflected in the objectives the company sets itself each year. The objective for 2018 was to ensure more effective leadership based on clear expectations, open feedback and responsible decision-making. One important instrument in strengthening leadership is the group-wide Business Challenge learning initiative, which in 2018 was all about taking MTU's leadership culture to the next level. The "Business Challenge: Leadership Values" program places the emphasis on implementing shared leadership values as a basis for sustainable leadership behavior as well as an innovative corporate culture across the group. The Executive Board and managers have jointly established the leadership values "We transform, we empower, we create trust" as a complement to MTU's existing leadership competencies. These will apply across all divisions and locations. These leadership values are being integrated in a first step at MTU's organizational units in Germany from fall 2018. Four events held in Munich and Hannover launched the rollout process. They were attended by managers from all levels. These were followed up by workshops at center and department level in order to anchor application of the leadership values in day-to-day management activities. In 2019, similar workshops will be held at the locations outside Germany.

In order to promote a common understanding of leadership in a global business environment, the International Leadership Program (ILP) has been established that takes place every two years and is again scheduled for 2019.

Employee satisfaction surveys with good results
One important yardstick for successful teamwork and leadership is the employee satisfaction survey held at MTU's German locations every three years. In the 2018 reporting year, the survey achieved a high participation rate of 81 %. An independent institute evaluated the data collected and determined the High Performance Organization Index (HiPO), which measures a company's performance in terms of factors such as commitment, leadership, processes and structures. The results show an overall positive development compared with the last survey held three years ago, with the HiPO Index increasing by eight percentage points to 73 %. Areas where a need for action has been identified, such as better cooperation across teams and locations or improved decision-making processes will be dealt with in a structured follow-up process by an interdisciplinary team consisting of members of senior management and the Executive Board. Managers actively drive forward further developments at divisional and team level in dialog with their employees.

MTU Aero Engines Polska in Rzeszów also asked its employees for their feedback in 2018, with the support of an external provider, and they responded with a participation rate of 70 %. The overall result showed that 84 % of the employees are highly satisfied with MTU as an employer. The rating was in the top third in all 15 survey categories. In the follow-up process, an improvement was initiated in the cooperation between teams and the further development of leadership skills.

Diversity and equal opportunities
MTU is actively committed to equality of opportunity and equal treatment of all employees and takes a clear stand against discrimination at the workplace. These are the principles underpinning MTU's corporate behavior and that are set out in its code of conduct, which applies worldwide. MTU endeavors to deploy and support all employees in accordance with their skills, abilities and performance. Everyone should have the same opportunities regardless of their gender, ethnic origin, age, religion, disability or sexual orientation. Promoting diversity is a key component of the corporate culture and business success that is enshrined in the MTU Principles. MTU firmly believes that a diverse workforce bolsters a company's innovative capabilities and competitiveness and views fostering female talent and equal participation of women in management as its greatest innovation potential. The company sees broad scope for action here, above all in Germany. The Executive Board is kept regularly informed about the diversity concept with respect to the promotion of women and measures that have been initiated. Furthermore, the Executive Board presents a report on equality at the works meeting of the German locations once a year. In Germany, the works council is involved in decisions subject to co-determination, such as flexible working time rules.

MTU commits to diversity and equality of opportunity in the following external initiatives:

- Charter of Diversity
- UN Global Compact
- Munich Memorandum for Women in Management

To ensure diversity and equal opportunity within the company as well as to prevent discrimination, MTU

espouses a corporate culture based on respect and appreciation that promotes fair and cooperative conduct. Processes are implemented to allow breaches of the code of conduct or of internal guidelines to be reported. Employees group-wide who suspect breaches of the code of conduct can contact an ombudsman or the Compliance Officer confidentially. Managers, the works council and members of the human resources department are also designated as persons of trust in this context.

Information on dealing with discrimination in connection with human rights can be found in section "Respecting human rights" in this non-financial statement.

Women in management

Promoting a diverse and international workforce is one of the company's ongoing overarching corporate objectives, which it continued to pursue in 2018. MTU attaches particular importance in this context to gender diversity in order to make better use of talent potential in the face of demographic change and better position the company for the future. One important goal is therefore to increase the proportion of women in management positions at the German sites to 13 % by 2022 for all management levels except Executive Board level, where the target is 25 %.

The principal focus of the initiatives worldwide and especially in Germany was again in 2018 to secure more female talent for the company and offer female employees greater support throughout their careers. The initiatives are elaborated and implemented at the individual locations. MTU focuses on getting more women into management by participating in several mentoring programs for women:

- For example, since 2003 it has participated in the Cross-Mentoring program organized by the City of Munich, in which high-potential female employees are supported for a year by a mentor from another company, and MTU managers also become involved as mentors.
- Since 2018, the company has also been a member of the University of Stuttgart's Mentoring Program for Female Students and Researchers ("FeelScience" module for female doctoral students).
- Similarly since 2018, MTU has been supporting the multi-stage program of the TU Munich to promote female doctoral students and post-docs (participation in the Women's Career Talks).
- At the Hannover location, MTU Maintenance became a program partner and a member of the corporate advisory council in 2018 of the new "Project U" cooperation project for STEM students at Leibniz Universität Hannover, in an attempt to attract more female talent to the company.

Apart from its involvement in selected cooperation programs, MTU has also established extensive in-house initiatives to improve employees' work-life balance. These include flexible working hours, services to assist families and mobile working. In October 2018, a first women's networking workshop was held at the Munich headquarters to discuss the possibility of setting up and making available an MTU platform allowing female employees to communicate and share their views.

For MTU, the number of female new hires and the proportion of women among high-potential candidates at the Development Center (DC) provide indicators of where changes are emerging. By means of training exercises and interviews, the Development Center in Germany helps female talent draw up a personal development plan to assume a management function in the short term. In 2018, the proportion of female participants at the DC was 20 % (23.3 % MTU AG) compared with 11.9 % in 2017 (16.1 % MTU AG), and of female new hires in Germany 14.7 % (18.8 % MTU AG) as opposed to 16.9 % (26.7 % MTU AG) in 2017.

The proportion of women in management positions in 2018 was 10.7 % for the group (2017: 10.3 %), 10.2 % at the German locations (2017: 9.7 %) and 11.4 % for MTU Aero Engines AG (2017: 10.3 %). The proportion of women in the workforce in 2018 was 14.4 % for the group, compared with 14.1 % in 2017, while the proportion at the German locations was 14.2 % (2017: 13.9 %) and the proportion of women at MTU Aero Engines AG in 2018 was 16.0 % (2017: 15.5 %). These statistics show a slight increase between 2017 and 2018, indicating a stable development. The stated percentages are based on the active workforce (employees with permanent or fixed-term contracts, excluding students, interns, trainees/apprentices, short-term holiday workers, temporary agency workers and employees from external companies).

MTU is assessed each year according to the Women's Career Index (FKi), an external tool for evaluating career opportunities for women in business enterprises, and with an index value of 82 ranked among Germany's best companies (fifth place) in the last available assessment (FKi 2017). From the Fki benchmark results, MTU also derives input for new initiatives or measures.

Respecting human rights

MTU respects the internationally proclaimed human rights set out in the United Nations' Universal Declaration of Human Rights and enforces and protects these rights within the company. In its non-financial statement, MTU focuses on human rights pertaining to the company's own employees. MTU pursues the goal of preventing human rights violations occurring in its own business activities (zero-tolerance principle).

MTU is committed to respecting the individuality and dignity of all, maintaining equality of opportunity in the workplace and preventing discrimination. The protection of human rights, the right to appropriate remuneration, as well as recognition of regulations governing employee and union representation under labor and works constitution law, are implemented group-wide through the code of conduct. As an employer, MTU aims to create fair working conditions based on legally binding employment contracts with appropriate remuneration. This includes the right to unionize and to adopt collective agreements. Compliance with the code of conduct and ethical principles is enshrined in the MTU Principles. The commitment to respecting human rights is reinforced by MTU's status as a signatory to the UN Global Compact and by national legislation that upholds human rights. In Germany, MTU is, for example, bound by the General Act on Equal Treatment (AGG), which prohibits discrimination against employees and job applicants. For employees in Germany, there are also internal guidelines on fair and cooperative conduct that are designed to prevent bullying, sexual harassment and discrimination.

Established reporting procedures are intended to ensure that MTU follows up all complaints or reports of human rights infringements. Reports can be submitted to the ombudsman or the Compliance Officer as the point of contact within the company; additionallylocations have a designated local contact. In line with the provisions for example of the General Act on Equal Treatment (AGG), every site in Germany has a designated contact who is appropriately trained, to whom employees can address any complaints of discrimination. In Hannover, a second, female contact has been appointed to deal with cases of sexual harassment. The designated contacts at the two other sites are women. MTU Maintenance Canada has set up an Employment Equity Committee to handle complaints or information relating to equal opportunities at the workplace and appointed an Employment Equity Officer to whom employees can address their concerns. At MTU Aero Engines Polska this function is carried out by an elected employee representative. Employees can also report complaints to managers, the works council or the head of human resources. The Executive Board is informed about infringements depending on the severity of their impacts.

When they join the company, new employees are informed about the regulations laid down in the code of conduct and – in Germany – in the General Act on Equal Treatment (AGG), and they undertake to comply with these requirements. In addition, MTU provides regular training on the code of conduct at all the company's sites and across all hierarchical levels.

Group-wide in the 2018 reporting period, there was one substantiated complaint at the MTU Maintenance Canada location in Vancouver under the prevailing antidiscrimination law (BC Human Rights Code). This complaint was followed up and appropriate action taken. Other than this, there were no substantiated breaches of the code of conduct within the MTU group.

MTU AG (disclosures in accordance with the German Commercial Code (HGB))

The management report of MTU AG and the group management report for the financial year 2018 have been combined in accordance with Sections 298 (2) and 315 (5) of the German Commercial Code (HGB). The annual financial statements of MTU AG were prepared in accordance with the provisions of the German Commercial Code (HGB) and are published together with the combined management report in the electronic version of the Federal Gazette (Bundesanzeiger).

The business environment of MTU AG corresponds for the most part with that of the group as described above under the heading *"Business environment".*

Business activities

MTU AG develops and manufactures commercial and military aircraft engines and aero-derivative industrial gas turbines. The company also carries out maintenance of military engines. In the military sector, MTU AG has for many decades been the leading company in the national market and lead industrial partner to the German armed forces.

The company is a technological leader in low-pressure turbines, high-pressure compressors and turbine center frames as well as repair techniques and manufacturing processes. MTU is a key partner in all national and international technology programs of note and cooperates with the top names in the industry – GE Aviation, Pratt & Whitney and Rolls-Royce.

Disclosures relating to operating results

[T41] Income statement of MTU Aero Engines AG

			Change 2018 - 2017	
in € million	2018	2017	in € million	in %
Revenues	**3,639.7**	**2,786.1**	**853.6**	**30.6**
Cost of sales	–3,417.7	–2,373.0	–1,044.7	–44.0
Gross profit	**222.0**	**413.1**	**–191.1**	**–46.3**
Selling expenses	–90.5	–71.5	–19.0	–26.6
General administrative expenses	–45.8	–36.8	–9.0	–24.5
Balance of other operating income and expenses	81.3	–19.8	101.1	>100
Financial result	209.9	132.0	77.9	59.0
Earnings from ordinary operating activities	**376.9**	**417.0**	**–40.1**	**–9.6**
Tax expense	–115.4	–131.6	16.2	12.3
Net profit for the year	**261.5**	**285.4**	**–23.9**	**–8.4**
Allocations to other reserves [1]	–114.0	–142.7	28.7	20.1
Net profit available for distribution	**147.5**	**142.7**	**4.8**	**3.4**

[1] For allocation to other revenue reserves in accordance with Section 58 II of the German Stock Corporation Act (AktG) following approval by the Supervisory Board

Revenues

Revenues in the financial year 2018 increased by € 853.6 million (30.6 %) to € 3,639.7 million. The commercial engine business provided much of the impetus for this growth, especially the new GTF programs. Other factors were effects arising from the revised revenue recognition process. For further information, see the separate income statement of MTU Aero Engines AG at December 31, 2018, in *Part VII of the Notes to the consolidated financial statements (Determination of the net profit available for distribution on the basis of the German GAAP annual financial statements).* These effects were counteracted by the development of the U.S.-dollar exchange rate against the euro, which went from an average of 1.1297 in 2017 to 1.1810 in 2018.

Cost of sales and gross profit

The cost of sales increased at a higher rate than revenues, by 44.0 % compared with the previous year. So, despite the growth in revenues, gross profit fell during the reporting period. This development was driven partly by the product mix in place at the Munich location and by the development of the U.S.-dollar exchange rate against the euro, but also by the non-recurring effect arising from the new method of accounting for inventory held in consortium leaders' warehouses, and by the change in the carrying amount of pension obligations. This was coupled with a drop in the gross margin to 6.1 % (2017: 14.8 %).

Balance of other operating income and expenses

In the reporting period, this item mainly comprised net income of € 27.1 million (2017: a net expense of € 41.5 million) from foreign currency translation and measurement of currency holdings, and € 63.7 million (2017: € 31.9 million) recognized in respect of non-cash value adjustments on provisions.

Financial result

MTU's financial result improved by € 77.9 million to € 209.9 million in the financial year 2018 (2017: € 132.0 million). It includes an amount of € 219.7 million (2017: € 153.1 million) representing MTU's share in the profit/loss of equity investments, of which the profit and loss transfer agreements with MTU Maintenance Hannover GmbH, Langenhagen, MTU Maintenance Berlin-Brandenburg GmbH, Ludwigsfelde, and MTU Versicherungsvermittlungs- und Wirtschaftsdienst GmbH, Munich, accounted for a total of € 196.2 million (2017: € 135.4 million).

The net interest expense improved in the reporting period, decreasing by € 10.0 million to € 15.8 million (2017: € 25.8 million), mainly as a result of increased interest income from associates and the scheduled repayment of the corporate bond in mid-2017.

Earnings from ordinary operating activities

The significant improvement in the balance of other operating income and expenses, and in the financial result, did not compensate entirely for the decrease in gross profit and the increase in selling costs and general administrative expenses. Consequently, the group's earnings from ordinary operating activities in 2018, at € 376.9 million, was € 40.1 million lower than in the previous year.

Tax expense

Income taxes amounted to € 114.4 million in the financial year 2018 (2017: € 130.7 million). The current effective tax expense amounted to € 122.1 million (2017: € 120.1 million), while deferred tax income amounted to € 7.7 million (2017: a deferred tax expense of € 10.6 million). The net tax amount includes tax income of € 1.0 million in connection with prior years (2017: tax expense of € 0.5 million).

Net profit available for distribution

Assuming the Supervisory Board approves the proposal of the Executive Board to allocate € 114.0 million (2017: € 142.7 million) to revenue reserves as required by Section 58 (2) of the German Stock Corporation Act (AktG), the net profit available for distribution to the shareholders of MTU Aero Engines AG would amount to € 147.5 million for the financial year 2018.

Net of deferred taxes, amounts totaling € 166.1 million (2017: € 130.8 million), arising mainly from the capitalization of internally generated intangible assets pursuant to Section 248 (2) of the German Commercial Code (HGB), and a gain of € 45.6 million (2017: € 41.8 million) due to the changed method of determining the discount rate applicable to the measurement of pension obligations as required by Section 253 (2) of the German Commercial Code (HGB), were excluded from the net profit available for distribution And were matched in full at the reporting date by free reserves as required by Sections 268 (8) and 253 (6) of the German Commercial Code (HGB).

The Executive Board has proposed to the Supervisory Board that, following allocations to other reserves, a dividend of € 2.85 per share (2017: € 2.30) be paid out to shareholders for the 2018 financial year. This corresponds to a dividend yield of 1.8 % (2017: 1.5 %), based on the closing share price at year-end 2018 of € 158.40 (2017: € 149.40). On condition that the proposal is accepted, the total dividend payment will amount to € 147.2 million (2017, by resolution of the Annual General Meeting: € 118.4 million). Pending approval by the Annual General Meeting, the dividend for the financial year 2018 will be paid on April 16, 2019.

Disclosures relating to financial situation and net asset position

[T42] Balance sheet of MTU Aero Engines AG

	Dec. 31, 2018		Dec. 31, 2017		Change 2018 - 2017	
in € million	in € million	in %	in € million	in %	in € million	in %
Assets						
Intangible assets and property, plant and equipment	1,710.0	30.8	1,650.9	33.7	59.1	3.6
Financial assets	848.1	15.2	877.8	17.9	–29.7	–3.4
Total assets	**2,558.1**	**46.0**	**2,528.7**	**51.6**	**29.4**	**1.2**
Inventories	664.1	11.9	873.4	17.8	–209.3	–24.0
Receivables and other assets	2,193.4	39.4	1,375.2	28.0	818.2	59.5
Cash and cash equivalents	5.2	0.1	0.2		5.0	>100
Current assets	**2,862.7**	**51.4**	**2,248.8**	**45.8**	**613.9**	**27.3**
Prepaid expenses	**6.0**	**0.1**	**4.2**	**0.1**	**1.8**	**42.9**
Deferred tax assets	**136.5**	**2.5**	**120.6**	**2.5**	**15.9**	**13.2**
Total assets	**5,563.3**	**100.0**	**4,902.3**	**100.0**	**661.0**	**13.5**
Capital						
Subscribed capital	51.6	0.9	51.5	1.1	0.1	0.2
Capital reserves	423.5	7.6	408.9	8.3	14.6	3.6
Revenue reserves	1,117.1	20.1	972.8	19.8	144.3	14.8
Net profit available for distribution	147.5	2.7	142.7	2.9	4.8	3.4
Equity	**1,739.7**	**31.3**	**1,575.9**	**32.1**	**163.8**	**10.4**
Pension provisions	643.6	11.6	600.7	12.3	42.9	7.1
Other provisions	1,757.4	31.6	1,279.4	26.1	478.0	37.4
Total provisions	**2,401.0**	**43.2**	**1,880.1**	**38.4**	**520.9**	**27.7**
Liabilities						
Bonds	602.4	10.8	602.4	12.3		
Liabilities to banks	54.4	1.0	108.2	2.2	–53.8	–49.7
Advance payments received	277.4	5.0	300.0	6.1	–22.6	–7.5
Trade payables and sundry other liabilities	297.7	5.3	253.2	5.2	44.5	17.6
Liabilities	**1,231.9**	**22.1**	**1,263.8**	**25.8**	**–31.9**	**–2.5**
Deferred tax liabilities	**190.7**	**3.4**	**182.5**	**3.7**	**8.2**	**4.5**
Total equity and liabilities	**5,563.3**	**100.0**	**4,902.3**	**100.0**	**661.0**	**13.5**

Total assets increased by € 661.0 million (13.5%) year on year to € 5,563.3 million.

Intangible assets and property, plant and equipment increased by a total of € 59.1 million to € 1,710.0 million. In the financial year 2018, intangible assets in the amount of € 113.4 million were capitalized. Of this sum, € 36.6 million (2017: € 16.5 million) relates to shares in the GE9X, PW1900G and PW800 programs. Other additions to intangible assets included externally acquired development costs amounting to € 14.3 million (2017: € 25.3 million) and internally generated development costs amounting to € 58.2 million (2017: € 57.9 million) for the PW1000G engine family, the GE9X and for the PW800 engine programs. Research and development expenses (recognized under cost of sales) amounted to € 56.0 million in 2018, down € 26.8 million on 2017. Altogether, MTU's total expenditure on development projects amounted to € 150.7 million (2017: € 151.9 million). Property, plant and equipment increased in particular as a result of new and replacement purchases of machinery, tools/fixtures and IT equipment.

In 2018, inventories decreased by € 209.3 million or 24.0% to € 664.1 million (2017: € 873.4 million). Inventories of raw materials and supplies decreased by € 19.9

million to € 82.3 million (2017: € 102.2 million), while work in progress decreased by € 31.6 million to € 405.5 million (2017: € 437.1 million) and finished products in inventory by € 152.5 million to € 162.1 million (2017: € 314.6 million). The reduction in inventories principally reflects the non-recurring effect arising from the new method of accounting for deliveries to consortium leaders' warehouses, introduced in 2018, which led to a simultaneous increase in trade receivables. Otherwise, the change in receivables continued to reflect the growth in revenues during the reporting period. Advance payments decreased by € 5.3 million to € 14.2 million (2017: € 19.5 million). Altogether, inventories currently account for 11.9 % of net assets (2017: 17.8 %). The sales to inventory ratio was 5.5 (2017: 3.2).

Receivables and other assets increased by € 818.2 million year on year to € 2,193.4 million. The main items contributing to this increase relative to the previous year were accounts receivable from third parties, which rose by € 345.1 million to € 638.2 million, accounts receivable from related companies, which rose by € 221.8 million to € 741.0 million, and accounts receivable from entities in which MTU holds an equity interest, which increased by € 266.9 million to € 729.2 million. The increase in the amount of receivables is mainly attributable to the growth in volume of the GTF programs, the non-recurring effect arising from the new method of accounting for inventory held in consortium leaders' warehouses, and the higher contribution of assets by subsidiaries to the parent company. Compared with the financial year 2017, other assets decreased by € 15.6 million to € 85.0 million.

Cash and cash equivalents increased by € 5.0 million to € 5.2 million. Their percentage of total assets increased by 0.1 % (2017: decrease of 3.9 %).

Equity comprises the capital stock less the nominal amount of treasury shares, capital and revenue reserves and the net profit available for distribution. The debt to equity ratio remained close to the previous year's level, at 31.3 % (2017: 32.1 %).

Provisions increased by € 520.9 million to € 2,401.0 million. This figure includes pension provisions of € 643.6 million (2017: € 600.7 million), an increase of € 42.9 million (7.1 %). Other provisions increased year on year by € 478.0 million. This increase is mainly due to the increase in provisions to cover warranty obligations and subsequent costs by € 107.8 million and € 191.8 million respectively, made necessary by the present product mix and higher revenues. It was also necessary to increase provisions for non-payment risks in respect of trade payables by € 158.9 million. These preventive measures are consistent with the growth in revenues in the reporting period, which also takes into account the non-recurring effect arising from the new method of accounting for inventory held in consortium leaders' warehouses. Tax provisions increased year on year by € 4.6 million.

Total liabilities decreased in relation to the previous year by € 31.9 million to € 1,231.9 million. Liabilities to banks decreased compared with 2017 by € 53.8 million to € 54.4 million. Advance payments received decreased by € 22.6 million to € 277.4 million. On the other hand, other liabilities increased by € 34.5 million to € 209.9 million, liabilities to related companies by € 7.5 million to € 9.8 million and trade payables by € 2.5 million to € 78.0 million. Other liabilities mainly comprise liabilities arising from investments in engine programs in the amount of € 48.4 million, liabilities in connection with acquired development services in the amount of € 44.6 million, and personnel-related financial liabilities amounting to € 46.6 million.

Other disclosures

The opportunities, risks and future development of MTU AG essentially correspond to the opportunities, risks and future development of the MTU group as described in later sections of this combined management report *(Forecasts and Risk and opportunity report).*

As the group's parent company, MTU AG is integrated in the group-wide risk management system that is described in detail in the *Risk and opportunity report.* The description of the internal control system of MTU AG required under Section 289 (4) of the German Commercial Code (HGB) can be found under the heading *"The internal control and risk management system in relation to the group accounting process".*

For further information on the use of financial instruments, please refer to the *Notes to the consolidated financial statements and to the section of the risk and opportunity report entitled "Use of financial instruments."*

Due to its dominant role within the OEM operating segment (commercial and military engine business), and in view of the profit and loss transfer agreements that exist between the parent company and its German maintenance subsidiaries in the MRO operating segment, the outlook for MTU AG is closely aligned with the expected future development of the group as described later on in this combined management report under the heading *Future development of MTU.*

Looking ahead to the annual financial statements for MTU AG in 2019, which are prepared in accordance with the provisions of the German Commercial Code (HGB), the Executive Board expects revenues in the OEM segment to increase in U.S.-dollar terms compared with 2018 by a low double-digit percentage. Revenues in the military engine business are expected to grow by approximately 10 % in 2019. Assuming a stable exchange rate between the U.S. dollar and the euro, MTU expects its earnings from ordinary operating activities to grow at a moderate rate in 2019.

Forecasts

Macroeconomic factors

The Economic Intelligence Unit (EIU) predicts continued robust growth in 2019, albeit at a slightly slower pace of 2.8 %. The global economy is likely to be negatively impacted above all by the trade conflict between the world's two largest economies, USA and China, and the U.S. Fed raising base lending rates. In the USA, the EIU expects growth of 2.3 % for 2019, while in the eurozone the economic growth rate looks set to reach 1.5 %. The main challenges in the eurozone are the handling of Brexit and the level of indebtedness in Italy.

For China, the EIU forecasts a slowing of economic growth to 6.3 % in 2019. A high level of indebtedness and a downturn in capital expenditure and consumer spending may hurt the Chinese economy.

Microeconomic factors in the aviation industry

On the back of a slight decline in economic growth, coupled with higher ticket prices as a result of the increasing cost of labor and kerosene, the International Air Transport Association IATA anticipates a more moderate increase in global air transport in 2019 compared with the 2018 financial year. Nevertheless, at 6.0 %, growth is likely to remain at a high level.

The EIA predicts an average price per barrel of Brent crude of U.S. $ 61 for 2019. Uncertainties exist with regard to the development of oil prices: On the one hand, oil production is falling in Iran and Venezuela, while on the other extraction of shale oil by fracking companies in the United States is increasing rapidly, accompanied by an anticipated slowdown in the demand for oil on the global market as a result of the moderate economic growth.

Uncertainty surrounding kerosene prices shores up demand for new, more efficient aircraft and ensures full order books for Airbus and Boeing. Both aircraft manufacturers are planning to raise their production in 2019: Airbus intends to increase the monthly output of the A320 family to 60 aircraft, and Boeing plans to raise output of the 737 to 57 aircraft per month. From 2019, Boeing plans to increase production of the 787 from 12 to 14 aircraft per month. Thanks to the boom in e-commerce, the older Boeing 767 cargo aircraft is also experiencing a renaissance, prompting Boeing to increase production to 3 aircraft per month in the short to medium term.

Future development of MTU

The statements below are based on the knowledge available at the beginning of 2019. Owing to the large number of new programs, any delays that might occur in development or in the ramp-up of volume production could have an effect on the performance indicators.

Expenditure on new products and services

The ramp-up of the new Geared Turbofan™ programs, which are enjoying considerable market success, has for the past several years called for substantial capital expenditure on development and production resources.

To limit the resulting increase in inventory levels, a project to reduce inventory requirements was launched at the end of 2018. In the OEM segment, this project will focus on supply chain optimization while in the MRO segment the emphasis will be on reducing cycle times, transport distances and warehouse inventories.

The ramp-up of the new engine programs means that MTU has had to invest heavily in building up highly productive manufacturing and logistics capacities at its main site in Munich. Meanwhile, MTU has continued to build up additional capacity at its other German locations and, more especially, in Poland and Canada.

Outlook for 2019

Targets

MTU's targets for the financial year 2019 are as follows:

[T43] Outlook for 2019

in € million	Forecast for 2019	Actual 2018
Revenues	approx. 4,700	4,567.1
EBIT margin adjusted (ratio of EBIT adjusted to revenues)	approx. 15.5%	14.7%
Net income adjusted	Growth in line with EBIT adjusted	479,1
Free cash flow	Stronger growth than net income adjusted	202.9

The company expects its earnings and free cash flow to continue rising in 2019.

Revenues by operating segment

In the commercial engine business, MTU expects to see an increase in revenues in 2019, both from engine manufacturing activities and from spare parts sales. All in all, it is expected that this area of business will organically grow by a high single-digit percentage.

Growth in the commercial engine business depends above all on a further increase of deliveries for the new Geared Turbofan™ programs, whereas deliveries of the V2500 predecessor are expected to decline.

Revenues in the military engine business are expected to grow by approximately 10% in 2019.

Revenues from spare parts sales are projected to grow by a mid-to-high single-digit percentage, driven principally by the V2500 program.

After several years of substantial growth, MTU's revenue forecast for its commercial maintenance business (MRO segment) is that it will level out in 2019 in U.S.-dollar terms. One reason is that shop visits previously carried out in Germany by MTU Maintenance Hannover GmbH, Langenhagen, on behalf of IAE International Aero Engines AG, Zurich, Switzerland, are now being subcontracted to MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China. As of 2019, IEA International Aero Engines AG, Zurich, Switzerland, will directly assign these shop visits to MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China, with the result that the corresponding revenues and costs of sales will no longer be recognized in the accounts of MTU Maintenance Hannover GmbH, Langenhagen. The related profits will still be recognized as profit/loss of companies accounted for using the equity method, in this case contributed by MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China.

On a comparable basis, assuming that maintenance services provided by MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China, to IAE International Aero Engines AG, Zurich, Switzerland, were to be invoiced indirectly via MTU Maintenance Hannover GmbH, Langenhagen, this would result in organic growth at a percentage in the high single-digit range for the commercial MRO business.

Given these considerations, MTU expects to see total group revenues, expressed in euros, grow steadily to a forecast amount of approximately € 4.7 billion. This estimate is based on an average exchange rate of the U.S. dollar to the euro of 1.15.

Operating profit
MTU expects its operating profit (EBIT adjusted) to grow at a higher rate than revenues in 2019. In concrete terms, MTU expects to achieve an adjusted EBIT margin of around 15.5 % (2018: 14.7 %). For comparison, i.e. assuming that the above-mentioned changes don't taken place, the EBIT margin would remain stable. Major factors likely to improve earnings in 2019 are growth in spare part sales for commercial engines, growth in the military engine business and growth in the commercial maintenance business (MRO segment).

In 2019, net income adjusted is expected to grow in line with EBIT adjusted.

Free cash flow
2019 will be another year of high investment spending. However, MTU plans to compensate for these effects through its operating activities and achieve a higher cash conversion rate (ratio of free cash flow to net income adjusted) in the region of 50 to 60 %. Therefore the free cash flow will grow at a higher rate than net income adjusted.

Future dividend
It is MTU's policy to pay an attractive dividend. Based on the overall prognosis of future business developments, MTU expects to be able to maintain a stable dividend yield in 2019, subject to the approval of the corporate bodies responsible for this decision.

Employees
Due to strong business growth in both operating segments, MTU expects the size of its workforce to increase in 2019. This mainly concerns the MTU locations in Poland, Berlin and Munich. Looking at the group as a whole, the global workforce is expected to increase only moderately, at a lower rate than revenues.

Research and development
In 2019, MTU will continue to focus its research and development activities on increasing engine efficiency by improving the performance of the key components in which MTU possesses specialized expertise, namely the low-pressure turbine, high-pressure compressor and turbine center frame, with a view to reducing fuel consumption and emissions and reducing the frequency of repairs. Detailed information on research and development activities, including the targeted medium- and long-term reductions in fuel consumption and emissions, is provided earlier in this combined management report, under the heading *Research and development.*

Overall prognosis of future business developments in 2019

The MTU Executive Board remains optimistic that it will be able to profitably expand the company's business in 2019, leading to a further increase in revenues, earnings and free cash flow. The sustained high level of R&D activities and the ramp-up of production for the new Geared Turbofan™ programs in 2019 will provide a sound basis for the sustained long-term growth of MTU's business.

Risk and opportunity report

Risk report

Risks are an inherent part of any entrepreneurial activity. In order to take best advantage of market opportunities and to identify and manage the risks involved, MTU has an integrated opportunity and risk management system in place, which is linked to the group's value-oriented performance indicators and its organizational structure. The system is based on the internationally recognized COSO II Enterprise Risk Management Framework and ensures compliance with statutory requirements. To assist in implementing risk management in the MTU group, the central risk management department provides the risk owners with information and working aids: These include the MTU risk guidelines and risk manual, and an extensive checklist, which gives specific examples of what is set down in the guidelines and provides help in everyday practice.

The systematic consideration of significant risk factors is of vital importance to the MTU group, and serves as a fundamental basis for value-oriented controlling functions and ensures sustainable business success. MTU identifies risks early on, analyzes their possible consequences and devises appropriate measures to limit them. The key areas of risk exposure are as follows:

- Risks arising from macroeconomic factors and corporate strategy
- Market and program risks
- Risks associated with product development and manufacturing
- Other risks pertaining to business operations

Strategy and risk management system

Control environment

MTU regards a suitable control environment as being essential for a functioning risk management system. The following are considered the main elements of such an environment:

- Management style and philosophy
- Integrity and ethical values
- No-blame culture
- Staff training and development

The concept of learning from mistakes is embodied in the MTU Principles, which in the chapter "Cooperation and behavior" for example formulate the company's commitment to actively driving change, harnessing improvement potential and identifying inefficiencies. This striving for continuous improvement is supported organizationally through lean management in all areas of the company, which aims to create a culture that underpins a functioning risk management system.

Risk management objectives and risk strategy
The objective of MTU's risk management system is to create transparency with regard to all risks and opportunities as well as to ward off risks to MTU's status as a going concern and to safeguard the company's future business success.

The company does not limit itself to ensuring compliance with statutory requirements. It seeks to integrate its corporate risk and opportunity management system into all business processes, from financial planning, to control and reporting processes, right through to monthly reporting to the Executive Board and the Supervisory Board. Risk management also takes place in other corporate areas, for instance it is a key component of project management.

Identification, analysis and management of risks
MTU regards risk management as a continuous process that ensures responsible behavior when dealing with specific risks at business unit level and general risks affecting several business units or the entire group.

The group's risk inventory, which encompasses all the business units and all the risk factors to which MTU is exposed, forms the basis for identifying risks. In accordance with the COSO II Framework, it is divided into governance and compliance, strategy and planning, operations and infrastructure, and reporting. In the interests of a more detailed assessment of risks, MTU has divided this framework into 15 risk categories covering all corporate areas. MTU also examines risks inherent in its business activities that may affect third parties.

Operational risk management takes place at the level of the individual, organizationally separate business units and in the subsidiaries. They are responsible for identifying, assessing, controlling and monitoring the risks in their specific areas, and documenting them in a central risk management tool. To this end, they use a general risk checklist derived from the risk inventory. They submit mandatory reports to the central risk management department for risks exceeding an amount of € 1 million over the five-year period under consideration, in the form of risk maps, at dates allowing them to be reviewed together with the quarterly financial results. The risk maps also serve to document risks below the threshold of € 1 million. Risks occurring during the year that could threaten the company's status as a going concern are reported immediately to the central risk management department. Risks are assessed based on uniform definitions of the probabilities of loss occurrence and as possible deviations of the group performance indicators "EBIT adjusted" and "free cash flow" from the currently applicable operational planning figures. In addition to financial risks, risk management also expressly considers non-financial risks.

The central risk management department aggregates and consolidates the reported risks. This department is also tasked with providing assistance during the risk management process, prescribing uniform methods and tools, and evaluating the overall risk position at group level. It furthermore supports the work of the cross-divisional Risk Management Board, which acts at group level to perform centralized control and monitoring functions. At its quarterly meetings, the Risk Management Board discusses the interactions between individual risks, ensures that all risks have been reported in full, and assesses the risk exposure of the group as a whole.

Risk reporting and risk communication
The MTU Executive Board receives a risk report once a quarter and is kept informed of the group's current risk situation. The risk report is coordinated with the Risk Management Board and is divided up into reporting segments. The Top Risk Map included in the report comprises all risks and opportunities above € 10 million in value over a five-year period and gives details of their probability of occurrence and possible countermeasures.

The Supervisory Board's Audit Committee is also given an update of the MTU group's risk position on a quarterly basis. The most important issues from the previous risk review are also presented in the monthly report to the Executive and Supervisory Boards.

Monitoring the risk management process
Monitoring the risk management process is of crucial importance for ensuring the proper functioning and ongoing development of the risk management system.

In addition to verification by the auditor of the system employed for the early recognition of risks, the risk management system is monitored and verified by other functions:

- Regular checks by the internal auditing department
- Oversight by the Supervisory Board
- Process reviews by the Risk Management Board in the form of a self-assessment

Strategy risks

Risks arising from macroeconomic factors

In general, the MTU group's business development is subject to a number of different risks, especially the U.S. dollar exchange rate, the level of commodity prices, the development of air traffic, and general economic risks. Taking the latest market forecasts into account, MTU sees the possibility of negative impacts for the company arising from reduced economic growth, increased protectionist measures in some economies or from the high sovereign debt in certain nations of the world economy or from the resulting monetary policy of the central banks. MTU is currently analyzing the possible effects of recent changes in the political environment (EU and U.S. interest rate policy and changes in international tax and customs regulations), in order to identify potential risks. Political crises in some regions and restrictions on air travel imposed as a result of natural disasters, epidemics or terrorist attacks are regularly discussed during the risk management process, but are currently not classified as critical. If the current economic situation should deteriorate, this could impact the volume of passenger or freight traffic, reduce the need for maintenance services and prompt a more cautious approach to orders for new air transportation capacity. In addition, further national budget cuts could negatively impact the military engine business. The current view, however, is that defense budgets are more likely to increase. Other risks affecting industry in general include fluctuating energy costs, the unavailability of suppliers, and delays in deliveries from suppliers. A further risk affecting engine programs are changes to interest rates and delayed delivery schedules due to the typically long lead times.

Risks arising from corporate strategy

The main forms of strategy risk are misjudgments when taking decisions concerning investments in engine programs, the establishment of new sites, and possible M&A activities. During the decision-making phase of a program, highly qualified specialists perform cost-benefit analyses based on set procedures that include the obligation to carry out a risk analysis on the basis of different scenarios. MTU's business model is based on long-term processes, particularly in the OEM segment. Many years of development, preproduction and volume production may lie between the decision to invest in a new commercial engine and the breakeven point.

The risk is that the original economic and technological parameters on which the decision was based might change over the course of time, hence the need for frequent reassessments that take into account the most recent economic and technological developments.

Decisive factors in this regard are, in particular, the success of the aircraft platforms on which the engines are deployed and any changes made to those platforms. MTU counters such strategy risks by means of a broad portfolio. That means that the company limits the impact of an individual program or aircraft platform by holding an interest in a wide range of products across all thrust classes.

In the longer term, a further identifiable risk in addition to that arising from MTU's strategic decisions is the arrival on the market of new competitors, e.g. from Russia or China. But given the high barriers to market entry, this risk is currently not regarded as critical.

Substitution risks arising from disruptive technologies

Electric propulsion systems for aircraft are in principle a substitution risk for conventional engine technologies, but they do not yet by far achieve the performance required to power a large passenger or freight aircraft. In collaboration with research partners, MTU has been studying all conceivable concepts, in order to be prepared. Among the key results from these studies are:

- If they continue to develop as expected (i.e. 5 % improvement of electrical storage capacity of batteries per year), it will be 30 years before electric engines can be used on regional aircraft.
- For short and medium-haul aircraft, which are an important market for MTU, there are some initial ideas for how to improve the battery capacity, but several decades of development work will be required until they can be used commercially.
- For long-haul aircraft, MTU's second most important market, no battery concepts with sufficient capacity are known of at present.

Much closer to a market introduction in the commercial aviation sector are hybrid propulsion systems, which combine electric motors, generators, gas turbines and batteries. These open up new possibilities for aircraft design and engine integration and still rely on an energy source with high energy density in the form of kerosene. MTU is involved in a number of studies that are examining the potential of these propulsion concepts.

So, from today's perspective, the MTU fields of business will not be affected by substitution risks in the foreseeable future. However, MTU will keep a close eye on the progress of developments in the field of electric motors and batteries, and compile further studies in order to be able to react in a timely fashion.

A change to alternative propulsion systems will not come suddenly; rather, it is expected to be characterized by a gradual transition with hybrid concepts, in which MTU's current products will continue to play a key role. What is more, MTU is permanently working on improving the efficiency of conventional engines, thus continuously raising the bar for any substitute products.

In view of MTU's core fields of expertise, an involvement in an electrically propelled aircraft is conceivable, so it considers this risk to be manageable.

Further risks could arise as a result of the trend toward increasing digitalization. MTU is monitoring developments in this area very closely and, by implementing its own digitalization strategy, is ensuring that all key areas are covered. From today's perspective, risks to MTU's business model arising from disruptive technologies are unlikely.

In all, MTU does not see any strategic risks at the present time that might endanger its status as a going concern.

Market and program risks

The profit to be gained from existing and established engine programs across their entire lifecycle depends to a large extent on aftermarket sales. Many airlines are still experiencing financial difficulties, especially as a result of competitive pressure in the aviation market. This already strained situation may be further strongly impacted by changes in fuel prices, by exchange rate fluctuations or by state intervention in the aviation industry. Given this, airlines are striving to keep their operating costs, including their aircraft and engine maintenance costs, as low as possible and to improve and lock in their profit margins. In addition, they may delay shop visits or replace defective parts or entire engines with used ones instead of new ones.

The market has also changed for new engine programs, to the extent that the engine manufacturers mainly sell their engines with maintenance packages. So, success no longer depends solely on spare-part sales, but also on the ability to forecast the volume of maintenance services including the supply of spare parts. As with production engines, a key element of the sales campaigns is to offer discounts on maintenance services sold. Moreover, as part of the sales campaigns engine manufacturers frequently offer loan arrangements to the end customer. These agreements are provided in two basic forms: predelivery payment (PDP) and backstop commitments. Within the scope of its partnerships in engine programs, MTU is a party to aircraft financing loans offered by consortium leaders (OEMs) to end customers. MTU's share of these loan agreements is equivalent to its proportional stake in the engine program. It is a fundamental condition that the funds are always made available to the aircraft manufacturer by the lead partners in the consortia (OEM) for the exclusive benefit of a specific airline. The risk of suffering a loss because an airline becomes insolvent is currently considered to be low, due to the collateral rights pertaining to retained goods. What is more, the airlines currently only avail themselves of these arrangements to a limited extent because loans are often available at better terms and conditions on the market than through the loan arrangements in question *(see also the section headed "Financial situation").*

MTU's military engine business customers are national and international agencies, therefore, political changes have an almost immediate effect on MTU. With the tight national budgets that can be observed especially in Europe at present, there is always the risk of buyer countries postponing or cancelling orders. For similar reasons, it may become necessary to renegotiate the scope of deliveries already agreed in existing contracts. In the military engine business, MTU is firmly embedded in international cooperative ventures, which tend to have a limiting effect on risks because the partners work together to protect their common interests. Furthermore, the terms of existing contracts in the military sector are generally defined to cover a prolonged period of time, thus largely ruling out price risks.

The client base in the MRO segment is characterized by a broad customer portfolio with only a few large large individual customers. When committing to new large-scale contracts, the risk arises of not being able to foresee all future economic developments over the long term. Some engine programs in the MRO phase are already at an advanced stage of their lifecycle. This harbors the risk of MTU's MRO portfolio becoming too focused on aging products with a limited future. MTU strives to maintain a balanced portfolio that is constantly being expanded to include maintenance services for new engine programs. However, new programs also harbor a ramp-up risk. Bespoke maintenance services are available for older engine programs.

Dependency on cooperative agreements

The commercial engine market is dominated by a small number of major manufacturers. MTU sells most of its products under risk- and revenue-sharing arrangements with market leaders. The major engine manufacturers, who are the lead partners in the consortia (OEMs), determine the prices, conditions and concessions. They also define the engine development processes prior to the market launch phase of new engines, e.g., the scope

of development costs and the payments toward development made by the individual partners in the consortia. As one such partner, MTU has rights of objection and control, and can improve its own position through negotiations. By virtue of these partnerships, MTU is able to participate in the industry-leading engine programs of the major engine manufacturers. In the commercial engine and maintenance sector, the customers of the consortium leaders (OEMs) are airlines and aircraft leasing companies. The marketing of commercial engines and the maintenance services they entail always involves making concessions to the end customers. MTU is obliged to absorb these concessions to the extent of its program share in risk- and revenue-sharing arrangements. The fact that the cooperation partners share a common interest helps to prevent excessive concessions during contract negotiations with the end customers.

In the commercial maintenance business, MTU's interests in the Asian market include a 50:50 joint venture, MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China. MTU is involved in further joint ventures in the fields of engine leasing, maintenance and development in order to keep abreast of the new structures in the aftermarket and be able to offer the customers a comprehensive range of services. In jointly controlled entities, where decisions have to be made by consensus, there is always a risk of differences of opinion. Participation in international joint ventures also very often reveals cultural and political differences (for instance payment morale).

From today's standpoint, MTU believes its collaborative business model stands it in good stead to effectively manage the market and program risks; in particular in respect of the challenges associated with the development, production and market introduction of new engine programs and architectures. MTU therefore does not expect these market and program risks or its dependency on cooperative agreements to have any significant impact on the group's continued existence as a going concern.

Risks associated with product development and manufacturing

Development risks

In the commercial and military engine business, MTU undertakes to perform development work, during which delays and additional costs may arise. The company ensures strict adherence to time schedules and budgets by permanently monitoring project management across all the departments involved and applying appropriate corrective measures where necessary. Furthermore, through its involvement in collaborative ventures, it works in partnerships that extend beyond corporate boundaries, thus spreading the risk; however, in isolated cases MTU can suffer significant economic impacts as a result of development and production risks materializing with cooperation partners. As the market launch of the innovative GTF engines demonstrates, the complexity of the products means that technical risks cannot be ruled out completely – even when all possible risk minimization measures are implemented. Such risks are not unusual in the context of rolling out completely new product architectures, however.

MTU products are subject to extremely stringent safety and quality requirements. The company requires numerous official certifications, particularly from the FAA and EASA, in order to carry out its activities. These certifications are valid for limited periods and can be renewed only after further tests have been carried out. The well documented development process ensures compliance with all regulations.

Production risks / shop floor risks

Highly sophisticated components and new materials are called for to meet the requirements of the airlines and OEMs with respect to engine weight, fuel consumption and noise emissions. In order to efficiently produce and process such components, MTU develops – and gains official approval for – innovative new manufacturing techniques. This can lead to delays in the start of production, temporarily increased unit costs or temporarily reduced delivery volumes to below those originally agreed. A further risk is that customers might impose penalties in the event that deliveries are delayed. It could also happen that the new manufacturing processes are not yet sufficiently mature to fully meet requirements when volume production is due to start. MTU counters this risk by providing systematic support for the development and implementation process in the context of technology projects.

Procurement and purchasing risks

MTU is dependent on suppliers and third-party vendors for some raw materials, individual parts and components, and for the provision of specific services. Risks can arise in the form of the unavailability of suppliers, problems with quality, and price increases. MTU strives to reduce its reliance on individual suppliers by securing the services of several, equally qualified, vendors for materials, parts and services. All ramp-up programs have a second – and in individual cases a third – back-up supplier for the majority of components. In the case of single-source suppliers, MTU enters into long-term agreements as a hedge against unforeseen shortages and to reduce the risk of sudden price hikes. The risks involved are manageable thanks to the broad diversity of the links in the supply chain.

Occasional delays may arise when ramping up production of new, high-volume programs involving production capacities, production processes or workflow systems, thus affecting the agreed delivery deadlines. MTU supports the ramp-up of new components through strict project management and the deployment of IIMs (Interim Improvement Managers). By deploying specialists on-site with the supplier, MTU is able to track and actively support process progress in a timely manner.

Liability risks

In the aviation industry, as elsewhere, accidents can still occur despite strict compliance with manufacturing quality standards and utmost diligence in performing maintenance work. In the military engine business (excluding exports), MTU is largely exempt from product risk liability through government agency indemnification. The remaining forms of product liability, especially in the commercial engine business, are covered by contractual clauses and by high-coverage insurance policies, including aircraft liability insurance. Other risks that could threaten the company's status as a going concern, such as loss of income through fire or the interruption of business operations, are similarly covered.

By virtue of MTU's collaborative business model and by additionally limiting liability risks and taking out insurance cover, the risks are rendered transparent and manageable. In this respect, MTU believes it is well-prepared to effectively manage the development, production and procurement risks and has not identified any risks related to these activities at the present time that might endanger its status as a going concern.

Use of financial instruments

More than 80 % of MTU's revenues are generated in U.S. dollars. On the other hand, a large proportion of expenses is likewise invoiced in U.S. dollars, thus providing a natural hedge. Most other expenses are incurred in euros and, to a lesser extent, in Polish zloty, Chinese renminbi and Canadian dollars. In line with the corporate policy of generating profit solely on the basis of operating activities and not through currency speculation, MTU makes use of hedging strategies for the exclusive purpose of controlling and minimizing the effect of U.S. dollar exchange rate volatility on EBIT.

The forward foreign exchange contracts concluded by MTU cover the greater part of the net exposure to currency risk, leaving only a small portion of the U.S. dollar surplus exposed to this type of risk. The unhedged portion of future cash flows is translated into euros at the exchange rate prevailing on the date of settlement.

MTU holds a long-term hedge portfolio comprising forward foreign exchange contracts with terms to maturity stretching over several years. At December 31, 2018, the value of the portfolio of hedging instruments with terms until 2020 amounted to U.S. $ 1,660.0 million (which translates to € 1,449.8 million at the exchange rate prevailing on the reporting date).

Detailed information on the financial instruments used to hedge future cash flows is provided in *Part IV of the Notes to the consolidated financial statements (Note 36).*

In view of this long-term hedging strategy, MTU considers its currency risks to be manageable.

For a detailed description of MTU's financial management system, please refer to the *section entitled "Financial situation" (in "Principles and objectives of financial management").*

Other risks pertaining to business operations

Compliance risks

Compliance risks arise when managers or employees of the company fail to comply with laws and regulations or fail to observe internal guidelines. These risks can arise in all areas of the company.

MTU has implemented a number of measures to minimize these risks and to safeguard compliance. The corporate units ensure that laws are complied with and internal regulations observed. The quality department, for example, is responsible for compliance with aviation authority regulations, while the environmental health and occupational safety department ensures that environmental protection regulations are adhered to.

Above and beyond that, measures have been put in place to minimize the risks associated with compliance issues:

- Binding rules of conduct valid throughout the group
- Establishment of a central office to receive reports of suspected misconduct
- Designation of a Compliance Officer
- Continuous security checks of employees
- Regular training courses

Criminal intent can never completely be ruled out. All in all, MTU considers the compliance risks to be manageable, especially in light of the measures taken.

Non-payment risk
Airlines in particular are direct and indirect customers of MTU. These companies may find themselves facing financial difficulties that affect the receivables of MTU and its partners. The consortium leaders in the OEM business have extensive receivables management systems in place. No significant risks have been identified with respect to MTU's long-standing partnerships with OEMs. In the MRO business, the responsible MTU departments monitor accounts receivable in short cycles. A risk assessment is carried out before any new contract is signed and all necessary precautions are taken, for instance by requesting an export credit guarantee (Hermes coverage) – if available – as protection against political credit risk. As a matter of principle, the group avoids signing contracts for which the parameters cannot be calculated. Hence MTU considers non-payment risks to be transparent and manageable.

Environmental risks
MTU is subject to numerous laws and regulations aimed at protecting the environment. Any tightening of the applicable environmental or health and safety requirements may give rise to additional investment costs in connection with the processing of materials containing nickel and cobalt alloys and with the use of chemicals in manufacturing and test rig emissions. It may even become necessary to find replacement substances for those in use (REACH compliance). Further information can be found in the *Non-financial statement, included in the present Annual Report.* MTU requires special certification in order to operate certain production facilities. The regulations must be strictly observed and all procedures fully documented. An environmental management system certified to EMAS minimizes the risks in this area. MTU considers these risks to be manageable.

IT risks
The main IT risks are the theft of confidential data through industrial espionage and data loss due to system failures. Through its experience in dealing with military customers, MTU is particularly aware of the need to safeguard confidential data and operates a strictly controlled, highly advanced data security system. When new IT systems are introduced, there is a possibility of workflows being disrupted. MTU minimizes these risks by employing qualified experts and using professional project management. Although dealing with these risks is becoming more and more costly for MTU, the company still considers them to be manageable in light of the measures implemented.

Personnel risks
The shortage of skilled workers, which is intensified by demographic change, can pose risks to the company. For instance, there may not be enough top performers available to fill vacancies, competent and experienced employees could leave the company and knowledge may be lost. MTU currently considers these personnel risks to be low.

Risks arising from general, customs and tax legislation
Identifiable risks arising from pending tax audits or ongoing customs audits and legal proceedings are managed by the central departments with the support of independent external consultants. The economic impacts have been taken into account in the financial statements where necessary.

MTU is well-prepared to effectively manage the challenges arising from general, international trade and tax legislation and has not identified any risks related to this at the present time that might endanger the company's continued existence as a going concern.

Overall assessment of MTU's risk exposure
Risks in each key area of exposure as described above are assessed for the coming financial year according to their probability of occurrence and quantified as a deviation of EBIT from the currently applicable operational planning figures. In MTU's risk management process, risks are assigned to one of four probability levels. Based on the assessment of MTU's top categories of measurable risk exposure, the following risk positions can be derived for the financial year 2019:

[T44] Assessment of the MTU group's risk exposure

in € million	OEM	MRO
Market and program risks	62.6	12.9
Risks associated with product development and manufacturing	./.	./.
Other risks pertaining to business operations	./.	./.

Apart from a quantitative assessment of the top individual risks and overall risk position, MTU monitors and reports qualitatively on risks associated with development, production and procurement that are not assessable yet – especially in connection with its involvement in the GTF family of engines.

As well as the risks shown in the table above, the risk management process is also used to monitor unplanned events with an impact on free cash flow. In addition to the impact of identified risks on EBIT, this assessment revealed further risk factors in 2019 affecting liquidity valued at approximately € 148 million, which, however, would be covered by the company's existing lines of credit. Other non-measurable risks have been identified over and above those previously mentioned.

Looking beyond the horizon of 2019, there is the possibility that the company may be exposed to other identifiable, in some cases significant, risk factors (potentially impacting earnings and free cash flow), which MTU is continuously monitoring and has integrated into its short- to medium-term planning and risk management processes. MTU considers it extremely improbable that all these risks might arise concurrently. Therefore, aggregated figures must be viewed merely as a rough indication of the MTU group's overall risk exposure.

At December 31, 2018, there had been no substantial changes in MTU's risk exposure compared with the end of the previous year. MTU continues to believe it is well-prepared to effectively manage its business risks, particularly those in connection with the development, production and market introduction of new engine programs. The level of risk exposure is manageable. From the present vantage point, the MTU group's continuing existence as a going concern is not endangered. MTU does not anticipate any fundamental changes in its risk exposure at the present time. The company has taken every possible organizational measure to ensure early awareness of potential risk situations.

Opportunities report

Market and program opportunities

Basic research and the constant refinement of engine technologies followed by their deployment in the final products have made MTU one of the world's leading manufacturers of engine components. MTU's new products lead the field in terms of efficiency because they save fuel and reduce emissions, noise and costs. MTU has achieved considerable market successes with the Geared Turbofan™ (GTF) engines of the PW1000G family, which it develops in partnership with Pratt & Whitney. The A320neo and the Airbus A220 together with the Embraer E190-E2 with GTF engines are already being operated in scheduled service. Further GTF applications will enter scheduled service in the coming years, in particular in the regional jet segment. Since 2018, the PW800 engine family developed in cooperation with Pratt & Whitney Canada, which is based on the same core engine as the GTF, has powered premium manufacturer Gulfstream's new generation of business jets. In order to balance out its engine portfolio in the long-haul segment, MTU has acquired a stake in the GE9X, which will be the sole engine for the Boeing 777X. Thanks to this balanced portfolio, MTU will benefit in the decades ahead from the predicted growth in all market segments – the regional jet, narrowbody and widebody segments. What is more, MTU has an opportunity to raise its share in the medium-haul market, because in addition to its stake in the PW1100G-JM for the A320neo family, it also holds a stake in the V2500 for the classic A320 family. The latter program is now entering the aftermarket phase, offering future potential in the spare parts business.

Among its customers in the military sector, MTU has established a reputation as a highly qualified partner with comprehensive system know-how in product development, manufacture and maintenance. In particular by driving forward its military-engine maintenance services with the German Air Force, MTU sees chances for strengthening its ties with Germany's armed forces.

What is more, ongoing export campaigns – especially for the Eurofighter EJ200 engine and the TP400-D6 for the A400M military transporter – present opportunities to acquire new customers for military business. In addition, the Eurofighter partner countries are discussing the procurement of substitute aircraft for ageing delivery tranches of the Eurofighter.

Driven in particular by the T408 engine, the military-program partnership with GE Aviation is doing well and could generate further opportunities to participate in transatlantic programs going forward.

The changed maintenance-related business practices in the aviation industry, in which MRO services are increasingly being offered together with engine sales contracts, opens up opportunities for MTU to develop customer loyalty in the commercial maintenance segment through integrated service agreements that promise to soften the impact of risks associated with the spare parts market. This integrated approach to MRO enables program partners to become members of an MRO network, giving them access to the entire volume of MRO work associated with an engine series, the so-called network volume, in accordance with their share in the program. Various different work-sharing arrangements are possible. For instance, partners in the MRO network might only perform repairs on their own components, or be allocated a quota of complete shop visits corresponding to their program share. Membership in an MRO network offers lower margins than operating as an independent MRO provider.

Meanwhile, the so-called independent MRO market for engines such as the GE90 and V2500 continues to offer the longer-term prospect for MRO providers of participating in this steadily growing market. In particular, the increase in the number of aircraft no longer tied to the OEMs offers independent MRO providers like MTU the opportunity to gain new customers and to assume responsibility for the management of the maintenance of large fleets.

Over the longer term, continued investments in automation and building up maintenance capacity, for instance through the creation of EME Aero Sp. Z.o.o., will enable MTU to meet future demands in both the OEM and MRO segments.

MTU Maintenance Lease Services B.V., Amsterdam, Netherlands, and Sumisho Aero Engines Lease B.V., Amsterdam, Netherlands, in the field of engine leasing and the founding of MS Engine Leasing LLC., Rocky Hill, USA, for engine leasing with the partner companies in the PW1100G-JM MRO network, were created to extend the group's activities in the lucrative leasing business, and to increase the scope of services provided in the aftermarket. The positive experiences with joint venture partner Sumitomo Corporation could also generate good opportunities to establish further strategic partnerships.

Opportunities associated with product development and manufacturing

The risk report describes the risks associated with product development and manufacturing, but MTU's ongoing development activities also open the way to new business opportunities. For example, the new technologies, including new materials, developed by MTU to improve the performance of its products create opportunities for the company to acquire new partnership roles in future engine programs, and thereby maintain a balanced product portfolio covering engines at all different stages of their lifecycle.

The risk report also refers to the challenges involved in ramping up new programs, and here again these challenges can be transformed into opportunities. Production processes and systems can be optimized, for example through the use of predictive simulation and data management, and new, cutting-edge manufacturing technologies introduced. The risk analyses carried out in order to safeguard production ramp-up, and the measures adopted on the basis of those analyses, can lead to lasting process improvements. The effects of these improvements can not only be felt in new programs, but can also be transposed to existing ones. That leads, for example, to further cost reductions and enhanced delivery reliability. The spread of additive manufacturing techniques (3D printing of components) opens up new possibilities for application-optimized design and potential cost benefits from the production of suitable components.

Shop-floor and office management and the application of lean management methods entail the continuous enhancement of management tools and management behavior, which results in greater transparency and less wastage, helps achieve ambitious targets, and makes for faster problem-solving and more lasting improvements. It helps shorten the time needed to respond to deviations from plan and enables the company to find structured and sustainable solutions to problems, making it possible to put in place stable processes and optimize resource deployment.

Other opportunities

As a large part of the company's revenues are based on contracts invoiced in U.S. dollars – especially in the commercial engine business and commercial MRO – a strengthening of the U.S. dollar against the euro would improve MTU's earnings. If energy prices were to stabilize or retreat to a lower level, and if commodity prices were to fall, this would have a positive effect on MTU's cost structure and hence on its business results.

Other opportunities are listed in the SWOT analysis presented below. See the risk report for information on how the opportunities identified can be exploited and the associated risks avoided.

Overall assessment of opportunities

At December 31, 2018, the opportunities identified by MTU had not changed substantially compared with the end of the previous year. MTU has taken all the organizational measures necessary to recognize potential opportunities in good time and respond to them adequately. MTU applies the same methods in its assessment of specific opportunities as it does when evaluating risks. As a conservative approach is taken to the identification of risks and opportunities, the opportunities are necessarily limited compared with the risks.

In the process of identifying opportunities, a number of smaller opportunities (< € 10 million) were established, which do not form part of the internal top risk and opportunity reporting used to prepare this report. Moreover, due to the long cycles on which MTU's business model is based, the company does not foresee the emergence of any opportunities in the immediately following years because the future engine programs (and especially the GTF programs) are currently still in the development phase or in the early stages of production. These opportunities are largely accounted for in the planning.

MTU does not currently foresee any fundamental changes in its opportunities.

SWOT analysis

The results of an analysis of the main strengths, weaknesses, opportunities and threats (SWOT) identified in the course of MTU's planning and risk management processes are as follows:

[T45] SWOT analysis of the MTU group

Corporate	Market
Strengths	**Opportunities**
Technological leadership – OEM: Low-pressure turbine and high-pressure compressor (2-module strategy) – MRO: expertise in high-tech repairs	Growing market in both operating segments
Balanced engine and service portfolio across all market segments and life-cycle phases	Excellent positioning in the regional jet, narrowbody and widebody segments
Long-term contracts in the OEM and MRO business, involvement in consortia and cooperative ventures	Export opportunities for military engine applications
Participation in aftermarket networks of new programs as well as coverage of all aftermarket services (e.g. leasing)	Growth potential in the MRO and OEM-IGT market (incl.fracking and new applications for energy generation)
Quality and supplier dependability form the basis for reliable partnerships	Greater exploitation of synergies between areas of commercial business (integration of MRO in new engine business)
Application of new manufacturing processes and systems, e.g. use of simulation and data management	Positive changes in U.S. dollar exchange rate
Continuous improvement through use of lean management methods, shop-floor and office management	
Weaknesses	**Threats**
High dependency on U.S. dollar	Changes to aftermarket business models – Price competition in maintenance – Market-entry barriers for OEMs (licenses) – Changes to price and demand in spare parts business
Dependency on decisions of consortium partners	Entry of new participants in engine market
Partnerships focused on only two OEM manufacturers in the commercial market	Fundamental changes in and higher complexity of aircraft engine technologies
Higher wage levels at the traditional manufacturing sites	Additional development costs and contractual penalties due to technical difficulties with new engine types
	Dependency on national and international political decisions
	Negative changes in U.S. dollar exchange rate

The internal control and risk management system in relation to the group accounting process

The current recommendations of German Accounting Standard No. 20 (DRS 20) have been applied in this section of the combined management report concerning the main features of the accounting-related internal control and risk management system.

Objectives and components

The Executive Board, Supervisory Board and Audit Committee of MTU attach the greatest importance to ensuring the regularity, accuracy and reliability of MTU's financial reporting. The accounting-related internal control and risk management system, which provides the yardstick for the MTU group's financial statements, helps ensure that these internal and external accounting requirements are systematically complied with. The Executive Board of MTU bears overall responsibility for establishing and refining the required control and monitoring systems. The systems are tailored to the MTU group's business model and company-specific requirements, and are an important part of the comprehensive approach to corporate governance that defines the basic framework for creating sustainable value for shareholders, customers, employees and the public.

/ The accounting-related risk management system (RMS) is an integral part of the group's comprehensive company-wide risk management system. It forms the basis for the uniform and appropriate handling of risks and for communicating them within the group. The risks entailed in financial reporting at group level are among the corporate risks to be monitored as a whole.
The design of the accounting-related internal control system (ICS) at MTU meets the requirements of the German Accounting Law Modernization Act (BilMoG), the definition provided by the Institute of Public Auditors in Germany (Institut der Wirtschaftsprüfer IDW e.V.), the internationally recognized and established framework of the Committee of Sponsoring Organizations of the Treadway Commission (COSO I), and the features specific to MTU. MTU understands an internal control system (ICS) to be the principles, procedures and measures introduced at the company by its management that are aimed at the organizational implementation of the decisions of management to:
  - safeguard the effectiveness and economic efficiency of business operations – which also includes protecting the company's assets,
  - ensure the regularity and reliability of internal and external accounting, and
  - comply with statutory regulations relevant to the company.

- The internal auditing system, which is process-independent, plays an important role in checking the effectiveness of, and improving, the accounting-related ICS and RMS. The corporate audit department of MTU assesses, and helps to enhance, the controlling and monitoring systems. It is also considered to have an advisory function, contributing toward improving business processes and, ultimately, the effectiveness of the internal control system. The rules of procedure of the corporate audit department comply with national and international requirements as laid down by the Institut für Interne Revision and the Institute of Internal Auditors. The corporate audit department is also bound by the code of professional ethics. The administrative standards of the internal auditing department are available to all employees for perusal on MTU's intranet.
- The Audit Committee of the Supervisory Board deliberates on risk management and on the findings of internal auditing. In accordance with Section 107 (3) of the German Stock Corporation Act (AktG), as amended by the German Accounting Law Modernization Act (BilMoG), the Audit Committee is responsible also for monitoring the effectiveness of the risk management system, the internal control systems, the internal auditing systems, the financial reporting process and the audit of the financial statements.

Main features

- MTU has a clearly defined management and corporate structure. Key functions spanning more than one business unit are managed centrally. The individual subsidiaries nevertheless enjoy an adequate level of autonomy.
- The integrity and responsibility of all employees, also in terms of finances and financial reporting, are ensured by their undertaking to observe the group-wide code of conduct.
- An adequate system of guidelines has been drawn up and is updated as required.
- The departments and business units involved in the accounting process are suitably equipped and regularly trained both in quantitative and qualitative terms.
- The IT systems are protected against unauthorized access by appropriate installations in the IT area. As far as possible, standard software is used in the finance systems area. Within the framework of the comprehensive IT strategy and the IT architecture, the IT system's application controls are reviewed internally and externally on a regular basis against a background of a high level of automatic (plausibility) checks. The general IT controls are checked during internal and external IT audits.
- Suitable controls are in place in all accounting-relevant processes, such as dual control during detailed analytical checks and programmed plausibility checks in accounting or during the consolidation process.
- The consolidated financial statements and all significant financial data submitted for inclusion by the group companies are audited by an external auditor once a year. The same auditor also reviews the condensed consolidated financial statements and interim group management report in the half-year financial report.
- In addition, accounting-relevant processes are checked by the process-independent corporate audit department.
- The subsidiaries report directly to the group accounting department, to which they submit their annual and monthly financial statements. This information is used to prepare the consolidated financial statements in accordance with IFRSs, which are compiled in consultation with the business administration departments of the group companies.
- The financial data communicated by the group companies for inclusion in the consolidated financial statements are processed and validated on a decentralized basis by the respective business administration departments, taking the group-wide reporting guidelines into account. As a supplementary control measure, (plausibility) checks of the reported data are carried out by the group accounting department during the compilation of its monthly reports and during the consolidation process in connection with the consolidated financial statements.
- The group accounting department is also the central point of contact and controlling body for reporting issues at group level or within individual subsidiaries and joint ventures. If necessary, external consultants are called on for support.
- All subsidiaries and joint ventures are obligated to report their business figures to the group in a standardized reporting format on a monthly basis, and the reported data are compared with the planning figures. This allows the company to implement measures to identify risks and limit their consequences in good time.

Disclosures in connection with the takeover directive

The following disclosures are made pursuant to Section 315a of the German Commercial Code (HGB) (takeover directive implementation). Items of Section 315a of the German Commercial Code (HGB) that are not met at MTU Aero Engines AG are not mentioned here.

Composition of subscribed capital

The company's subscribed capital (capital stock) amounts to € 52,000,000 and is divided into 52,000,000 registered non-par-value shares. All shares have equal rights and each share entitles the holder to one vote at the Annual General Meeting.

Restrictions concerning voting rights and the transfer of share ownership

At December 31, 2018, MTU held 365,773 treasury shares (2017: 500,158). No voting rights are exercised in respect of treasury shares. The articles of association of MTU Aero Engines AG do not contain any restrictions concerning voting rights or the transfer of share ownership. The Executive Board has no knowledge of any agreement between shareholders that could give rise to any such restrictions.

Rules governing the appointment and dismissal of members of the Executive Board and amendments to the company's articles of association

The rules for the appointment and dismissal of members of the Executive Board are based on Sections 84 and 85 of the German Stock Corporation Act (AktG) and Section 31 of the German Co-Determination Act (MitbestG) in conjunction with Article 5 of the company's articles of association.

All amendments to the articles of association require a resolution on the part of the Annual General Meeting with a majority of at least three quarters of the voting stock attending, pursuant to Section 179 of the German Stock Corporation Act (AktG). The right to add amendments of a purely formal nature, for instance changes to the share capital as the result of utilization of the authorized capital, is devolved to the Supervisory Board under the terms of Article 13 of the articles of association.

Authorizations conferred on the Executive Board, especially concerning the issue and purchase of shares

Authorized capital

In accordance with Article 4 (5) of the articles of association, the Executive Board is authorized until April 14, 2020, to increase the company's capital stock by up to € 15.6 million, with the prior approval of the Supervisory Board, by issuing, either in a single step or in several steps, new registered non-par-value shares in return for cash contributions (Authorized capital 2015).

Conditional capital

In accordance with Article 4 (6) of the articles of association, the company's capital stock may be conditionally increased by up to € 5.2 million through the issue of up to 5,200,000 new registered non-par-value shares. The purpose of this conditional capital increase is to issue shares to owners or creditors of convertible bonds and/or bonds with warrants in accordance with the authorization granted to the company under a resolution passed by the Annual General Meeting on April 15, 2015. Shares may be issued at a conversion price or warrant exercise price determined on the basis of the conditions laid down in the relevant authorization.

The Executive Board is authorized until April 14, 2020, to issue, in a single step or in several steps and with the prior approval of the Supervisory Board, bearer convertible bonds and/or bonds with warrants (collectively referred to as "securities"), with or without maturity date, with a total nominal value of up to € 500 million, and to grant the owners of convertible bonds and/or bonds with warrants the right, obligation or option to convert them into registered non-par-value shares of the company representing a stake in the capital stock of up to € 5.2 million under the conditions established for the issue of convertible bonds or bonds with warrants. The bonds may be issued in return for cash contributions only. They may be issued in euros or – to an equivalent value – in any other legal currency, for instance that of an OECD country. They may also be issued by an affiliated company in which MTU holds a controlling interest. In such cases, and subject to the prior approval of the Supervisory Board, the Executive Board is authorized to act as guarantor for the securities, and to grant the owners of the securities the right, obligation or option to convert them into new registered non-par-value shares in MTU. In 2016, MTU made use of this authorization to increase the company's capital stock by issuing a convertible bond with a nominal value of € 500 million. For more information about this bond issue, please refer to the section of this combined management report dealing with the business environment, under the heading *"Financial situation", and to Note 28 to the consolidated financial statements (Financial liabilities).*

Resolution concerning the authorization to purchase and use treasury shares pursuant to Section 71 (1) item 8 of the German Stock Corporation Act (AktG) and to exclude subscription rights

By resolution of the Annual General Meeting of April 15, 2015, the company was authorized:

/ to purchase treasury shares accounting for a proportion of up to 10% of the company's issued capital stock, as applicable on the date of the resolution, during the period from April 15, 2015, through April 14, 2020, pursuant to Section 71 (1) item 8 of the German Stock Corporation Act (AktG). At no point in time may the value of the acquired shares, together with other treasury shares in the company's possession or which are assigned to it pursuant to Section 71a et seq. of the German Stock Corporation Act (AktG), exceed 10% of the company's capital stock. At the discretion of the Executive Board, the shares may be purchased through the stock exchange or by means of a public offering addressed to all shareholders (or – if legally acceptable – through an open invitation to submit offers for sale). The shares must be sold in return for proceeds that do not lie more than 10% above or below the quoted share price, net of any supplementary transaction charges. In the case of a sale through the stock exchange, the reference for the quoted share price as defined in the above ruling is the average value of share prices in the closing session of Xetra trading (or a comparable successor system) on the last three trading days prior to the publication of the offering or invitation. In the case of shares purchased by means of a public offering addressed to all shareholders (or an open invitation to submit offers for sale), the reference for the quoted share price is the average value of share prices in the closing session of Xetra trading (or a comparable successor system) on the last three trading days prior to the publication of the offering or invitation. In the event of substantial fluctuations in the share price, the Executive Board is authorized to publish a new public offering or invitation to submit offers for sale, based on a recalculated average value of share prices according to the previously mentioned formula. The volume of the offer can be limited in the case of shares purchased by means of a public offering addressed to

all shareholders (or an open invitation to submit offers for sale). If the take-up of the offering (or the total number of offers) exceeds this volume, the purchase must be transacted in proportion to the number of shares offered. Preferential treatment may be given to small packages (up to 100 shares) offered for sale. Further conditions may be imposed in the offering or invitation to submit offers;

- to sell the purchased treasury shares in another manner than through the stock exchange or by means of a public offering addressed to all shareholders, on condition that the shares are sold in return for cash contributions at a price that does not lie significantly below the market price of similarly entitled MTU shares at the time of sale;
- with the prior approval of the Supervisory Board, to sell the purchased treasury shares in another manner than through the stock exchange or by means of an offering addressed to all shareholders if the treasury shares are sold to program participants in conjunction with the company's stock option programs and those participants are, or were, employees or officers of the company or one of its affiliated companies. If shares are to be issued to active or former members of the MTU Executive Board under the terms of the company's stock option programs, the Supervisory Board is authorized to transact this issue;
- to use the purchased treasury shares as partial or complete payment in conjunction with business combinations or the acquisition, whether direct or indirect, of businesses, parts of businesses or equity investments;
- with the prior approval of the Supervisory Board, to use the purchased treasury shares to discharge obligations or exercise rights relating to convertible bonds, bonds with warrants, certificates of beneficial interest or income bonds (or combinations of such instruments) issued by the company or by a dependent group company;
- with the prior approval of the Supervisory Board and without any requirement for a further resolution to be passed by the Annual General Meeting, to retire purchased treasury shares in whole or in part. Their retirement may be effected by employing a simplified procedure without any capital reduction, by adapting the actuarial value of the outstanding portion of shares to that of the company's stock capital. The retirement may be limited to a defined fraction of the purchased shares. The authorization to retire shares may be utilized on one or more occasions. If the simplified procedure is employed, the Executive Board is authorized to amend the number of outstanding shares stated in the articles of association.

The above-stated authorizations may be exercised on one or more occasions, in whole or in part, singly or in combination. They may be exercised also by group companies as defined in Section 17 of the German Stock Corporation Act (AktG).

The subscription rights of existing shareholders in respect of these treasury shares are excluded insofar as the shares are utilized in the manner described in the above-stated authorizations.

The authorization to purchase treasury shares granted to the company on April 22, 2010, was revoked as of the effective date of this new authorization. The authorization to use the treasury shares purchased under the terms of the above-mentioned earlier resolution dated April 22, 2010, remains in force.

Significant agreements relating to change of control subsequent to a takeover bid

MTU Aero Engines AG issued a registered bond in June 2013 and a note purchase agreement in March 2014. These grant the creditor a right of early repayment in the event that a third party assumes control of over 50 % of the company's share capital with voting rights and this change of control has a negative impact on the company's credit rating.

The convertible bond issued by MTU Aero Engines AG in May 2016 contains the rules summarized below with regard to a change of control: In the event of a change of control, the bond terms grant bondholders the right to exercise their conversion right within a specific period of time and at an adjusted conversion rate. In the event of control being taken over, bondholders can redeem their bonds prematurely at the terms described more closely in the bond conditions. A "change of control" shall be deemed as when a change of control occurs or a mandatory takeover offer is published pursuant to Section 35 (2) p. 1, Section 14 (2) p. 1 of the German Securities Acquisition and Takeover Act (WpÜG) or, in the case of a voluntary takeover offer, if more than 30 % of MTU Aero Engines AG's voting rights are legally or beneficially owned by the bidder or attributed to it pursuant to the bond conditions. If one or more persons in the sense of Section 22 (2) WpHG acquire 50 % of the voting rights of MTU Aero Engines AG, this shall represent an "acquisition of control".

In October 2013, MTU Aero Engines AG agreed on a revolving credit facility with a banking syndicate (extended in September 2018), which provides for a right of termination for the lenders in the event that one or more persons assume control of MTU Aero Engines AG or acquire more than 50 % of the company's issued capital.

MTU Aero Engines AG has risk and revenue sharing agreements with an engine manufacturer containing clauses that allow the risk and revenue sharing agreement to be converted into a long-term supplier contract in the event that a major competitor of the contracting party acquires 25 % or more of the company's voting rights or assets, thus constituting a controlling interest.

In addition, MTU Aero Engines AG has a cooperative agreement with another engine manufacturer. Under this agreement, that manufacturer is entitled to terminate the contract for cause in the event that one of its competitors acquires more than 50 % of the company's voting rights. MTU Aero Engines AG has further cooperative agreements with the same engine manufacturer. Under these agreements, that manufacturer is entitled to terminate the contract for cause in the event that one of its competitors acquires more than 30 % of the company's voting rights.

MTU Aero Engines AG also has equity investments in various joint ventures with other engine manufacturers, the purpose of which is to cooperate in the development and production of aircraft engines. According to the provisions of the corresponding agreements, MTU Aero Engines AG's share in the joint venture may be withdrawn and its participation in the accompanying cooperative agreements terminated if MTU Aero Engines AG is taken over by a competitor of the partners in these consortia.

It is standard market practice to confer contractual rights of this kind. Should an event meeting any of the above definitions of change of control take place, the exercise of rights ensuing from these agreements could have a substantial impact on MTU's net assets, financial position or operating results.

Other agreements

Claims for compensation in the event of a takeover bid

Pursuant to the Executive Board contracts in effect since January 1, 2016, a change of control is deemed to have occurred when a shareholder acquires a majority interest in the company and this entails material disadvantages for members of the Executive Board. Material disadvantages are in particular if the Executive Board member is dismissed, if their responsibilities and duties are significantly altered, or if the Executive Board member is asked to accept a reduction in their employment benefits or to agree to a premature termination of their contract. In such case, each member of the Executive Board shall have a special right of termination, which is to be exercised within a period of six months, with a period of notice of three months to the end of a month. If a member of the Executive Board makes use of this right, or if the executive employment contract is terminated by mutual consent within nine months after the change of control, the Executive Board member shall receive a severance payment corresponding to the benefits that would otherwise have been awarded up to the date on which their contract would normally have expired. For the calculation of the severance payment, 100 % fulfilment of the management objectives is agreed upon with regard to the variable compensation components. The maximum amount of the severance payment is limited to three times the annual target direct compensation.

No comparable agreements have been made with regard to other employees.

Other disclosures

Corporate governance statement

Declaration of conformity

The executive and supervisory boards of listed companies issue an annually renewed declaration stating that the recommendations of the Government Commission on the German Corporate Governance Code have been and are being complied with, where necessary citing those recommendations that have not been or are not being applied. The declaration of conformity of MTU Aero Engines is included in the *Corporate governance section of this Annual Report.*

There is also a section devoted to corporate governance on the MTU website at *www.mtu.de under Investor Relations.*

Management practices extending beyond statutory requirements

A full description of management practices that extend beyond statutory requirements is provided in the *Corporate governance section of this 2018 Annual Report.*

Working procedures of the Executive Board and the Supervisory Board

A description of the working procedures of the Executive Board and Supervisory Board is provided in this *Annual Report in the Corporate governance report.*

German law on equal participation of women and men in leadership positions

In the context of the new German law on equal participation of women and men in leadership positions (so-called “Frauenquote”), MTU Aero Engines has set itself the following goals:

In accordance with the statutory provisions, MTU had planned to increase the proportion of women holding seats on the Supervisory Board of MTU Aero Engines AG to at least 30 % when positions are vacated and refilled. This quota applies both to the number of shareholder representatives and to the number of employee representatives. Two women candidates were presented for election to the Supervisory Board as shareholder representatives at the 2018 Annual General Meeting. Currently, women therefore now make up 33.3 % of the membership of the Supervisory Board.

It is also planned that the overall proportion of women in leadership positions at the company's three locations in Germany should be increased to 13 % by the end of 2022. As at December 31, 2018, a proportion of 10.2 % had been reached. MTU's talent management program gives priority to promoting women at all levels of the corporate hierarchy. Increasing the number of women in the general workforce and thus increasing the pool of female candidates for management positions is a long-term process. As regards the composition of the Executive Board of MTU Aero Engines AG, the company plans to increase the proportion of women to 25 % by 2022. For more information on MTU's diversity policy, please see the *corporate governance report and the non-financial statement.*

Reference to management compensation report

The compensation awarded to members of the Executive Board is made up of fixed and variable components. A more detailed description, including a table of individual members' compensation entitlements, can be found in the *management compensation report under Corporate governance.* The management compensation report forms an integral part of the combined management report.

Directors' dealings

Pursuant to Section 15a of the German Securities Trading Act (WpHG), members of the Executive Board and the Supervisory Board have a legal obligation to disclose transactions involving the purchase or sale of shares in MTU Aero Engines AG, Munich, or of related financial instruments, on condition that the total amount of the transactions undertaken by a board member or related persons reaches or exceeds € 5,000 within a single calendar year. These transactions are posted on the MTU website at www.mtu.de and published in the register of companies.

The total number of shares in MTU Aero Engines AG, Munich, held by members of the company's Executive Board and Supervisory Board at December 31, 2018, equaled less than 1 % of the company's share capital (at December 31, 2017, less than 1 %).

Statement by the legal representatives

We hereby affirm that, to the best of our knowledge, the consolidated financial statements of the MTU group and the separate annual financial statements of MTU Aero Engines AG present a true and fair view of their respective net assets, financial position and operating results in accordance with the applicable financial reporting standards, and that the combined management report provides a faithful and accurate review of the business performance of the MTU group and of MTU Aero Engines AG, including operating results and situation, and outlines the significant risks and opportunities of the MTU group's likely future development and those of MTU Aero Engines AG.

Munich, February 18, 2019

Reiner Winkler
Chief Executive Officer

Peter Kameritsch
Chief Financial Officer and Chief Information Officer

Michael Schreyögg
Chief Program Officer

Lars Wagner
Chief Operating Officer

Consolidated financial statements

Consolidated income statement

[T46] Consolidated income statement – prior-year data adjusted

in € million	(Note)	2018	2017
Revenues	**(1.)**	**4,567.1**	**3,897.4**
Cost of sales	(2.)	–3,715.8	–3,186.5
Gross profit		**851.3**	**710.9**
Research and development expenses	(3.)	–60.7	–51.7
Selling expenses	(4.)	–115.1	–102.2
General administrative expenses	(5.)	–83.6	–76.8
Other operating income	(6.)	9.0	7.9
Other operating expenses	(6.)	–26.2	–10.8
Profit/loss of companies accounted for using the equity method	(7.)	43.8	42.4
Profit/loss of equity investments	(7.)	1.7	1.5
Earnings before interest and tax (EBIT)		**620.2**	**521.2**
Interest result	(8.)	–0.7	–7.2
Financial result on other items	(9.)	–12.2	–35.9
Financial result		**–12.9**	**–43.1**
Earnings before tax		**607.3**	**478.1**
Income taxes	(10.)	–154.0	–119.4
Net income		**453.3**	**358.7**
Thereof attributable to:			
Owners of MTU Aero Engines AG		447.0	355.1
Non-controlling interests		6.3	3.6
Earnings per share in €			
Basic (EPS)	(11.)	8.67	6.90
Diluted (DEPS)	(11.)	8.10	6.46

Consolidated statement of comprehensive income

[T47] Consolidated statement of comprehensive income – prior-year data adjusted

in € million	(Note)	2018	2017
Net income		**453.3**	**358.7**
Translation differences arising from the financial statements of international entities		–4.6	–9.7
Financial instruments designated as cash flow hedges		–83.2	151.0
Items that may subsequently be recycled to profit or loss		–87.8	141.3
Actuarial gains and losses on pension obligations and plan assets		–4.0	12.8
Fair value gains and losses on equity investments		2.5	
Items that will not be recycled to profit or loss		–1.5	12.8
Other comprehensive income, net of tax	**(24.)**	**–89.3**	**154.1**
Total comprehensive income		**364.0**	**512.8**
Thereof attributable to:			
Owners of MTU Aero Engines AG		355.6	509.8
Non-controlling interests		8.4	3.0

Consolidated balance sheet – assets

[T48] Assets – prior-year data adjusted

in € million	(Note)	Dec. 31, 2018	Dec. 31, 2017	Jan. 1, 2017
Non-current assets				
Intangible assets	(14.)	1,072.7	1,032.5	1,007.6
Property, plant and equipment	(15.)	799.3	735.5	672.5
Financial assets accounted for using the equity method	(16.)	426.9	291.5	201.9
Other financial assets	(16.)	104.4	167.8	130.2
Acquired program assets, acquired development costs and other assets	(17.)	1,252.1	1,259.3	1,228.6
Deferred tax assets	(18.)	60.5	55.2	92.8
Total non-current assets		**3,715.9**	**3,541.8**	**3,333.6**
Current assets				
Inventories	(19.)	995.8	845.1	922.6
Trade receivables	(20.)	1,051.2	914.5	827.5
Contract assets	(21.)	864.3	632.8	577.2
Income tax receivables	(22.)	43.2	31.3	21.1
Other financial assets	(16.)	40.6	113.2	42.9
Other assets	(17.)	40.8	40.4	43.8
Cash and cash equivalents	(23.)	99.0	106.1	322.4
Total current assets		**3,134.9**	**2,683.4**	**2,757.5**
Total assets		**6,850.8**	**6,225.2**	**6,091.1**

Consolidated balance sheet – equity and liabilities

[T49] Equity and liabilities – prior-year data adjusted

in € million	(Note)	Dec. 31, 2018	Dec. 31, 2017	Jan. 1, 2017
Equity	**(24.)**			
Subscribed capital		52.0	52.0	52.0
Capital reserves		465.8	451.2	435.5
Revenue reserves		1,829.0	1,503.0	1,245.5
Treasury shares		–16.9	–23.1	–25.3
Accumulated other comprehensive income		–259.7	–178.1	–332.8
Owners of MTU Aero Engines AG		**2,070.2**	**1,805.0**	**1,374.9**
Non-controlling interests		74.0	36.3	0.2
Total equity		**2,144.2**	**1,841.3**	**1,375.1**
Non-current liabilities				
Pension provisions	(25.)	853.2	847.6	860.6
Other provisions	(27.)	47.7	37.6	23.4
Refund liabilities	(31.)	30.3	1.4	2.0
Financial liabilities	(28.)	935.0	935.2	1,054.4
Contract liabilities	(30.)	27.0	16.9	
Other liabilities	(31.)	0.7		
Deferred tax liabilities	(33.)	8.4	16.9	0.2
Total non-current liabilities		**1,902.3**	**1,855.6**	**1,940.6**
Current liabilities				
Pension provisions	(25.)	25.8	23.1	22.7
Income tax liabilities	(26.)	9.9	2.9	5.8
Other provisions	(27.)	177.3	175.6	136.2
Refund liabilities	(31.)	1,506.2	1,155.3	1,207.2
Financial liabilities	(28.)	228.5	242.1	522.9
Trade payables	(29.)	230.6	307.1	244.7
Contract liabilities	(30.)	549.0	555.7	593.8
Other liabilities	(31.)	77.0	66.5	42.1
Total current liabilities		**2,804.3**	**2,528.3**	**2,775.4**
Total equity and liabilities		**6,850.8**	**6,225.2**	**6,091.1**

Consolidated statement of changes in equity

[T50] Consolidated statement of changes in equity – prior-year data adjusted

in € million	Subscribed capital	Capital reserves	Revenue reserves	Treasury shares	Accumulated other comprehensive income				Owners of MTU Aero Engines AG	Non-controlling interests	Total equity
					Translation differences arising from the financial statements of international entities	Fair value gains and losses on equity investments	Actuarial gains and losses [1]	Financial instruments designated as cash flow hedges			
Carrying amount at Jan. 1, 2017, reported	**52.0**	**435.5**	**1,370.9**	**–25.3**	**25.2**		**–258.7**	**–99.3**	**1,500.3**	**0.2**	**1,500.5**
Effect of first-time application of IFRS 15			–125.4						–125.4		–125.4
Carrying amount at Jan. 1, 2017, adjusted	**52.0**	**435.5**	**1,245.5**	**–25.3**	**25.2**		**–258.7**	**–99.3**	**1,374.9**	**0.2**	**1,375.1**
Net income			355.1						355.1	3.6	358.7
Other comprehensive income					–9.1		12.8	151.0	154.7	–0.6	154.1
Total comprehensive income			**355.1**		**–9.1**		**12.8**	**151.0**	**509.8**	**3.0**	**512.8**
Dividend payment			–97.6						–97.6		–97.6
Investment by minority shareholders										33.1	33.1
Restricted Stock Plan		3.1		0.5					3.6		3.6
MAP employee stock program		12.6		1.7					14.3		14.3
Carrying amount at Dec. 31, 2017	**52.0**	**451.2**	**1,503.0**	**–23.1**	**16.1**		**–245.9**	**51.7**	**1,805.0**	**36.3**	**1,841.3**
Effect of first-time application of IFRS 9			–2.6			9.8			7.2		7.2
Carrying amount at Jan. 1, 2018	52.0	451.2	1,500.4	–23.1	16.1	9.8	–245.9	51.7	1,812.2	36.3	1,848.5
Net income			447.0						447.0	6.3	453.3
Other comprehensive income					–6.7	2.5	–4.0	–83.2	–91.4	2.1	–89.3
Total comprehensive income			**447.0**		**–6.7**	**2.5**	**–4.0**	**–83.2**	**355.6**	**8.4**	**364.0**
Dividend payment			–118.4						–118.4		–118.4
Investment by minority shareholders										29.3	29.3
Restricted Stock Plan		2.9		1.6					4.5		4.5
MAP employee stock program		11.7		4.6					16.3		16.3
Carrying amount at Dec. 31, 2018	**52.0**	**465.8**	**1,829.0**	**–16.9**	**9.4**	**12.3**	**–249.9**	**–31.5**	**2,070.2**	**74.0**	**2,144.2**

[1] Refers to pension obligations and plan assets

Consolidated cash flow statement

[T51] Consolidated cash flow statement – prior-year data adjusted

in € million	(Note)	2018	2017
Operating activities			
Net income		453.3	358.7
Non-cash amortization of acquired program assets and acquired development costs		49.0	47.3
Depreciation, amortization, impairment losses and reversals of impairment losses on other non-current assets		151.5	146.2
Profit / loss of companies accounted for using the equity method		–43.8	–42.4
Profit / loss of equity investments		–1.7	–1.5
Proceeds from the disposal of fixed assets		–0.1	5.2
Change in pension provisions	(25.)	2.3	6.8
Change in other provisions	(27.)	11.8	53.6
Change in refund liabilities (not included in working capital)		170.4	131.8
Change in working capital		–320.4	–191.0
Other non-cash items		67.0	–43.8
Interest result	(8.)	0.7	7.2
Interest paid		–7.3	–14.5
Interest received		10.5	4.7
Dividends received		34.2	17.8
Income taxes	(10.)	154.0	119.4
Income taxes paid		–136.7	–144.6
Cash flow from operating activities		**594.7**	**460.9**
Investing activities			
Capital expenditure on:			
Intangible assets	(14.)	–72.1	–68.4
Property, plant and equipment	(15.)	–199.3	–172.0
Financial assets	(16.)	–113.7	–79.9
Acquired program assets and acquired development costs		–48.4	–64.6
Proceeds from disposal of:			
Intangible assets / property, plant and equipment	(14.) / (15.)	14.9	5.5
Financial assets	(16.)	82.5	38.6
Cash flow from investing activities		**–336.1**	**–340.8**
Financing activities			
Increase in financial liabilities	(28.)		78.1
Repayment of corporate bond	(28.)		–250.0
Settlement of contingent purchase price liability for PW1000G program shares, PW800 program shares, IAE-V2500 stake increase		–77.6	–76.4
Repayment of financial liabilities	(28.)	–83.0	–1.3
Dividend payment		–118.4	–97.6
Sale of treasury shares under the MAP employee stock option program	(28.)	16.3	14.3
Cash flow from financing activities		**–262.7**	**–332.9**
Net change in cash and cash equivalents during the reporting period		**–4.1**	**–212.8**
Effect of translation differences on cash and cash equivalents		–3.0	–3.5
Cash and cash equivalents at beginning of financial year (January 1)		106.1	322.4
Cash and cash equivalents at end of financial year (December 31)		**99.0**	**106.1**

Reporting by operating segment

[T52] Reporting by operating segment – prior-year data adjusted

	Commercial and military engine business (OEM)	
in € million	**2018**	2017
External revenues	1,995.9	1,698.5
Revenues from intersegment sales	38.0	36.3
Total revenues	**2,033.9**	**1,734.8**
Gross profit	**549.1**	**470.0**
Amortization	31.0	29.1
Non-cash value amortization of acquired program assets and acquired development costs	49.0	47.3
Depreciation	82.0	79.7
Impairment losses		
Amortization / value adjustments / depreciation / impairment losses	**162.0**	**156.1**
Earnings before interest and tax (EBIT)	**382.6**	**329.3**
Exceptional effect of purchase price allocation	18.6	18.6
Exceptional effect of IAE-V2500 stake increase	30.2	30.2
Adjusted earnings before interest and tax (EBIT adjusted)	**431.4**	**378.1**
Profit / loss of companies accounted for using the equity method	11.4	5.3
Carrying amount of companies accounted for using the equity method	250.6	137.9
Assets	**6,034.5**	**5,453.4**
Liabilities	**4,118.2**	**3,795.6**
Significant non-cash items	**41.4**	**–35.9**
Capital expenditure on:		
Intangible assets	71.8	68.5
Property, plant and equipment	127.5	116.4
Aquired program assets and aquired development	59.5	45.5
Total capital expenditure	**258.8**	**230.4**
Key segment data:		
EBIT in % of revenues	18.8	19.0
EBIT adjusted in % of revenues	21.2	21.8

The key indicator used by management to measure the operating performance of each segment is adjusted earnings before interest and tax (EBIT adjusted). The contribution of companies accounted for using the equity method to EBIT adjusted amounted to € 43.8 million in the financial year 2018 (2017: € 42.4 million).

Intersegment sales are transacted on an arm's-length basis at normal market transfer prices and invoiced in the same way as transactions with external third parties.

Significant non-cash items mainly comprise one-time financing agreements concluded in the reporting period in the course of exceptional reimbursement of received advance payments in connection with long-term service agreements and participation in changes to supply agreements between an OEM and airframer resulting in program-lifetime-related payments to one OEM. This item also includes non-cash profit / losses from FX revaluation.

Commercial maintenance business (MRO)		Total reportable segments		Consolidation / reconciliation		MTU group	
2018	2017	**2018**	2017	**2018**	2017	**2018**	2017
2,571.2	2,198.9	4,567.1	3,897.4			4,567.1	3,897.4
228.6	86.4	266.6	122.7	–266.6	–122.7		
2,799.8	**2,285.3**	**4,833.7**	**4,020.1**	**–266.6**	**–122.7**	**4,567.1**	**3,897.4**
301.3	**239.8**	**850.4**	**709.8**	**0.9**	**1.1**	**851.3**	**710.9**
6.7	10.4	37.7	39.5			37.7	39.5
		49.0	47.3			49.0	47.3
25.9	27.0	107.9	106.7			107.9	106.7
5.9		5.9				5.9	
38.5	**37.4**	**200.5**	**193.5**			**200.5**	**193.5**
237.3	**191.9**	**619.9**	**521.2**	**0.3**		**620.2**	**521.2**
2.4	2.5	21.0	21.1			21.0	21.1
		30.2	30.2			30.2	30.2
239.7	**194.4**	**671.1**	**572.5**	**0.3**		**671.4**	**572.5**
32.4	37.1	43.8	42.4			43.8	42.4
176.3	153.6	426.9	291.5			426.9	291.5
1,845.9	**1,565.9**	**7,880.4**	**7,019.3**	**–1,029.6**	**–794.1**	**6,850.8**	**6,225.2**
1,277.2	**1,041.4**	**5,395.4**	**4,837.0**	**–688.8**	**–453.1**	**4,706.6**	**4,383.9**
25.7	**–8.0**	**67.1**	**–43.9**	**–0.1**	**0.1**	**67.0**	**–43.8**
1.5	0.8	73.3	69.3			73.3	69.3
72.0	56.9	199.5	173.3			199.5	173.3
		59.5	45.5			59.5	45.5
73.5	**57.7**	**332.3**	**288.1**			**332.3**	**288.1**
8.5	8.4	12.8	13.0			13.6	13.4
8.6	8.5	13.9	14.2			14.7	14.7

In the reporting period, two major customers each accounted for more than 10 % of total group revenues. Business with the largest customer led to revenues of € 1,418.0 million (2017: € 1,009.1 million) and with the second-largest customer € 639.3 million (2017: € 521.6 million). In each case, the revenues were generated in both operating segments.

There were no changes in the delimitation of the segments vis-à-vis the previous year.

For more information on segment reporting, please see *Part V of these Notes (Segment information).*

I. Accounting policies and principles

Fundamentals and methods

MTU Aero Engines AG, Munich, together with its consolidated entities (hereinafter referred to as MTU or the MTU group) ranks among the world's largest manufacturers of engine modules and components, and is one of the leading providers of MRO services for commercial aero engines in the world.

The group's business activities encompass the entire lifecycle of an engine program - from development, structural design, testing and manufacturing of new commercial and military engines and spare parts through to the maintenance, repair and overhaul of commercial and military engines. MTU divides its activities into two operating segments: the commercial and military engine business (OEM) and the commercial maintenance business (MRO).

MTU's commercial and military engine business covers the development and production of modules, components and spare parts for engine programs, including final assembly. MTU's military engine business additionally includes maintenance services for these engines. The MRO segment consists of the commercial maintenance business, which covers all activities relating to the maintenance, repair and overhaul of commercial engines and associated services.

The parent company, MTU Aero Engines AG, registered office Dachauer Str. 665, 80995 Munich, is registered under reference HRB 157 206 in the commercial registry of the district court of Munich, Germany.

The consolidated financial statements were approved for publication by the Executive Board of MTU Aero Engines AG, Munich, on February 18, 2019.

MTU's consolidated financial statements have been drawn up in accordance with International Financial Reporting Standards (IFRSs), such as they apply in the European Union (EU), and the supplementary requirements of Section 315e (1) of the German Commercial Code (HGB). All IFRSs issued by the International Accounting Standards Board (IASB) that were effective and had been endorsed by the European Commission for use in the EU at the time these consolidated financial statements were drawn up have been applied.

The consolidated financial statements as at December 31, 2018 and the combined management report for the financial year 2018 have been compiled in accordance with Section 315e (1) of the German Commercial Code (HGB) and published in the Federal Gazette (Bundesanzeiger).

The financial year is identical with the calendar year. Comparative data for the previous year are disclosed in the consolidated financial statements.

In the presentation of the balance sheet, a distinction is made between non-current and current assets and liabilities. A more detailed presentation of certain of these items in terms of their timing is provided in the Notes to the consolidated financial statements. An asset or liability is classified as current if:

- it is held primarily for trading purposes,
- it is expected to be realized or repaid respectively within twelve months of the reporting date,
- it is cash or a cash equivalent, unless the exchange or utilization of the asset for the purpose of fulfilling an obligation is restricted for a period of at least twelve months after the reporting date, or
- it is a balance of assets/receivables and liabilities pertaining to a contract that will be realized during MTU's normal business cycle, even if the period for realization exceeds twelve months.

The income statement is laid out in accordance with the cost-of-sales accounting format, in which revenues are balanced against the expenses incurred in order to generate these revenues, and the expenses are recorded in the appropriate line items by function: manufacturing, research and development, selling and general administration. The consolidated financial statements have been compiled in euros. All amounts are stated in millions of euros (€ million), unless otherwise specified. Due to rounding, some of the totals presented in these financial statements may not correspond exactly to the sum of the individual components, and some percentages may not precisely reflect the absolute figures on which they are based.

The financial statements prepared by MTU Aero Engines AG, Munich, and its subsidiaries are included in the consolidated financial statements considering uniform methods of recognition and measurement.

Accounting standards and interpretations, and revised / amended accounting standards and interpretations, applied for the first time in the financial year 2018

The following accounting standards and interpretations, and revised/amended accounting standards and interpretations, were applied for the first time in MTU's financial statements:

[T53] New and amended standards and interpretations

Standard	Title
IFRS 2	Amendments to Classification and Measurement of Share-Based Payment Transactions
IFRS 4	Amendments to Applying IFRS 9 Financial Instruments with IFRS 4 Insurance Contracts
IFRS 9	Financial Instruments
IFRS 15	Revenue from Contracts with Customers
IAS 40	Amendments to Transfers of Investment Property
IFRIC 22	Foreign Currency Transactions and Advance Consideration
Annual improvements to IFRSs 2014 - 2016	IFRS 1 – First-time Adoption of International Financial Reporting Standards IAS 28 – Investments in Associates and Joint Ventures

Except in the case of IFRS 9 and IFRS 15, their application did not result in any significant changes to MTU's financial reporting.

IFRS 9, Financial Instruments

IFRS 9, Financial Instruments, issued in July 2014, supports the legislator's aim of introducing simpler, principles-based rules for the accounting treatment of financial instruments. MTU has been applying the new standard since January 1, 2018.

IFRS 9 introduces a new classification and measurement model for debt instruments which is oriented toward the structure of contractual cash flows and the nature of the business model. As a result, loans and receivables and cash and cash equivalents, which were classified as loans and receivables according to IAS 39, are now allocated to the category "measured at amortized cost."

In total, the changes due to this reclassification were as follows:

[T54] Reallocation to IFRS 9 categories – prior-year data adjusted

in € million	Dec. 31, 2017	Adjustments due to IFRS 9	Adjusted amount at Jan. 1, 2018	Financial instruments classified according to IFRS 9: Measured at amortized cost	Financial instruments classified according to IFRS 9: Fair value recognized in other comprehensive income	Financial instruments classified according to IFRS 9: Fair value recognized in profit or loss
Financial instruments classified according to IAS 39						
Loans and receivables	1,207.8	–2.9	1,204.9	1,204.9		
Available-for-sale financial assets	3.4	9.8	13.2		13.2	
Financial assets held for trading	1.8		1.8			1.8
Financial liabilities measured at amortized cost	2,579.8		2,579.8	2,579.8		
Financial liabilities held for trading	0.9		0.9			0.9

Equity investments, which under the previous rules had to be measured at cost, are now measured at fair value in accordance with IFRS 9. An analysis of the fair value of the equity investments in question resulted in an increase of € 9.8 million in the amount recognized in other comprehensive income.

IFRS 9 moreover introduces a new impairment model that constitutes a shift away from the previously utilized incurred loss model as defined in IAS 39. The new expected loss model now requires expected losses to be accounted for at inception of a contract, except in the case of financial assets that were already impaired at the time of acquisition. For MTU, application of the expected loss model resulted in the recognition of valuation allowances totaling € 3.7 million. Contract assets account for € 0.8 million of these valuation allowances. The low amount of valuation allowances for expected credit losses is due to the fact that, as a matter of course in both the OEM and MRO segments, products and services are not delivered to the customer until collection of payment is reasonably assured. For this reason, there have been no relevant cases of unrecoverable payments in the past and, in MTU's considered opinion, it is unlikely that such cases will arise in the future, given the precautions taken in this respect as part of its delivery and payment processes. In a separate evaluation, minor impairment losses are determined on the basis of an assessment of the customer's credit standing. This is described in *Note 37 (Financial risks).*

Through the introduction of IFRS 9, the legislator has also made provision for a more differentiated designation of hedging relationships. However, MTU does not make use of these new designations at present. However, as a result of the application of IFRS 9, the cost of effective hedging instruments designated as cash flow hedges in connection with forecast transactions (cash flow hedging) must from now on be recognized in other comprehensive income rather than as a revenue item.

Otherwise, MTU sees no significant impact on its net assets, financial situation or operating results arising from initial application of IFRS 9. Accordingly, in line with the transitional provisions, MTU is not currently planning to adjust prior period figures.

IFRS 15, Revenue from Contracts with Customers

IFRS 15, Revenue from Contracts with Customers, was issued in May 2014 and provides a five-step model framework for accounting for revenue from contracts with customers. The new standard for the recognition of revenue replaces all previously applicable standards and interpretations for revenue recognition from contracts with customers. Application of the standard is mandatory for annual reporting periods beginning on or after January 1, 2018. When first applying IFRS 15, entities may opt either to apply the standard in full to prior periods (full retrospective approach) or to retain prior-period figures as reported under the previous standards (modified retrospective approach).

In mid-April 2016, the International Accounting Standards Board (IASB) published additional clarifications to IFRS 15, which are intended to resolve a number of implementation issues. The amendments are effective for annual reporting periods beginning on or after January 1, 2018 (same effective date as IFRS 15 itself).

IFRS 15 introduces an extensive framework for the measurement and recognition of revenue from contracts

with customers. The core principle is that an entity will recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods and services (the transaction price as defined by IFRS 15). The transaction price determined for a contract is allocated to the performance obligations identified in the contract by reference to their relative standalone selling prices. MTU calculates these standalone selling prices on the basis of observable standalone selling prices or on the cost of acquisition/construction, plus a reasonable, market-based margin. Revenue is recognized when control of the goods or services is passed to the customer, either over time or at a point in time. Revenues may only be recognized over time if the customer simultaneously receives and consumes all of the benefits provided by MTU during the fulfillment of its performance obligations, if MTU's performance creates or enhances an asset that the customer controls, or if MTU's performance creates an asset for which the group itself has no alternative use and MTU has an enforceable right to payment for performance completed to date. The method chosen to recognize revenues over time must be consistent with the pattern of transfer of control to the customer of the distinct goods and services. Application of IFRS 15 has no impact on the amount of net cash flows in either direction.

For MTU as an engine manufacturer and maintenance provider, the following significant changes result from applying IFRS 15: The criteria for recognizing revenue over time by measuring the progress toward complete satisfaction of the performance obligation differ fundamentally from the criteria applied up to now, and focus on the right to payment for performance completed to date in the event that the customer terminates the contract. This may also result in changes to the way in which progress toward complete satisfaction of a performance obligation is measured.

Payments to customers are usually accounted for as a reduction of revenue unless such payments are in consideration of distinct goods or services that are clearly not linked to the payments made to the customer for goods delivered or services performed.

Based on these considerations, MTU has identified the following significant changes to recognition methods resulting from the application of IFRS 15:

Commercial engine business
In its commercial engine business, MTU has contracted agreements with engine manufacturing customers – mainly in the form of risk- and revenue-sharing partnerships – for the development, production and delivery of engine components and for the assembly and delivery of entire engines. In this context, expenses incurred in connection with the marketing of engine programs, especially in the form of indirect payments to airlines and leasing companies, and expenses arising from the pro rata reimbursement of costs related to the engine program to the consortium leader (OEM), were previously recognized under cost of sales. Under IFRS 15, such payments to the consortium leader (OEM) qualify as a payments to customers, and are consequently recognized as a reduction of revenue. Payments to the consortium leader (OEM) in respect of the acquisition of program assets and the pro rata assumption of costs, in particular for program development work, were until now capitalized as intangible assets and amortized on a straight-line basis over their expected useful lives (lifetime of the program). The underlying payment obligations qualify under IFRS 15 as "program-lifetime-related" payments to the customer. Consequently, such payments are presented in the balance sheet under other non-current assets in the line item "acquired program assets, acquired development costs and other assets" and they are accounted for as a reduction of revenue rather than as cost of sales.

With respect to program-related development activities, IFRS 15 implies an adjustment to the presentation of costs by function for MTU. In particular, in the case of payments to customers (OEM) in consideration of acquired development services, the expense for program-related development activities is recognized as a reduction of revenue, rather than as research and development expenses. Self-generated program-related development costs, on the other hand, are recognized as a cost-of-sales item. MTU accounts for the identifiable consideration received in respect of its provided IP and technologies when working on behalf of an engine consortium in the same way as sales-based license revenue. Consequently, such revenues are realized on the basis of the revenue entitlement report drawn up by the consortium leader (OEM) for each accounting period.

With regard to the time of revenue recognition, application of IFRS 15 allows MTU to bring this forward to the time of delivery to the OEM (i.e. delivery to the consortium leader's warehouse), and hence transfer of ownership, in the case of engine programs in which engine modules and components are supplied to the consortium leader (OEM) for marketing. Previously, revenues were only recognized when the OEM utilized the deliveries (withdrawal from the consortium leader's warehouse).

Military engine business
In its military engine business, MTU has contracted agreements with manufacturers of military aircraft,

European defense agencies, and one engine manufacturer, for the development, production and delivery of engine components and for the assembly and delivery of entire engines. This operating segment also includes the delivery of spare parts and maintenance services for military engines, which form an integral part of the contracts signed with government agencies. Given that the criteria for recognizing revenue over time are not met, MTU has complied with the requirements of IFRS 15 by adopting the principle of recognizing revenues from specific military engine development and manufacturing contracts at a point in time. Until now, such revenues were recognized over time using the percentage-of-completion method. As a result, adjustments were necessary with regard to *the time of revenue recognition.*

Commercial maintenance business (MRO)
In the commercial maintenance business, the group overhauls and repairs aircraft engines and industrial gas turbines and provides related services. MTU performs this work in the context of agreements contracted with engine manufacturers and airlines. In view of the customer-specific nature of such services, revenue from engine maintenance contracts was previously recognized over time, based on the fulfillment of performance obligations (shop visits), using the cost-to-cost method. MTU is required under IFRS 15 to recognize revenue from some long-term service agreements over time on the basis of the full term of the contract rather than individual shop visits. However, the transition to IFRS 15 does not lead to any changes in the presentation of MTU's net assets, financial position and operating results for the current reporting period, nor for comparative prior periods.

Initial application of IFRS 15
MTU has elected to use the full retrospective approach when applying IFRS 15 for the first time. Under this approach, all transition effects at the beginning of the comparative prior-year period were recognized directly in equity as an adjustment to revenue reserves. The material effects concern the recognition of revenues from military development and manufacturing contracts over time, which on the one hand means recognizing revenues from engine manufacturing contracts at a point in time, rather than over time as previously, and on the other hand leads to changes resulting from the allocation of elements of the transaction price to different line items. Another new aspect concerns the recognition of revenues in respect of commercial engine programs, whereby goods delivered to the consortium leader's warehouse are now recognized in revenue immediately, at the delivery date, rather than when they are withdrawn from the warehouse. Thus, in the 2018 consolidated financial statements, both the reporting period and the comparative prior period will be presented applying IFRS 15, which improves comparability of the consolidated income statement in particular. On initial application, MTU made use of the disclosure exemptions under IFRS 15 relating to modified and completed contracts. According to IFRS 15, if a right to consideration for an identified, satisfied performance obligation is conditional on something other than the passage of time, it must be recognized as a contract asset and not as a receivable. Similarly, according to IFRS 15, an amount of consideration received for a performance obligation that has not yet been satisfied at the reporting date must be recognized as a contract liability. Contract assets and liabilities are offset if they relate to a contract with one and the same customer. Accordingly, to comply with the requirements of IFRS 15, MTU has reclassified certain items and now presents construction contract and service business receivables as contract assets and the balance of construction contract and service business receivables and payables as contract assets or contract liabilities.

If a contract allows a customer to be reimbursed for previously paid considerations (advance payments) within a defined period of time, IFRS 15 requires this contingent liability to be recognized as a refund liability. This has resulted in the reclassification of relevant amounts previously recognized under other provisions or trade payables.

The adjustments are presented in the tables below in the column labelled *Reclassification of contract assets/liabilities and refund liabilities.*

DRSC Interpretation 4 (IFRS)
To comply with DRSC Interpretation 4 (IFRS), published in 2018, MTU was obliged to change its accounting policy (IAS 8) applied in previous years, whereby interest on payments in arrears and refunds in connection with tax field audits was treated as a part of income tax. Such interest is now accounted for as part of the financial result on other items (interest portion included in measurement of assets and liabilities - receivables, other provisions and liabilities). The adjustments to prior-year data are presented in the tables below in the column labelled *DRSC Interpretation 4 (IFRS).*

[T55] Consolidated income statement

in € million	Adjusted amount 2017	Adjustments: Payments to customers	Adjustments: Program-life-time-related payments to customers	Adjustments: Expenses incurred for program-specific development work	Adjustments: Time of revenue recognition	Adjustments: DRSC Interpretation 4 (IFRS)	Reported amount 2017
Revenues	**3,897.4**	**–1,134.2**	**–42.7**	**–8.5**	**46.5**		**5,036.3**
Cost of sales	–3,186.5	1,134.2	42.7	–16.4	–80.6		–4,266.4
Gross profit	**710.9**			**–24.9**	**–34.1**		**769.9**
Research and development expenses	–51.7			24.9			–76.6
Selling expenses	–102.2						–102.2
General administrative expenses	–76.8						–76.8
Other operating income	7.9						7.9
Other operating expenses	–10.8						–10.8
Profit/loss of companies accounted for using the equity method	42.4						42.4
Profit/loss of equity investments	1.5						1.5
Earnings before interest and tax (EBIT)	**521.2**				**–34.1**		**555.3**
Interest result	–7.2						–7.2
Financial result on other items	–35.9					–3.1	–32.8
Financial result	**–43.1**					**–3.1**	**–40.0**
Earnings before tax	**478.1**				**–34.1**	**–3.1**	**515.3**
Income taxes	–119.4				11.0	3.1	–133.5
Net income	**358.7**				**–23.1**		**381.8**
Thereof attributable to:							
Owners of MTU Aero Engines AG	355.1				–23.1		378.2
Non-controlling interests	3.6						3.6
Earnings per share in €							
Basic (EPS)	6.90				–0.45		7.35
Diluted (DEPS)	6.46				–0.42		6.88

[T56] Consolidated statement of comprehensive income

in € million	Adjusted amount 2017	Adjustments: Payments to customers	Adjustments: Program-life-time-related payments to customers	Adjustments: Expenses incurred for program-specific development work	Adjustments: Time of revenue recognition	Reported amount 2017
Net income	**358.7**				**–23.1**	**381.8**
Translation differences arising from the financial statements of international entities	–9.7					–9.7
Financial instruments designated as cash flow hedges	151.0					151.0
Items that may subsequently be recycled to profit or loss	141.3					141.3
Actuarial gains and losses on pension obligations and plan assets	12.8					12.8
Items that will not be recycled to profit or loss	12.8					12.8
Other comprehensive income, net of tax	**154.1**					**154.1**
Total comprehensive income	**512.8**				**–23.1**	**535.9**
Thereof attributable to:						
Owners of MTU Aero Engines AG	509.8				–23.1	532.9
Non-controlling interests	3.0					3.0

Adjustments as of January 1, 2017

[T57] Assets

in € million	Adjusted amount Jan. 1, 2017	Adjustments: Reclassification of contract assets/liabilities and refund liabilities	Adjustments: Program-life-time-related payments to customers	Adjustments: Time of revenue recognition	Reported amount Jan. 1, 2017
Non-current assets					
Intangible assets	1,007.6		–1,226.6		2,234.2
Property, plant and equipment	672.5			–9.0	681.5
Financial assets accounted for using the equity method	201.9				201.9
Other financial assets	130.2				130.2
Acquired program assets, acquired development costs and other assets	1,228.6		1,226.6		2.0
Deferred tax assets	92.8			36.2	56.6
Total non-current assets	**3,333.6**			**27.2**	**3,306.4**
Current assets					
Inventories	922.6			–100.1	1,022.7
Trade receivables	827.5	224.1		–88.7	692.1
Construction contract and service business receivables		–241.8		–151.4	393.2
Contract assets	577.2	198.0		379.2	
Income tax receivables	21.1				21.1
Other financial assets	42.9				42.9
Other assets	43.8				43.8
Cash and cash equivalents	322.4				322.4
Prepayments					
Total current assets	**2,757.5**	**180.3**		**39.0**	**2,538.2**
Total assets	**6,091.1**	**180.3**		**66.2**	**5,844.6**

Adjustments as of January 1, 2017

[T58] Equity and liabilities

in € million	Adjusted amount Jan. 1, 2017	Adjustments: Reclassification of contract assets/ liabilities and refund liabilities	Adjustments: Program-life-time-related payments to customers	Adjustments: Time of revenue recognition	Adjustments: DRSC Interpretation (IFRS) Nr. 4	Reported amount Jan. 1, 2017
Equity						
Subscribed capital	52.0					52.0
Capital reserves	435.5					435.5
Revenue reserves	1,245.5			–125.4		1,370.9
Treasury shares	–25.3					–25.3
Accumulated other comprehensive income	–332.8					–332.8
Owners of MTU Aero Engines AG	**1,374.9**			**–125.4**		**1,500.3**
Non-controlling interests	0.2					0.2
Total equity	**1,375.1**			**–125.4**		**1,500.5**
Non-current liabilities						
Pension provisions	860.6					860.6
Other provisions	23.4					23.4
Refund liabilities	2.0	2.0				
Financial liabilities	1,054.4	–2.0				1,056.4
Deferred tax liabilities	0.2			–23.3		23.5
Total non-current liabilities	**1,940.6**			**–23.3**		**1,963.9**
Current liabilities						
Pension provisions	22.7					22.7
Income tax liabilities	5.8				–1.0	6.8
Other provisions	136.2	–638.6		89.5	1.0	684.3
Refund liabilities	1,207.2	1,207.2				
Financial liabilities	522.9	–122.3				645.2
Trade payables	244.7	–396.7		6.5		634.9
Construction contract and service business payables		–463.1		118.9		344.2
Contract liabilities	593.8	593.8				
Other liabilities	42.1					42.1
Total current liabilities	**2,775.4**	**180.3**		**214.9**		**2,380.2**
Total equity and liabilities	**6,091.1**	**180.3**		**66.2**		**5,844.6**

Adjustments as of December 31, 2017

[T59] Assets

in € million	Adjusted amount Dec. 31, 2017	Adjustments: Reclassification of contract assets/liabilities and refund liabilities	Adjustments: Program-life-time-related payments to customers	Adjustments: Time of revenue recognition	Reported amount Dec. 31, 2017
Non-current assets					
Intangible assets	1,032.5		–1,257.6		2,290.1
Property, plant and equipment	735.5			–27.9	763.4
Financial assets accounted for using the equity method	291.5				291.5
Other financial assets	167.8				167.8
Acquired program assets, acquired development costs and other assets	1,259.3		1,257.6		1.7
Deferred tax assets	55.2				55.2
Total non-current assets	**3,541.8**			**–27.9**	**3,569.7**
Current assets					
Inventories	845.1			–152.8	997.9
Trade receivables	914.5	239.9		–62.3	736.9
Construction contract and service business receivables		–294.0		–160.0	454.0
Contract assets	632.8	285.7		347.1	
Income tax receivables	31.3				31.3
Other financial assets	113.2				113.2
Other assets	40.4				40.4
Cash and cash equivalents	106.1				106.1
Prepayments					
Total current assets	**2,683.4**	**231.6**		**–28.0**	**2,479.8**
Total assets	**6,225.2**	**231.6**		**–55.9**	**6,049.5**

Adjustments as of December 31, 2017

[T60] Equity and liabilities

in € million	Adjusted amount Dec. 31, 2017	Adjustments: Reclassification of contract assets/ liabilities and refund liabilities	Adjustments: Program-life-time-related payments to customers	Adjustments: Time of revenue recognition	Adjustments: DRSC Interpretation 4 (IFRS)	Reported amount Dec. 31, 2017
Equity						
Subscribed capital	52.0					52.0
Capital reserves	451.2					451.2
Revenue reserves	1,503.0			–148.5		1,651.5
Treasury shares	–23.1					–23.1
Accumulated other comprehensive income	–178.1					–178.1
Owners of MTU Aero Engines AG	**1,805.0**			**–148.5**		**1,953.5**
Non-controlling interests	36.3					36.3
Total equity	**1,841.3**			**–148.5**		**1,989.8**
Non-current liabilities						
Pension provisions	847.6					847.6
Other provisions	37.6					37.6
Refund liabilities	1.4	1.4				
Financial liabilities	935.2	–1.4				936.6
Contract liabilities	16.9	16.9				
Other liabilities		–16.9				16.9
Deferred tax liabilities	16.9			–70.5		87.4
Total non-current liabilities	**1,855.6**			**–70.5**		**1,926.1**
Current liabilities						
Pension provisions	23.1					23.1
Income tax liabilities	2.9				–0.7	3.6
Other provisions	175.6	–772.7		91.8	0.7	855.8
Refund liabilities	1,155.3	1,155.3				
Financial liabilities	242.1	–57.8				299.9
Trade payables	307.1	–258.3		2.6		562.8
Construction contract and service business payables		–390.6		68.7		321.9
Contract liabilities	555.7	555.7				
Other liabilities	66.5					66.5
Total current liabilities	**2,528.3**	**231.6**		**163.1**		**2,133.6**
Total equity and liabilities	**6,225.2**	**231.6**		**–55.9**		**6,049.5**

[T61] Consolidated cash flow statement

in € million	Adjusted amount 2017	Adjustments: Reclassification of contract assets/ liabilities and refund liabilities	Adjustments: Program-life-time-related payments to customers	Adjustments: Time of revenue recognition	Adjustments: DRSC Interpretation (IFRS) 4	Reported amount 2017
Operating activities						
Net income	**358.7**			**–23.1**		**381.8**
Non-cash value adjustments on capitalized program assets and acquired development costs	47.3		47.3			
Depreciation, amortization, impairment losses and reversals of impairment losses on non-current assets	146.2		–47.3	–2.7		196.2
Profit/loss of companies accounted for using the equity method	–42.4					–42.4
Profit/loss of equity investments	–1.5					–1.5
Proceeds from the disposal of fixed assets	5.2					5.2
Change in pension provisions	6.8					6.8
Change in other provisions	53.6	–131.8			–0.3	185.7
Change in refund liabilities (not included in working capital)	131.8	131.8				
Change in working capital	–191.0			15.2		–206.2
Other non-cash items	–43.8					–43.8
Interest result	7.2					7.2
Interest paid	–14.5					–14.5
Interest received	4.7					4.7
Dividends received	17.8					17.8
Income taxes	119.4			–11.0	–3.1	133.5
Income taxes paid	–144.6				3.4	–148.0
Cash flow from operating activities	**460.9**			**–21.6**		**482.5**
Investing activities						
Capital expenditure on:						
Intangible assets	–68.4		64.6			–133.0
Property, plant and equipment	–172.0			23.4		–195.4
Financial assets	–79.9					–79.9
Acquired program assets and acquired development costs	–64.6		–64.6			
Proceeds from disposal of:						
Intangible assets / property, plant and equipment	5.5			–1.8		7.3
Financial assets	38.6					38.6
Cash flow from investing activities	**–340.8**			**21.6**		**–362.4**
Financing activities						
Increase in financial liabilities	78.1					78.1
Repayment of corporate bond	–250.0					–250.0
Settlement of contingent purchase price liability for PW1000G program shares, PW800 program shares, IAE-V2500 stake increase	–76.4					–76.4
Repayment of financial liabilities	–1.3					–1.3
Dividend payment	–97.6					–97.6
Sale of treasury shares under the MAP employee stock option program	14.3					14.3
Cash flow from financing activities	**–332.9**					**–332.9**
Net change in cash and cash equivalents during the reporting period	**–212.8**					**–212.8**
Effect of translation differences on cash and cash equivalents	–3.5					–3.5
Cash and cash equivalents at beginning of financial year (January 1)	322.4					322.4
Cash and cash equivalents at end of financial year (December 31)	**106.1**					**106.1**

Accounting standards and interpretations, and revised / amended accounting standards and interpretations, issued but not yet applied

The following accounting standards and interpretations, and revised/amended accounting standards and interpretations, have been issued by the IASB but were not yet effective for annual periods beginning on or after January 1, 2018:

[T62] New and amended standards and interpretations

Standard	Title
IFRS 3	Amendment: Definition of a Business [2) 4)]
IFRS 9	Amendment: Prepayment Features with Negative Compensation [1)]
IFRS 16	Leases [1)]
IFRS 17	Insurance Contracts [3)]
IAS 1 und IAS 8	Amendment: Definition of Material [2) 4)]
IAS 19	Amendment: Plan Amendment, Curtailment or Settlement [1) 4)]
IAS 28	Amendment: Long-term Interests in Associates and Joint Ventures [1) 4)]
IFRIC 23	Uncertainty over Income Tax Treatments [1)]
Annual improvements to IFRSs 2015 – 2017	IFRS 3 Business Combinations and IFRS 11 Joint Arrangements [1) 3)] IAS 12 Income Taxes [1) 3)] IAS 23 Borrowing Costs [1) 3)]

[1)] Effective for annual periods beginning on or after January 1, 2019.
[2)] Effective for annual periods beginning on or after January 1, 2020.
[3)] Effective for annual periods beginning on or after January 1, 2021.
[4)] Still awaiting EU endorsement.

MTU does not intend voluntarily to apply any of these standards and interpretations, or any amendments made to them, in advance of their effective date.

In the interests of efficient reporting practice, the following descriptions of standards and interpretations are limited to those that, on the basis of the MTU group's current business model, could potentially have a material impact on the financial reporting in future reporting periods.

IFRS 16, Leases

IFRS 16 redefines how to recognize, measure, present and disclose lease arrangements. IFRS 16 replaces the standards and interpretations IAS 17, SIC 15, SIC 27 and IFRIC 4.

The main change in the accounting treatment of leases is that, from a lessee's perspective, the previous differentiation between finance leases and operating leases is no longer applied. This means that assets must be recognized in the balance sheet for all rights and licenses in respect of these leases, insofar as they exceed the immateriality thresholds set by the legislator.

MTU intends to apply the amended standard as of the effective date of January 1, 2019, using the modified retrospective approach, in which the right-of-use assets are balanced against the lease liabilities. Based on an analysis in the current reporting period of the portfolio of lease arrangements, the effect of recognizing a right-of-use asset and a lease liability as an adjustment to opening equity at the date of initial application is estimated at approximately €150 million.

IFRIC 23

IFRIC 23 clarifies how the recognition and measurement requirements of IAS 12 Income Taxes are applied where there is uncertainty over income tax treatments.

An uncertain tax treatment is any tax treatment applied by an entity where there is uncertainty over whether that approach will be accepted by the tax authority. Recognition of an uncertain tax treatment (assets and liabilities) depends on whether an entity deems that settlement of the tax is probable. An uncertain tax treatment may be recognized and measured for deferred and current income tax assets and liabilities. IFRIC 23 requires consistent judgments and assessments to be applied when

recognizing and measuring the effect of uncertain tax treatments. MTU does not expect the interpretation to result in any changes in the net assets, financial position and operating results of the MTU group.

Invocation of Section 264 (3) of the German Commercial Code (HGB)

MTU Maintenance Hannover GmbH, Langenhagen, and MTU Maintenance Berlin-Brandenburg GmbH, Ludwigsfelde, which are consolidated affiliated companies of MTU Aero Engines AG, Munich, have invoked the exemption provisions of Section 264 (3) of the German Commercial Code (HGB).

Group reporting entity

At December 31, 2018, the MTU group including MTU Aero Engines AG, Munich, comprised 32 companies. These are presented in detail in the list of major shareholdings in *Note 39 (Relationships with related companies and persons).*

Change in composition of the group reporting entity

The number of group companies and equity investments in associated companies and joint ventures included in the consolidated financial statements developed as follows:

[T63] Group reporting entity

	Germany	International	Total
Shareholdings at Dec. 31, 2016	**11**	**20**	**31**
Additions 2017		2	2
Disposals 2017			
Shareholdings at Dec. 31, 2017	**11**	**22**	**33**
Additions 2018			
Disposals 2018	–1		–1
Shareholdings at Dec. 31, 2018	**10**	**22**	**32**

After completion of the liquidation procedure, MTU München Unterstützungskasse GmbH i.L., Munich, ceased to exist as a legal entity on October 9, 2018.

Subsidiaries

The consolidated financial statements of MTU Aero Engines AG, Munich, include all significant companies in which MTU Aero Engines AG, Munich, has a controlling interest as defined by IFRS 10, in other words entities in which MTU, as the investor, is exposed to, or has rights to, variable returns from its involvement with the investee and has the ability to affect those returns through its control over the investee. There were no changes in the classification of these controlling interests during the reporting period.

Associated companies

Associated companies are companies in which MTU has significant influence on the investee in accordance with IAS 28 and which are neither subsidiaries nor joint ventures. The equity investments in entities corresponding to this definition, over whose financial and operating policies MTU directly or indirectly exercises significant influence, are accounted for using the equity method, or at fair value if the effects of their consolidation under the equity method would have no significant impact on the presentation of MTU's net assets, financial situation or operating results. There were no changes in the classification of these equity investments during the reporting period. Whereas MTU held an 18 % share in the voting rights of IAE International Aero Engines LLC., East Hartford, USA, as well as PW1100G-JM Engine Leasing LLC., East Hartford, USA, the underlying agreements grant MTU significant influence over the investees, as well as information and consultation rights, thus justifying their classification as associated companies.

Joint ventures

Joint ventures are companies over which MTU exercises joint control together with one or more other entities in accordance with IFRS 11.

MTU's principal joint ventures, namely

- MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China,
- Pratt & Whitney Canada Customer Service Centre Europe GmbH, Ludwigsfelde, Germany,
- Ceramic Coating Center S.A.S., Paris, France,
- Airfoil Services Sdn.Bhd., Kota Damansara, Malaysia,
- AES Aerospace Embedded Solutions GmbH, Munich, Germany
- Engine Maintenance Europe Aero sp. z.o.o., Jasionka, Poland

are accounted for in the consolidated financial statements using the equity method.

Non-significant investments

Non-significant investments are shares in companies and stakes in engine programs whose overall impact on the group's net assets, financial situation and operating results is currently and foreseeably not material. These investments are measured at fair value in compliance with the amended requirements of IFRS 9.

Restrictions

In individual cases, MTU or its subsidiaries may be subject to restrictions on their ability to transfer liquid funds or other assets to other group companies. Such restrictions may stem from regulatory requirements or from contractual agreements between the investors in the individual companies.

Consolidation principles

All business combinations are accounted for using the acquisition method in accordance with IFRS 3. Under the acquisition method, the acquirer accounts for the business combination by measuring and recognizing the identifiable assets acquired and the liabilities and contingent liabilities assumed. The identifiable assets, liabilities, and contingent liabilities are measured at fair value. Any excess of the purchase price over the net fair value of the acquired assets is recognized as goodwill in accordance with IAS 36 and tested for impairment at least annually, or at shorter intervals if there is an indication that the asset might be impaired. If the group's interest in the net fair value of the acquired identifiable net assets exceeds the cost of the business combination, that excess (negative goodwill) is recognized in the income statement – after remeasurement as required by IFRS 3.36.

The effects of intragroup transactions are eliminated. When accounting for dealings between entities of the consolidated group, accounts receivable are offset against accounts payable and expenses are offset against income. Internal sales are transacted on the basis of normal market transfer prices and intragroup profits and losses are eliminated.

In accordance with IAS 12, deferred tax assets and liabilities are recognized on temporary differences arising from the elimination of intragroup profits and losses.

Currency translation

Transactions in foreign currencies are translated to the functional currency using the exchange rate prevailing on the date of the transaction. At the reporting date, monetary items are translated using the exchange rate prevailing at that date, whereas non-monetary items are translated using the exchange rate prevailing on the transaction date. Translation differences are recognized in the income statement. The assets and liabilities of group companies whose functional currency is not the euro are translated from the corresponding local currency to the euro using the closing exchange rate at the reporting date. In the income statements of foreign group companies whose functional currency is not the euro, income and expense items are translated each month using the exchange rate applicable at the end of the month; the average exchange rate for the year can be derived from these end-of-month exchange rates. The translation differences arising in this way are recognized in other comprehensive income and do not have any impact on the net profit/loss for the year. In the case of non-monetary items, the date of initial recognition is used to determine the exchange rate for translation of the asset or liability at initial recognition and for the subsequent recognition of income and expenses arising on derecognition of the asset or liability.

Accounting policy and measurement methods

The consolidated financial statements of MTU Aero Engines AG, Munich, and its subsidiaries are drawn up using uniform accounting policies based on the International Financial Reporting Standards (IFRSs).

Revenues

As of January 1, 2018, the effective date of IFRS 15, Revenue from Contracts with Customers, the previous standards IAS 18 (Revenue), and IAS 11 (Construction Contracts) became obsolete.

IFRS 15 states that revenue from contracts with customers should be recognized as an amount that reflects the consideration to which the entity expects to be entitled in exchange for the promised goods or services as part of its performance obligation. A five-step model framework is used to identify and measure these revenues:

1. Identify the contract(s) with the customer,
2. Identify each party's performance obligations in the contract,
3. Determine the transaction price,
4. Allocate the transaction price to the performance obligations in the contract,
5. Recognize revenue when (or as) the entity satisfies a performance obligation.

Identification of the contract with the customer

Contracts may be concluded in writing, orally, or implicitly in the ordinary course of business. In whatever form they are concluded, contracts must be enforceable and have commercial substance. A contract with a customer will be within the scope of IFRS 15 if these conditions are met and it is probable that MTU will collect the consideration to which it is entitled. When assessing the probability that the consideration will be collected, the customer's ability and intention to deliver the contracted goods or services by the due date are taken into consideration. MTU considers contracts to be within the scope of IFRS 15 if:

- All parties are in agreement with the terms of the contract,
- each party's rights in relation to the goods or services to be transferred can be identified,
- the payment terms for the goods or services to be transferred can be identified,
- the contract has commercial substance, and
- it is probable that the consideration to which MTU is entitled in exchange for the goods or services will be collected.

If, at the reporting date, a contract with a customer does not yet meet all of the above criteria, the company will continue to re-assess the contract at regular intervals until such time as the criteria are met. From this point onward, IFRS 15 will be applied to the contract.

In the OEM segment, MTU has identified the respective consortium leaders (OEMs) as customers in the case of the existing risk- and revenue-sharing partnerships in the commercial engine business. In the case of risk- and revenue-sharing partnerships with joint consortium leadership, as in the military engine business, the end customer served by the consortium (e.g. an air force) was identified as the customer as defined in IFRS 15. In the commercial maintenance business (MRO segment), MTU has identified its direct contractual partners as the customers (e.g. aircraft operator, leasing company).

Contract modification

Contracts are often modified to take changes in the terms and conditions into account. The renewal of existing contracts is also regarded as a contract modification. A contract modification exists if the changes either create new rights and obligations, or modify existing enforceable rights and obligations, thus altering the scope of the contract and/or the agreed price. Such changes must be accounted for either by modifying the accounting for the current contract or by establishing a separate, new contract. In the MRO segment, it is common for contracts in the form of fly-by-hour agreements to be renewed for an extended term. Such renewals are usually accounted for as the termination of the old contract and the simultaneous creation of a new contract.

Identification of performance obligations

Once a contract has been identified as being within the scope of IFRS 15, its terms and conditions, and the company's general terms of business, are assessed in order to identify the promised goods or services (or bundle of goods and services) to be treated as distinct performance obligations. A good or service is distinct if the customer can benefit from the good or services on its own or in conjunction with other readily available resources, and if the promise to transfer the good or services to the customer is separately identifiable from other promises in the contract.

MTU's performance obligations mainly comprise:

- Manufacturing/delivery of aero engine components (sometimes including their assembly into modules)
- Development / Access to new technology
- MRO services for individually commissioned shop visits
- MRO services on the basis of fixed fees per flying hour or per maintenance intervention (fly-by-hour or pay-per-event agreements) – typically, the agreed transaction prices are calculated according to the number of flying hours accomplished (fly-by-hour) or the number of times defined MRO services are requested (pay-per-event)

Warranty obligations do not constitute distinct performance obligations, because their sole purpose is to guarantee that engine components delivered by MTU or that services provided by MTU comply with the agreed specifications, and do not include any other performance guarantees.

Determination of the transaction price
The transaction price is the amount of consideration to which a company expects to be entitled in exchange for the transfer of goods or delivery of services to a customer. Where a contract contains elements of variable consideration, the company may estimate the amount of variable consideration to which it is entitled under the terms of the contract.

Variable consideration is only included in the transaction price to the extent that MTU considers it highly improbable that its inclusion will result in a subsequent revenue reversal.

The agreed transaction price is reduced in the case of payments to customers. MTU defines payments to customers as payments that are not made in exchange for identifiable goods and services that are independent of MTU's performance obligations toward the customer. Payments to customers arise, in particular, in connection with the commercial engine business (OEM segment).

Allocation of transaction price to performance obligations in the contract
Where a contract comprises multiple performance obligations, the transaction price is allocated to the performance obligations by reference to their standalone selling prices. Standalone selling prices are based wherever possible on observable data. Certain components of variable consideration are allocated in full to a performance obligation, because their payment depends on MTU's satisfaction of that performance obligation and the allocation is consistent with the chosen distribution of the transaction price. If no standalone selling price is directly observable, MTU as a general rule estimates the applicable transaction price on the basis of the expected costs plus an appropriate margin by assessing relevant information that can be obtained without undue effort.

In the case of contracts in the commercial and military engine business (OEM segment) in which MTU's role is effectively that of a supplier or service provider to the consortium leader (OEM), without technology or design responsibility, the transaction prices are fixed in the consortium agreement, including variable elements where appropriate. These transaction prices must be allocated in full to the goods delivered or services provided (e.g. engine assembly). The performance obligations arising from consortium agreements frequently involve granting other consortium members or the consortium leader (OEM) access to engine technologies, in addition to the supply of engine components or the provision of services such as engine or module assembly. In such cases, MTU's role is that of a supplier or service provider with technology or design responsibility. Here, MTU allocates the fixed, market-adapted transaction prices as per the consortium agreement (relative standalone selling prices) to the corresponding delivery and performance obligations concerning the delivery of components and assembly services, treating the revenue from access to engine technology as sales-based royalties, received in the form of a share in the profits of the engine program.

In the commercial maintenance business (MRO segment), transaction prices fixed in the consortium agreement, including variable elements, are allocated with reference to the relative standalone selling prices to the identified components of the serviced maintenance contracts.

Recognition of revenues when performance obligations are satisfied
Revenues are recognized, either over time or at a point in time, when control of a good or service is transferred.

Revenues from the delivery of engine modules and components are recognized at a point in time, and calculated with respect to the effective transfer of control to the customer and the associated beneficial risks and opportunities. Revenues from customer-specific services - such as development projects and especially engine maintenance - are recognized over time if they meet the necessary criteria.

When such revenues are recognized over time, the amount of completed work is determined as the ratio of contract costs incurred up to the reporting date to total contract costs.

Where not explicitly stated differently, all revenues recognized qualify as revenues under IFRS 15.

Contracts with subcontractors
MTU sometimes works together with subcontractors to fulfil its performance obligations. When MTU subcontracts the repair of engine components to a third party, MTU remains responsible for the quality of these repairs vis-à-vis the customer. Moreover, MTU is responsible for obtaining certificates of airworthiness for all new parts and components it delivers to customers. The subcontractors invoice MTU for their services in accordance with their contractual agreement with the group. They have no influence over the prices charged to customers by MTU.

MTU is thus the principal contractor and reports its revenues as a gross amount. In other words, the full amount of revenues from the customer is reported, while the amount invoiced by the subcontractor is recognized under cost of sales.

Activity as agent for the sale of non-MTU parts
As a member of certain engine consortia in the military sector, MTU is responsible for sales of parts made by other partners, in addition to its development and production activities. The specific tasks performed by MTU consist of organizing the sales process for the non-MTU parts, and contract negotiations. The percentage commission on the sale is not recognized as revenue until no uncertainty exists as to the amount of revenue arising from the sale, which is then recognized at a point in time.

Since MTU is merely the agent in this transaction, it recognizes the net amount of the consideration to which it is entitled for its activity as an agent.

Cost of sales
The cost of sales comprises the manufacturing cost of goods and services sold, including the amortization charge from purchased development assets, and the cost of products purchased for resale. In addition to direct material and production costs, it also comprises allocated manufacturing-related overheads, including amortization/depreciation of the production-related intangible assets and production installations, write-downs on inventories and an appropriate portion of production-related administrative overheads.

Research and development expenses
Research costs are charged to expense in the period in which they are incurred.

In the case of development costs, a distinction is drawn between externally funded development activities and company-funded development activities. Services provided as part of externally funded development projects (e.g. government-funded technology programs) are allocated to cost of sales, in light of the fact that the incurred costs are reimbursed by a contracting entity, and are hence recognized as revenue in profit or loss. The income and expenses recognized in this context do not fall within the scope of IFRS 15.

Development costs generated in the context of company-funded R&D projects are capitalized in accordance with the requirements of IAS 38 or recognized as an expense in the period in which they are incurred. The capitalized development costs comprise all costs directly attributable to the development process and are amortized over the asset's respective useful life from the date at which it is put to productive use in MTU's value creation process. The amortization expense is recognized in cost of sales.

Intangible assets
Externally acquired and internally generated intangible assets are recognized in accordance with IAS 38 if it is probable that a future economic benefit associated with the asset will flow to the entity and the cost of the asset can be measured reliably.

Intangible assets with a finite useful life are carried at their acquisition or construction cost and amortized on a straight-line basis over their useful lives.

Amortization is based on the following generally accepted useful lives:

[T64] Useful lives of assets (in years)

Program assets arising from the purchase price allocation and self-created development assets	maximum 30
Program-independent technologies	10
Customer relations	4 - 26
Other assets	3 - 5

Depreciation is based on the following generally accepted useful lives:

[T65] Useful lives of assets (in years)

Buildings	25 - 50
Lightweight structures	10
Property facilities	10 - 20
Technical equipment, plant and machinery	5 - 10
Operational and office equipment	3 - 15

The useful lives and amortization methods pertaining to intangible assets are regularly assessed for relevance and adjustments are made where necessary to the estimates used when compiling the financial statements.

Goodwill is tested for impairment on a yearly basis in accordance with IAS 36. Each of the two operating segments, OEM (commercial and military engine business) and MRO (commercial maintenance business), are tested separately.

Public sector grants and assistance

Public sector grants and assistance are recognized in accordance with IAS 20 only if there is reasonable assurance that the conditions attached to them will be complied with and that the grants will be received. Grants are recognized as income over the periods necessary to match them with the related costs that they are intended to compensate. In the case of capital expenditure on property, plant and equipment and on intangible assets, the amount of the public sector grant awarded for this purpose is deducted from the acquisition or construction costs of the asset. The grants are then recognized in the income statement using reduced depreciation/ amortization amounts over the lifetime of the asset.

Property, plant and equipment

Property, plant and equipment are subject to wear and tear and are carried at their acquisition or construction cost less cumulative depreciation charges and impairment losses. The cost of items of self-constructed plant and equipment comprises all directly attributable costs and an appropriate proportion of production-related overheads. The assets are assigned to an appropriate category once they have been completed or are operational. The revaluation model is not applied. Depreciation on property, plant and equipment is calculated using the linear method in accordance with the useful life of the asset.

The useful lives of machines used in multi-shift operation are reduced accordingly to take account of additional usage.

Borrowing costs

Borrowing costs directly related to the acquisition, construction or production of qualifying assets are added to the acquisition or construction costs of those assets until such time as the assets have been made ready for sale or for their intended use. Qualifying assets are those that require a substantial period of time to be made ready for sale or for their intended use in accordance with IAS 23.

Borrowing costs are capitalized only insofar as they relate to the purchase and preparation of qualifying assets for their intended use or sale, and only include activities that commenced on or after January 1, 2009.

Leases

Leasing contracts are classified in accordance with IAS 17 as either operating leases or finance leases, depending on whether the lessor or lessee is attributed the beneficial ownership of the leased asset and bears the substantial risks and rewards associated with ownership of the leased asset. If the lessor retains the substantial risks and rewards (operating lease), the leased asset is recognized in the lessor's balance sheet. The lessee in an operating lease arrangement recognizes lease payments effectuated throughout the duration of the lease arrangement as expenses.

If the substantial risks and rewards associated with ownership of the leased asset are transferred to the lessee (finance lease), the leased asset is recognized in the lessee's balance sheet. The leased asset is recognized at its fair value as measured at the date of acquisition, or at the present value of future minimum lease payments if lower, and depreciated over its estimated useful life, or the contract duration if shorter. The lessee immediately recognizes a finance lease liability corresponding to the carrying amount of the leased asset. The effective interest rate method is employed to measure the lease liability in subsequent periods.

Acquired program assets and acquired development costs

Acquired program assets and acquired development costs represent payments to customers as defined in IFRS 15 and are recognized as non-current assets. They are capitalized at the nominal amount of these payments. These assets result from payments to customers and are amortized against revenue over the lifetime of the program in question, which generally means a period of up to 30 years.

When program assets are acquired that include significant deferred, conditional purchase price components, they are accounted for by analogy with IFRIC 1. Changes resulting from the subsequent measurement of the conditional purchase price components are therefore accounted for as subsequent costs of acquisition, or as a reduction of such costs.

Subsequent payments to customers during the lifetime of the program that do not result from remeasurement are recognized as an increase in the program-lifetime-related payments, insofar as these payments are associated with future economic benefits derived from the program-lifetime-related payments.

Impairment of intangible assets, property, plant and equipment, acquired program assets and acquired development costs

At each reporting date, an analysis is carried out to reveal any indication that the value of intangible assets, or property, plant and equipment, or acquired program or development assets might be impaired. If impairment is indicated, the value of the asset in question is assessed on the basis of its recoverable amount.

Assets with an indefinite useful life, intangible assets that are not yet ready for use, and goodwill acquired in connection with a business combination are not subject to amortization, but are instead reviewed for impairment at least once each year.

The impairment loss on intangible assets, property, plant and equipment and, in analogy to IAS 36, acquired program and development assets, is determined by comparing the carrying amount with the recoverable amount. The recoverable amount is either the fair value of the asset (or of the cash-generating unit) less costs to sell, or the value in use, whichever is higher. The recoverable amount is usually determined using a discounted cash flow (DCF) method. If it is not possible to attribute separate future cash flows to discrete assets that have been generated independently of other assets, then an impairment test must be carried out on the basis of the cash-generating unit to which the asset (group) ultimately belongs. That involves making forecasts of the cash flow that can be generated by the asset or cash-generating unit, and applying a discount rate that takes into account the risks associated with the asset or cash-generating unit.

If the reasons for impairment losses recognized in a prior period no longer exist, the impairment loss on these assets is reversed, except in the case of goodwill.

Non-current financial assets

Investments in joint ventures and associated companies that have a significant impact on the group's net assets, financial situation or operating results are accounted for using the equity method. The group's share in the profit or loss of these entities is therefore allocated on a pro rata basis to profit/loss and to the corresponding carrying amount of the investment. This profit/loss is reported as a separate line item under "profit/loss of companies accounted for using the equity method."

Investments in subsidiaries that are only proportionately consolidated, and other equity investments and loans, are recognized at fair value. Here, MTU makes use of the option of recognizing such assets in other comprehensive income. Dividend payments received from these equity investments is included in the profit/loss of equity investments.

Inventories

Raw materials and supplies are measured at average acquisition cost or net realizable value, whichever is lower. Trade discounts and customer loyalty awards are taken into account when determining acquisition costs. Acquisition cost comprises all direct costs of purchasing and other costs incurred in bringing the inventories to their present location and condition. Net realizable value is the estimated selling price generated in the ordinary course of business for the finished product in question, less estimated costs necessary to make the sale (costs to complete and selling costs).

Finished products and work in progress are recognized at manufacturing cost or net realizable value, whichever is lower. Manufacturing cost comprises all production-related expenses based on normal capacity utilization. In addition to direct costs, these include an appropriate and necessary portion of the cost of material and production overheads, including production-related depreciation. Administrative expenses are also included to the extent that they can be attributed to production operations.

Contract assets

A contract asset represents the group's right to consideration for goods or services it has transferred to a customer. A contract asset is recognized when the group has satisfied its performance obligation and when its right to consideration is conditional on something other than the passage of time. If the right to consideration is unconditional except for the passage of time, it is recognized as a trade receivable and accounted for in accordance with the accounting principles for financial instruments.

Financial instruments

A financial instrument is a contract that simultaneously gives rise to a financial asset in one company and to a financial liability or equity instrument in another company.

Financial assets

Financial assets include, in particular, cash and cash equivalents, trade receivables, loans to third parties, other receivables, and derivative financial assets.

At initial recognition, financial assets are measured at their fair value. The measurement of a financial asset subsequent to initial recognition depends on its classification. Financial assets are measured at amortized cost if their purpose is to generate cash flows to fulfill obligations under contracts that require payments at predefined dates.

Financial assets are measured at fair value through other comprehensive income if their purpose is to generate cash flows to fulfill obligations under contracts that require payments at predefined dates and, additionally, these assets are to be sold at maturity. A distinction is made between debt instruments for which the accumulated gains and losses are reclassified on derecognition and equity instruments for which this is not the case. MTU has elected to use the option offered by IFRS 9 of recognizing equity instruments at fair value through other comprehensive income.

All other financial instruments are measured at fair value through profit or loss.

In 2017, financial assets were classified and measured in accordance with IAS 39 as follows:

Financial assets include, in particular, cash and cash equivalents, trade receivables, loans, other receivables, financial investments held to maturity, and non-derivative and derivative financial assets held for trading.

Financial assets are measured in accordance with their classification as per IAS 39. The measurement of a financial asset subsequent to initial recognition depends on whether the financial instrument is classified as held for trading, held to maturity, available for sale, or whether it falls into the loans and receivables category. The assignment of an asset to a measurement category is performed at the time of acquisition and is primarily determined by the purpose for which the financial asset is acquired. No financial assets were reclassified in the financial year 2018.

At initial recognition, financial assets are measured at their fair value. In the case of financial assets that are not subsequently measured at fair value through profit or loss, the transaction costs directly attributable to the acquisition of the financial asset are included in the initial measurement.

Financial instruments held for trading are measured at fair value through profit or loss. This category primarily includes derivative financial instruments that do not form part of an effective hedging relationship as defined in IAS 39. Any gain or loss resulting from remeasurement is recognized in the income statement.

Financial assets acquired when making financial investments and that are intended and expected, with reasonable certainty, to be held to maturity are measured at amortized cost using the effective interest method less impairment.

Financial assets classified as loans and receivables are measured at amortized cost less impairment, using the effective interest method where appropriate.

Other non-derivative financial assets are classified as available for sale. These are always measured at fair value. In MTU's financial statements, this item includes the carrying amount of subsidiaries, joint ventures and other equity investments, which are measured at the cost of acquisition because they are not quoted in an active market, and are not the subject of any planned disinvestment. Resulting gains or losses are recognized directly in equity. If it is not possible to reliably measure the fair value of an equity instrument that is not quoted in an active market, the investment is measured at cost (less impairment).

Impairment loss on financial assets

The impairment model in IFRS 9 is based on the premise of providing for expected losses.

In the case of trade receivables and contract assets, expected losses are recognized for the entire remaining duration of the contract (full lifetime loss allowance.) For all other financial instruments, expected credit losses are measured at an amount equal to the 12-month expected credit losses, unless there has been a significant increase in the credit risk. Otherwise, expected losses are also recognized for these financial assets over their remaining term to maturity.

When calculating the expected credit losses, an amount is factored in for the possible impairment of groups of financial assets with a comparable credit rating. The loss allowance is based on credit spreads covering good, average and poor credit ratings. The classifications used by international rating agencies are applied when making these measurements.

The credit rating of financial assets is considered to be impaired in the following cases: significant financial difficulties of the debtor or a high probability that the debtor will enter bankruptcy or financial reorganization, the closure of an active market, significant changes in technological, economic, legal or market conditions affecting the issuer, or a significant or persistent decline in the fair value of the financial asset below its amortized cost, including any previously recognized impairment losses. Impairment losses are initially entered in a separate valuation allowance account and only recognized as such after it has been established that the value of the asset is unrecoverable.

Until 2017, impairment losses on financial assets were recognized in accordance with IAS 39 as follows:

At each reporting date, the carrying amounts of financial assets that are not measured at fair value through profit or loss are assessed for any indication of impairment.

Examples of such indications include significant financial difficulties of the debtor or a high probability that the debtor will enter bankruptcy or financial reorganization, the closure of an active market, significant changes in technological, economic, legal or market conditions affecting the issuer, or a significant or persistent decline in the fair value of the financial asset below its amortized cost, including any previously recognized impairment losses. Impairment losses are initially entered in a separate valuation allowance account and only recognized as such after it has been established that the value of the asset is unrecoverable. The amount of the impairment loss is recognized in the income statement. If impairment is indicated for available-for-sale financial assets, the amounts previously recognized in other comprehensive income are eliminated from equity up to the amount of the assessed impairment loss and recycled to the income statement.

If, in a subsequent period, there is objective evidence that the fair value has increased due to an event occurring after the impairment was originally recognized, the impairment loss is reversed through profit or loss. Impairment losses affecting available-for-sale equity instruments and equity instruments not quoted in an active market are not reversed through profit or loss until they are effectively recovered.

Financial liabilities

Financial liabilities often oblige the holder to return the instrument to the issuer in return for cash or another financial asset. Financial liabilities include, in particular, bonds and other debts evidenced by certificates, trade payables, liabilities to banks, finance lease liabilities, borrowers' note loans and derivative financial liabilities.

Financial liabilities are measured at their fair value at the time of acquisition, which is normally equivalent to the fair value of the settlement amount. Transaction costs directly attributable to the acquisition are deducted from the amount of all financial liabilities. If a financial liability is interest-free or bears interest at below the market rate, it is recognized at an amount that is consistently lower than the settlement price or nominal value. The financial liability initially recognized at fair value is amortized subsequent to initial recognition using the effective interest method.

Cash and cash equivalents

The salient features of cash and cash equivalents, which include demand deposits and short-term bank deposits, are that they have a maturity of three months or less from the date of acquisition and are measured at their nominal value. The associated credit risk is considered low, and hence no write-down was deemed necessary.

Derivative financial instruments

MTU uses derivative financial instruments as a hedge against currency and price risks arising out of its operating activities and financing transactions.

At initial recognition and when measured subsequently, derivative financial instruments are measured at their fair value. This value is determined using quoted market prices in an active market and is represented by the amount that MTU would receive or would have to pay at the reporting date when the financial instrument is terminated. If no quoted market prices in an active market are available, the fair value is calculated using recognized financial mathematical models (DCF method) on the basis of the relevant exchange rates, interest rates and credit standing of the contractual partners at the reporting date.

Hedge accounting (hedging relationships)

MTU satisfies the requirements of IFRS 9 (2017: IAS 39) concerning instruments used to hedge future cash flows. When a hedge is undertaken, the relationship between the financial instrument designated as the hedging instrument and the underlying transaction is documented, as are the risk management objective and strategy for undertaking the hedge. This includes assessing the effectiveness of the hedging instrument used. Existing cash flow hedges are checked for effectiveness on a regular basis.

MTU uses cash flow hedges to hedge the exposure of future payment cash flows transacted in U.S. dollars (underlying transactions) to fluctuations in foreign currency exchange rates. At remeasurement subsequent to initial recognition, the effective portion of the hedging instrument is recognized in equity under other comprehensive income, together with attributable deferred taxes, until such time as the underlying hedged transaction is realized.

The amounts recognized in other comprehensive income at remeasurement are recycled to the income statement as soon as the underlying hedged transaction is recognized. As a result of the application of IFRS 9, the cost of effective hedging instruments designated as cash flow hedges in connection with future revenue transactions must be recognized in other comprehensive income rather than as a revenue item.

Current and deferred taxes

Current and deferred taxes are recognized in the consolidated financial statements in the manner prescribed in the relevant tax jurisdictions. Current and deferred taxes are recognized in equity if they relate to business transactions that directly lead to a decrease or increase in equity.

Deferred tax assets and liabilities are established for temporary differences between the tax bases of assets and liabilities and their carrying amount in the consolidated balance sheet (“balance sheet liability method”.) Tax assets are established on tax credits available for carry-forward at such time as the conditions attached to the award of the tax credit have been fulfilled. Similarly, deferred tax assets are established on tax losses available for carry-forward. Deferred tax assets are recognized to the extent of the probability that taxable income will be available against which the deductible temporary difference can be applied together with losses as well as tax credits that are permitted to be carried forward. Deferred tax assets and liabilities are measured using the tax rates applicable on the date when the temporary differences are reversed. Deferred tax assets and liabilities are offset insofar as this meets the requirements of IAS 12.74.

Pension obligations

Provisions for pension obligations are accounted for using the projected unit credit method in accordance with IAS 19. This method takes account not only of pension and other vested benefits known at the reporting date, but also of expected increases in pensions and salaries, applying a conservative assessment of the relevant parameters.

Actuarial gains and losses – from the measurement of the defined benefit obligation (DBO) and the plan assets – may arise either from changes in the actuarial assumptions used or when the actual development diverges from those assumptions. They are recognized in other comprehensive income in the period in which they arise, and are recognized separately in the statement of comprehensive income. Past service cost is recognized directly in profit and loss. Where reinsurance claims exist and the criteria given in IAS 19 are met, these claims are treated as plan assets and netted against the pension obligations.

The interest expense resulting from the reversal of the discount on the net liability, comprising pension obligations less the corresponding plan assets, is recognized under the financial result on other items. Service cost is recognized in the income statement as personnel expenses allocated to the relevant costs by function.

Other provisions

In accordance with IAS 37, other provisions are recognized to cover legal or de facto obligations resulting from past events if settlement is expected to result in an outflow of resources. Such obligations regularly arise in connection with claims on warranties and the risk of pending losses on onerous contracts, the recognition of losses arising from the settlement of accounts and subsequent costs, personnel costs, various taxes (especially consumer taxes), and other costs such as the risk of legal action and lawsuits, for instance in connection with government investigations. Non-current provisions for liabilities with an identifiable due date more than one year beyond the reporting date are measured at the present value of expected future cash flows. The company measures provisions for pending losses on onerous contracts at the lower of the expected costs on settlement of the contract and the expected costs on premature termination of the contract.

Provisions for personnel obligations are recognized in accordance with IAS 19 or IAS 37. Obligations relating to pre-retirement part-time working arrangements and long-service awards are measured on the basis of actuarial reports.

Contingent liabilities

Contingent liabilities are potential obligations arising from past events whose existence depends on the occurrence or non-occurrence of one or more uncertain future events that are not wholly within the control of MTU. Contingent liabilities are not recognized as liabilities in the balance sheet because at the reporting date it is considered that there is unlikely to be an outflow of economic resources, or that the amount of the obligation cannot be reliably estimated.

Contract liabilities

When a customer pays the consideration for a performance obligation, or if the company has an enforceable right to receive a specified consideration prior to the transfer of a good or service to the customer, the company presents such contracts with customers as contract liabilities, recognizable on the due date or on the date of settlement in accordance with IFRS 15. Recognition of a contract liability signifies that MTU has entered into an agreement with a customer in which it promises to transfer goods or services to that customer in exchange for a (received or future) consideration.

Refund liabilities

In accordance with IFRS 15, a refund liability is recognized if the company receives consideration from a customer and expects to refund some or all of that consideration to the customer. Refund liabilities represent the amount of consideration to which the company does not expect to be entitled at the reporting date.

Dividend payment and profit distribution

The claims of shareholders to dividend payments and profit distribution relating to a specific reporting period (financial year) are recognized as a liability in the period in which the corresponding resolution is passed. Disclosures relating to the Executive Board's or Supervisory Board's proposal to the Annual General Meeting concerning the dividend payment are provided in *Part VII of these Notes (Determination of the net profit available for distribution on the basis of the German GAAP annual financial statements.)*

Discretionary scope, measurement uncertainties and sensitivity

Preparation of the consolidated financial statements in accordance with IFRSs requires that assumptions and estimations be made that have an impact not only on the amounts of the assets and liabilities, and contingent liabilities, but also on how these items are recognized. These assumptions and estimations conform with the circumstances prevailing at the reporting date and, to that extent, also influence the amount of income and expenditure recognized in the financial years presented. The assumptions and estimations relate primarily to the group's own determination of the useful lives of intangible assets and property, plant and equipment or that serve as the basis for measuring acquired program assets and development costs, the calculation of the fair value of financial instruments, the determination of the effective date of planned transactions that form part of a hedging relationship, the measurement and recognition of provisions and tax credits, and assumptions in connection with impairment tests and purchase-price allocations.

Actual values may occasionally deviate from the assumed and estimated values. Changes are made when more reliable information becomes available and these may have an impact on the figures in the period in which the changes are effectuated and, where applicable, on subsequent periods.

- Due to the long product lifecycle, changes in the applied interest rates and payment flows, and in the expected volume of sales and its distribution over time, have a significant impact on the amounts recognized for program assets and their amortization. They therefore necessarily require judgements on the part of management.
- The interpretation of a sensitivity analysis of the extent of possible consequences of changes to measurement parameters, in particular those relating to claims on warranties, price and quantity structure, the risk of pending losses on onerous contracts, the risk of losses arising from the settlement of accounts, and the measurement of risks arising from legal action and lawsuits, does not allow the consequences of individual events to be assessed, due to the multitude of sensitivity scenarios presenting high degrees of uncertainty.
- The measurement of property, plant and equipment, intangible assets and financial assets involves the use of estimations. Judgements by management form the basis for determining the fair value of assets and liabilities and the useful life of assets.
- In the process of determining impairment losses, estimations are made concerning such parameters as the source, timing and amount of the impairment loss. Many different factors can give rise to an impairment loss, e.g. changes in the competitive situation, expectations concerning the growth of air travel and the aircraft industry, changes in the cost of capital, changes in the future availability of financing funds, aging and obsolescence of technologies, replacement costs, or purchase prices paid in comparable transactions.
- Estimates are also involved when calculating the recoverable amounts for both operating segments as well as for assets as part of impairment tests. They concern the identification and verification of indicated impairments, expected cash flows, relevant discount rates, corresponding useful lives and residual values. In particular, the estimation of cash flows on which the recoverable amounts are based in the case of new engine programs depends on the assumption that it will be possible to raise funds on a continuous basis and that it will be necessary to make continuous ongoing investments. If the demand for engines is slower than expected, this could reduce earnings and cash flows and possibly lead to the recognition of impairment losses. These estimations and the method used to obtain them have a significant impact on the recoverable amount determined and on the amount of the impairment loss recognized on goodwill. Reference is made to *Note 36 (Sensitivity analysis of goodwill) for a sensitivity analysis of the goodwill of the two operating segments.*
- Management recognizes allowances for expected credit losses in accordance with the requirements of IFRS 9. One factor used to identify the need to recognize impairment losses on receivables is the receivables balance structured according to the customer's credit standing and judgements concerning the available security interests. If the customer's credit standing should deteriorate, the volume of the impairments that then have to be recognized or receivables to be written off may exceed the provisions made for this purpose.
- In certain cases, financial liabilities may be linked to deferred, conditional purchase price components, resulting in the need to make predictions about the conditions upon which their subsequent measurement is dependent. A particular case in point in this context is the purchase price obligation arising from the IAE-V2500 stake increase. To account for changes in this liability, MTU makes use of publicly available market data (interest rates, U.S.-dollar exchange rates) and, in particular, an input parameter that is not

publicly observable, namely the number of flight hours that a part of the V2500 engine fleet is expected to accumulate, on which the deferred payments up to the year 2027 are based. To predict the future number of flight hours, MTU makes use of an in-house forecasting model that is based on internally available information concerning the in-service V2500 fleet. The sensitivity analysis takes into account both the absolute number of flight hours on which payments are based and the time period within which these hours arise.

- When revenues are recognized at a point in time, estimates are necessary because, as a partner in engine consortia, MTU receives a fixed and a variable revenue component. The variable revenue component, which is mainly made up of a profit share and revenue-reducing effects such as losses arising from the settlement of accounts and rebates, is determined on the basis of empirical data and parameters specified in customer contracts, which necessarily implies management judgements. Estimates are in particular needed with regard to refund liabilities toward the OEM as defined in IFRS 15.
- Revenues recognized over time are accounted for using the percentage-of-completion method, if it is sufficiently probable that future economic benefits associated with the business will flow to MTU. Because in some cases it may not be possible to reliably estimate the outcome, revenues calculated using the percentage-of-completion method are recognized on the basis of the contract costs incurred up to the reporting date, to the extent that it is probable that these costs can be recovered. The measurement uncertainty is consistent with the complexity and long-term nature of the respective customer contract. Management regularly reviews all estimations made in connection with these customer contracts, making adjustments to the accounts where necessary.
- Revenues and the cost of sales for engine components and spare parts is partially based on estimates for accounting purposes. These estimations are derived principally from preliminary data supplied by the consortium leaders. Moreover, the settlement of insurance claims in connection with customized production and maintenance services may in certain cases require the use of estimations as to the probability that the claimed amount will ultimately be paid.
- Income taxes must be determined for each tax jurisdiction in which the group operates. Estimates are required when measuring actual and deferred taxes. The utilization of deferred tax assets depends on the possibility of generating sufficient taxable income in a particular tax category and tax jurisdiction. A variety of factors are used to assess the probability that it will be possible to utilize deferred tax assets, e.g. past operating results, operating business plans and the periods over which losses can be carried forward. If the actual results deviate from these estimations, or if these estimations have to be adjusted in a future period, this may have an impact on the group's net asset position, financial situation and operating results.
- The total value of provisions for pensions and similar obligations, and therefore the expenses in connection with employees' retirement benefits, are determined using actuarial methods based on assumptions concerning interest rates, choice of optional payment modalities, salary and pension trends, and life expectancy. If it should become necessary to modify these assumptions, this could have a significant effect on the future amount of pension provisions or the future expenses for pensions.
- The measurement and recognition of other provisions, accrued liabilities (as defined in IAS 37), refund liabilities and contingent liabilities involve substantial estimations by MTU. Such estimations concern contractual penalties, the failure of program partners and customers to provide relevant information, the cost of developing suitable engineering solutions, changes in the requirements imposed by flight safety organizations and aviation authorities, and the cost of meeting warranty obligations. Similarly, when accounting for committed aircraft financing agreements, estimations are required concerning the probability that the loans will be realized, the consistency of the terms with market conditions, and the change in the value of the pledged securities. Due to the uncertainties attached to this assessment, the actual expenses may deviate from those originally estimated, and from the corresponding balance sheet items and explanatory disclosures in the Notes.

All assumptions and estimates are based on the prevailing conditions and judgements made at the reporting date. Any subsequent changes occurring before the financial statements are published are taken into account. Estimations of future business developments also take into account the economic environment of the industry and the regions in which MTU is active, such as are deemed realistic at that time. In order to obtain new information, MTU also relies on the services of external consultants such as actuaries and legal counsels. Changes to the estimations of these obligations can have a significant impact on future operating results.

II. Notes to the consolidated income statement

1. Revenues

Revenues developed in the reporting period as follows:

[T66] Revenues – prior-year data adjusted

in € million	Revenues recognized at a point in time	Revenues recognized over time	Jan. 1 to Dec. 31, 2018	Revenues recognized at a point in time	Revenues recognized over time	Jan. 1 to Dec. 31, 2017
Commercial engine business	1,391.0	211.8	1,602.8	1,214.6	75.3	1,289.9
Military engine business	291.8	139.3	431.1	312.6	132.3	444.9
Commercial and military engine business (OEM)	**1,682.8**	**351.1**	**2,033.9**	**1,527.2**	**207.6**	**1,734.8**
Commercial maintenance business (MRO)	**112.2**	**2,687.6**	**2,799.8**	**84.1**	**2,201.2**	**2,285.3**
Consolidation	–38.0	–228.6	–266.6	–36.3	–86.4	–122.7
Total revenues	**1,757.0**	**2,810.1**	**4,567.1**	**1,575.0**	**2,322.4**	**3,897.4**

Revenues included € 455.5 million (2017: € 458.6 million), which at the beginning of the financial year were carried as contract liabilities, and € 23.5 million (2017: € 25.6 million) relating to performance obligations recognized in prior periods.

The group generates its revenues in the following geographical areas:

[T67] Revenues according to customer's country of domicile

in € million	2018	2017
Germany	492.2	468.4
Europe (excluding Germany)	438.3	361.7
North America	3,005.5	2,513.3
Asia	310.1	280.0
Other regions	321.0	274.0
Total revenues	**4,567.1**	**3,897.4**

In 2018, approximately 66 % (2017: 64 %) of MTU's revenues were generated from business with customers in North America, of which the U.S. market accounted for a share of 62 % (2017: 60 %).

A cumulative amount of around € 17.6 billion (2017: € 14.9 billion) was determined in respect of transaction prices - including estimated elements of variable consideration - allocated to contracted performance obligations not yet satisfied at December 31, 2018. Of the cumulative amount of transaction prices not yet recognized as revenues at the reporting date, some 25 % is expected to be realized within one year. The remaining amount will be generated and recognized successively over a period of up to 25 years.

A more detailed presentation of revenues, with tables showing external and intersegment revenues and their attribution to major customers, is provided in the section preceding these *Notes, under "Reporting by operating segment". Additional information can be found under "Operating results" in the combined management report*.

2. Cost of sales

[T68] Cost of sales – prior-year data adjusted

in € million	2018	2017
Cost of materials	–2,985.0	–2,450.2
Personnel expenses	–633.6	–566.6
Depreciation and amortization	–147.4	–142.2
Other cost of sales	–30.0	–118.2
Cost of sales	**–3,796.0**	**–3,277.2**
Capitalized development costs	80.2	90.7
Total cost of sales	**–3,715.8**	**–3,186.5**

The change in cost of sales is consistent with the growth in revenues in the reporting period and reflects the production ramp-up in connection with MTU's share in new engine programs as well as the realized product mix in the commercial engine and maintenance business and the stable military business.

The change in the item "Other cost of sales" was mainly due to the effect of translation differences on trade payables and the change in inventories of work in progress and finished products in the reporting year.

3. Research and development expenses

Company-funded research and development expenditure developed as follows:

[T69] Research and development expenses – prior-year data adjusted

in € million	2018	2017
Cost of materials	–36.2	–29.4
Personnel expenses	–22.1	–20.0
Depreciation and amortization	–1.2	–0.4
Other development costs	–2.6	–2.4
Research and development expenditure	**–62.1**	**–52.2**
Capitalized development costs	**1.4**	**0.5**
Research and development costs recognized as expense	**–60.7**	**–51.7**

More information is given in the *"Research and development" section of the combined management report.*

4. Selling expenses

[T70] Selling expenses

in € million	2018	2017
Cost of materials	–23.2	–21.2
Personnel expenses	–72.3	–68.7
Depreciation and amortization	–1.2	–1.6
Other selling expenses	–18.4	–10.7
Total selling expenses	**–115.1**	**–102.2**

Selling expenses comprise expenses for advertising and marketing, expenses in connection with air shows, trade fairs and exhibitions, media relations expenses, and valuation allowances and write-downs on trade receivables. The latter are mainly related to MRO activities and determine the development of "Other selling expenses".

5. General administrative expenses

[T71] General administrative expenses

in € million	2018	2017
Cost of materials	–7.4	–6.9
Personnel expenses	–59.2	–59.2
Depreciation and amortization	–1.7	–2.0
Other administrative expenses	–15.3	–8.7
Total general administrative expenses	**–83.6**	**–76.8**

General administrative expenses are expenses incurred in connection with administrative activities unrelated to development, production or sales activities.

6. Other operating income and expenses

[T72] Other operating income and expenses

in € million	2018	2017
Income		
Gains from the disposal of intangible assets and property, plant and equipment	0.3	0.4
Reimbursement of insurance claims	1.0	0.6
Rental income from		
property owned by MTU	1.7	1.2
sublet property owned by third parties	1.7	1.7
Sundry other operating income	4.3	4.0
Total other operating income	**9.0**	**7.9**
Expenses		
Hedging costs	–22.1	
Losses from the disposal of intangible assets and property, plant and equipment	–0.2	–5.6
Expenses associated with insurance claims	–0.6	–0.7
Rental payments for sublet property	–1.7	–1.7
Sundry other operating expenses	–1.6	–2.8
Total other operating expenses	**–26.2**	**–10.8**
Balance of other operating income and expenses	**–17.2**	**–2.9**

The hedging costs included in other operating income and expenses in 2018 comply with the requirements of IFRS 9, applicable for the first time that year.

The MTU group does not hold any investment property. An insignificant part of the buildings recognized under property, plant and equipment is rented out to external third parties.

7. Profit / loss of companies accounted for using the equity method and of equity investments

[T73] Profit / loss of companies accounted for using the equity method and of equity investments

in € million	2018	2017
Profit / loss of companies accounted for using the equity method		
Associated companies	10.8	2.9
Joint ventures	33.0	39.5
Total profit / loss of companies accounted for using the equity method	**43.8**	**42.4**
Profit/loss of equity investments		
Program management and coordination companies	0.6	0.5
Other related companies	1.1	1.0
Total profit/loss of equity investments	**1.7**	**1.5**

The development of business by the joint venture MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China, was responsible for a significant part of MTU's profit/loss of companies accounted for using the equity method.

8. Interest result

[T74] Interest result

in € million	2018	2017
Interest income	**7.6**	**5.8**
Interest expense on		
Corporate bonds and notes	–3.8	–7.4
Convertible bond	–4.6	–4.5
Liabilities to banks	–0.9	–0.6
Finance lease arrangements	–0.3	–0.3
Other interest expenses	–1.9	–2.3
Capitalized borrowing costs for qualifying assets	3.2	2.1
Interest expenses	**–8.3**	**–13.0**
Interest result	**–0.7**	**–7.2**

The increase in interest income year on year is due to higher interest income from extended loans for aircraft and engine financing activities required by MTU's partnership in commercial engine programs.

The decrease in interest expenses results from the repayment of a corporate bond in 2017.

The borrowing costs capitalized in the reporting period relate to qualifying assets acquired or constructed mainly in connection with the group's stake in the PW1000G family and PW800 engine program. The capitalized amount was determined on the basis of a cost of debt capital of 2.1 % (2017: 2.2 %).

9. Financial result on other items

[T75] Financial result on other items

in € million	2018	2017
Effects from currency translation: exchange rate gains / losses on		
Currency holdings	4.7	–5.4
Financing transactions	4.9	–7.3
Fair value gains / losses on derivatives		
Currency and interest rate derivatives	5.4	6.9
Forward commodity sales contracts	–0.6	1.0
Interest portion included in measurement of assets and liabilities		
relating to pension funds	–13.8	–12.4
Receivables, other provisions and liabilities	–12.7	–18.7
Financial result on sundry other items	–0.1	
Financial result on other items	**–12.2**	**–35.9**

10. Income taxes

Recognized income taxes comprise current income taxes paid or payable in the countries in which the group operates, and deferred tax income or expense.

To comply with DRSC Interpretation 4 (IFRS), published in 2018, MTU was obliged to change its accounting policy (IAS 8) applied in previous years, whereby interest on payments in arrears and refunds in connection with tax field audits was treated as a part of income tax. Such interest is now accounted for as part of the financial result on other items (interest portion included in measurement of assets and liabilities - receivables, other provisions and liabilities).

[T76] Analysis of current and deferred tax expenses – prior-year data adjusted

in € million	2018	2017
Tax expense incurred in current period	–113.9	–128.0
Tax expense (-) / tax income incurred in prior periods	–17.5	–3.3
Current tax expense	**–131.4**	**–131.3**
Deferred tax expense (-) / tax income resulting from temporary differences	–21.5	6.4
Deferred tax expense (-) / tax income resulting from tax credits	5.6	2.8
Deferred tax expense (-) / tax income resulting from tax losses carried forward	–6.7	2.7
Deferred tax expense (-) / tax income	**–22.6**	**11.9**
Recognized tax expense	**–154.0**	**–119.4**

Tax reconciliation

As a basic principle, deferred tax assets and liabilities are measured using the tax rates that are expected to apply to the period when the asset is realized or the liability is settled, based on current tax legislation in the countries concerned.

In the 2018 reporting period, as in the previous year, the tax assets and liabilities of the German group companies were measured using an income tax rate of 32.2 %. This rate is unchanged and comprises the uniform corporation tax rate of 15.0 % plus a solidarity surcharge of 5.5 % on the calculated corporation tax expense, and takes into account an average municipal trade tax rate of 16.4 %.

The tax assets and liabilities of companies outside Germany were measured using the relevant tax rates for the countries in question, which range between 19 % and 27 %.

Information on changes in deferred tax assets and liabilities is provided in *Note 34 (Deferred tax assets and liabilities).*

The following table shows the reconciliation of expected tax expense to recognized tax expense:

[T77] Tax reconciliation – prior-year data adjusted

in € million	2018	2017
Earnings before tax	607.3	478.1
Income tax rate	32,2 %	32,2 %
Expected tax expense	**–195.6**	**–153.9**
Impact of		
Recognition and measurement adjustments and write-downs on deferred tax assets	8.7	17.9
Non-tax-deductible expenses and tax exempt income	0.2	–2.0
Lower tax rate for companies outside Germany	13.1	5.7
Investments accounted for using the equity method	12.3	13.5
Tax field audit and prior periods	–0.3	–2.5
Tax credits available for carry-forward	8.1	4.1
Withholding tax charge on dividends paid by companies outside Germany	–1.0	–0.6
Other impacts	0.5	–1.6
Recognized tax expense	**–154.0**	**–119.4**
Effective tax rate	**25.4%**	**25.0%**

11. Earnings per share

Diluted earnings per share are calculated by dividing net income by the sum obtained when the number of common shares that could potentially be issued through the granting of equity instruments is added to the weighted average number of outstanding shares.

The net income available for distribution to shareholders of MTU Aero Engines AG in 2018 amounted to € 447.0 million (2017: € 355.1 million).

In the reporting period, the weighted average number of outstanding shares was 51,580,929 (2017: 51,442,495 shares). Based on these parameters, basic earnings per share amounted to € 8.67 (2017: € 6.90).

Diluting effects arose from 4,007,370 shares that could potentially be issued through the convertible bond issued in May 2016, so that diluted earnings per share amounted to € 8.10 (2017: € 6.46).

12. Additional disclosures relating to the income statement

After adjustments to eliminate the depreciation and amortization effect of the purchase price allocation (PPA) and of the stake increase in the IAE-V2500 program, the following reconciliation produces the performance indicator "Adjusted earnings before interest and tax (EBIT adjusted)":

[T78] Reconciliation of EBIT to EBIT adjusted, depreciation / amortization expense and non-recurring items – prior year data adjusted

in € million	2018	2017
Earnings before interest and tax (EBIT)	**620.2**	**521.2**
+ Depreciation / amortization effect of purchase price allocation		
IAE-V2500 stake increase	30.2	30.2
Intangible assets	20.8	20.8
Property, plant and equipment	0.2	0.3
Adjusted earnings before interest and tax (EBIT adjusted)	**671.4**	**572.5**

Costs by function include the following personnel expenses items:

[T79] Personnel expenses

in € million	2018	2017
Wages and salaries	656.6	593.3
Social security, pension and other benefit expenses	122.6	114.3
Total personnel expenses	**779.2**	**707.6**

Pension benefits account for € 20.4 million (2017: € 22.5 million) of these expenses. Other social security expenses amounted to € 102.2 million (2017: € 91.8 million).

The average number of persons employed during the financial year 2018 breaks down as follows:

[T80] Disclosures relating to the average number of employees

Number	2018	2017
Industrial staff	3,777	3,643
Administrative staff	4,074	3,828
Employees on temporary contracts	1,060	662
Trainees /apprentices	281	281
Students on work experience projects	199	200
Total average number of employees	**9,391**	**8,614**

The fees charged by the group auditor Ernst & Young GmbH Wirtschaftsprüfungsgesellschaft in 2018 in accordance with Section 314 (1) no. 9 of the German Commercial Code (HGB) amounted to a total of € 1.3 million (2017: € 1.1 million).

[T81] Fees charged by the group auditor

in € million	2018	2017
Financial statement auditing services	1.2	1.0
Other independent auditing services	0.1	0.1
Total fees charged by the group auditor	**1.3**	**1.1**

The fee for financial statement auditing services primarily related to the audit of the consolidated financial statements and the separate financial statements of MTU Aero Engines AG and its subsidiaries, reviews of the interim financial statements integrated in the audit process, project-related IT audits as well as auditing services in connection with the implementation of new accounting standards. Other auditing services included the limited assurance engagement on the non-financial statement and the EMIR audit.

III. Notes to the consolidated balance sheet

13. Analysis of changes in intangible assets and property, plant and equipment

[T82] Changes in non-financial assets – cost of acquisition and construction 2018

in € million	Balance at Jan. 1, 2018	Translation differences	Additions	Transfers	Disposals	Balance at Dec. 31, 2018
Program assets arising from the purchase price allocation	670.3					670.3
Program-independent technologies	124.7					124.7
Customer relations	56.5					56.5
Rights and licenses	134.1	0.1	4.6	4.5		143.3
Goodwill	391.6	0.2				391.8
Development assets	343.0	0.2	68.7			411.9
Intangible assets	**1,720.2**	**0.5**	**73.3**	**4.5**		**1,798.5**
Land, leasehold rights and buildings, including buildings on non-owned land	444.0	–1.4	0.8	0.7	–0.2	443.9
Technical equipment, plant and machinery	604.2	–1.9	25.1	44.9	–6.6	665.7
Other equipment, operational and office equipment	546.7	–0.4	71.2	7.4	–28.9	596.0
Advance payments and construction in progress	112.5	–0.8	102.4	–57.5	–4.3	152.3
Property, plant and equipment	**1,707.4**	**–4.5**	**199.5**	**–4.5**	**–40.0**	**1,857.9**
Total	**3,427.6**	**–4.0**	**272.8**		**–40.0**	**3,656.4**

[T83] Changes in non-financial assets – depreciation / amortization and carrying amount 2018

in € million	Balance at Jan. 1, 2018	Translation differences	Depreciation / amortization	Transfers	Disposals	Balance at Dec. 31, 2018	Carrying amount Dec. 31, 2018
Program assets arising from the purchase price allocation	393.9		18.3			412.2	258.1
Program-independent technologies	124.7					124.7	
Customer relations	43.5		2.5			46.0	10.5
Rights and licenses	106.2	0.1	7.3	0.3		113.9	29.4
Goodwill							391.8
Development assets	19.4		9.6			29.0	382.9
Intangible assets	**687.7**	**0.1**	**37.7**	**0.3**		**725.8**	**1,072.7**
Land, leasehold rights and buildings, including buildings on non-owned land	149.1	–0.4	9.9		–0.1	158.5	285.4
Technical equipment, plant and machinery	469.1	–0.9	41.9	0.5	–6.5	504.1	161.6
Other equipment, operational and office equipment	353.7	–0.3	62.0	–0.8	–18.6	396.0	200.0
Advance payments and construction in progress							152.3
Property, plant and equipment	**971.9**	**–1.6**	**113.8**	**–0.3**	**–25.2**	**1,058.6**	**799.3**
Total	**1,659.6**	**–1.5**	**151.5**		**–25.2**	**1,784.4**	**1,872.0**

[T84] Changes in non-financial assets – cost of acquisition and construction 2017 – prior-year data adjusted

in € million	Balance at Jan. 1, 2017	Translation differences	Additions	Transfers	Disposals	**Balance at Dec. 31, 2017**
Program assets arising from the purchase price allocation	670.3					670.3
Program-independent technologies	124.7					124.7
Customer relations	56.5					56.5
Rights and licenses	132.2	–1.2	2.5	1.2	–0.6	134.1
Goodwill	392.2	–0.6				391.6
Development assets	287.5	–0.1	66.8		–11.2	343.0
Intangible assets	**1,663.4**	**–1.9**	**69.3**	**1.2**	**–11.8**	**1,720.2**
Land, leasehold rights and buildings, including buildings on non-owned land	438.5	1.5	2.4	2.1	–0.5	444.0
Technical equipment, plant and machinery	558.1	1.2	19.0	35.8	–9.9	604.2
Other equipment, operational and office equipment	503.5	–0.3	67.4	2.7	–26.6	546.7
Advance payments and construction in progress	69.5	0.3	84.5	–41.8		112.5
Property, plant and equipment	**1,569.6**	**2.7**	**173.3**	**–1.2**	**–37.0**	**1,707.4**
Total	**3,233.0**	**0.8**	**242.6**		**–48.8**	**3,427.6**

[T85] Changes in non-financial assets –- depreciation / amortization and carrying amount 2017 – prior-year data adjusted

in € million	Balance at Jan. 1, 2017	Translation differences	Depreciation / amortization	Transfers	Disposals	**Balance at Dec. 31, 2017**	**Carrying amount Dec. 31, 2017**
Program assets arising from the purchase price allocation	375.5		18.4			393.9	276.4
Program-independent technologies	124.7					124.7	
Customer relations	41.1		2.4			43.5	13.0
Rights and licenses	99.0	–1.2	9.0		–0.6	106.2	27.9
Goodwill							391.6
Development assets	15.5		9.7		–5.8	19.4	323.6
Intangible assets	**655.8**	**–1.2**	**39.5**		**–6.4**	**687.7**	**1,032.5**
Land, leasehold rights and buildings, including buildings on non-owned land	139.0	–0.1	10.3		–0.1	149.1	294.9
Technical equipment, plant and machinery	433.0	0.1	41.5	3.5	–9.0	469.1	135.1
Other equipment, operational and office equipment	325.1	–0.2	54.9	–3.5	–22.6	353.7	193.0
Advance payments and construction in progress							112.5
Property, plant and equipment	**897.1**	**–0.2**	**106.7**		**–31.7**	**971.9**	**735.5**
Total	**1,552.9**	**–1.4**	**146.2**		**–38.1**	**1,659.6**	**1,768.0**

14. Intangible assets

Intangible assets mainly comprise program assets and program-independent technologies which were capitalized as part of the purchase price allocation in connection with the acquisition by Kohlberg Kravis Roberts & Co. Ltd. (KKR) on January 1, 2004, of the shareholding in MTU previously held by DaimlerChrysler AG, and acquired goodwill. This item also includes capitalized, self-created development assets and software (the latter mostly for engineering applications).

In the financial year 2018, capitalized intangible assets totaling € 73.3 million (2017: € 69.3 million) were recognized, of which € 68.7 million (2017: € 66.8 million) were internally generated, almost exclusively for new engine programs.

The amortization expense on intangible assets is presented in the following line items at the following amounts: cost of sales € 37.1 million (2017: € 38.2 million), research and development expenses € 0.2 million (2017: € 0.3 million), selling expenses € 0.3 million (2017: € 0.6 million), and general administrative expenses € 0.1 million (2017: € 0.4 million).

15. Property, plant and equipment

Through its capital expenditure on property, plant and equipment, MTU aims to expand its production capacity and modernize equipment and machinery to state-of-the-art standards.

In the financial year 2018, the group's total capital expenditure on property, plant and equipment amounted to € 199.5 million (2017: € 173.3 million). The depreciation expense on property, plant and equipment is included in the presentation of the following line items: cost of sales € 110.3 million (2017: € 104.0 million), research and development expenses € 1.0 million (2017: € 0.1 million), selling expenses € 0.9 million (2017: € 1.0 million), and general administrative expenses € 1.6 million (2017: € 1.6 million).

Additions to land, leasehold rights and buildings, including buildings on non-owned land, in the financial year 2018 amounted to € 0.8 million (2017: € 2.4 million) and relate mainly to buildings and their outfitting at the locations in Munich, Hannover and Rzeszów, Poland.

Capital expenditure on technical equipment, plant and machinery totaling € 25.1 million (2017: € 19.0 million) relates mainly to the purchase of plant and machinery for the production of engine modules belonging to the GTF product family.

The capital expenditure on other equipment, operational and office equipment in the amount of € 71.2 million (2017: € 67.4 million) and additions to advance payments and construction in progress in the financial year 2018 in the amount of € 102.4 million (2017: € 84.5 million) relate principally to the expansion of production capacities at the sites in Germany and Poland.

Capitalized assets under finance lease agreements are based on the following components:

[T86] Lease payments under finance lease agreements

in € million	2018	2017
Lease payments		
Due in less than one year	1.8	1.9
Due in more than one year and less than five years	3.7	5.0
Due in more than five years	3.8	4.5
Total future minimum lease payments	**9.3**	**11.4**
Interest included in lease payments		
Due in less than one year	0.2	0.2
Due in more than one year and less than five years	0.4	0.5
Due in more than five years	1.4	1.6
Total interest portion of future minimum lease payments	**2.0**	**2.3**
Present value of lease payments		
Due in less than one year	1.6	1.7
Due in more than one year and less than five years	3.3	4.5
Due in more than five years	2.4	2.9
Total present value of future minimum lease payments	**7.3**	**9.1**

A net carrying amount of € 7.4 million (2017: € 8.5 million) was recognized for the capitalized assets under finance lease agreements at the reporting date. Property, plant and equipment acquired under such agreements are subject to restrictions of use.

The most significant leased asset is a logistics center in Langenhagen, for which a net carrying amount of € 5.5 million (2017: € 5.7 million) was capitalized at December 31, 2018. The lessor is Wirtschaftsförderungs-Gesellschaft Langenhagen Flughafen mbH (WFG). The center is situated on land owned partly by MTU and partly by the Entwicklungsgesellschaft Langenhagen mbH. In order to construct this facility, MTU acquired heritable building rights from WFG permitting the site and its buildings to be utilized for a total period of 33 years. The lease became effective in 2013 and has a fixed contractual term that expires at the end of 2025, with a renewal option that allows the contract to be extended for additional periods of 5 years until 2035 at the latest. The lease payments are on a level with those normally charged in the region and include ground rent, interest charges, depreciation charges and administrative expenses. MTU is responsible for the upkeep of the property. The contract also includes a clause allowing MTU to purchase the real estate, comprising land and buildings, based on terms equivalent to those that prevail in arm's-length transactions.In 2014 and 2017, to take advantage of the attractive financing conditions, MTU adopted the finance lease model to fund the expansion of production capacity at its Munich location through the addition of technical equipment, plant and machinery and of operational and office equipment. At December 31, 2018, the carrying amount of assets financed in this way amounted to € 1.7 million (2017: € 2.8 million). The majority of the underlying finance lease agreements run for contractual periods up to 2021. At the end of the contractual period, the machinery becomes the property of MTU. The agreements do not include price adjustment clauses.

16. Financial assets

Financial assets accounted for using the equity method

The financial assets accounted for in the consolidated financial statements using the equity method amounted to € 426.9 million at the reporting date (2017: € 291.5 million).

Associated companies

Information on the principal associated companies in which MTU holds an equity share is provided in the tables below:

[T87] Principal investments in associates

Name of associate	Domicile	Shareholding
IAE International Aero Engines AG,	Zurich, Switzerland	25,25 %
IAE International Aero Engines LLC.	East Hartford, USA	18,00 %
PW 1100G-JM Engine Leasing LLC.	East Hartford, USA	18,00 %

All companies listed in the above table are accounted for using the equity method in the 2018 consolidated financial statements.

IAE International Aero Engines AG, Zurich, Switzerland was formed for the purpose of coordinating the development, production and marketing of the V2500 engine and the provision of related services.

IAE International Aero Engines LLC., East Hartford, USA develops, manufactures and provides MRO services for PW 1100G-JM engines.

PW1100G-JM Engine Leasing LLC., East Hartford, USA leases out replacement engines of the PW 1100G-JM series.

A summary of non-audited financial data for the principal associated companies in the reporting period is provided below:

[T88] Condensed financial information of the principal investments in associates

in € million	2018			2017		
	IAE International Aero Engines AG	IAE International Aero Engines LLC.	PW1100G-JM Engine Leasing LLC.	IAE International Aero Engines AG	IAE International Aero Engines LLC.	PW1100G-JM Engine Leasing LLC.
Balance sheet at December 31						
Current assets	2,737.0	4,293.3	147.4	2,485.0	2,226.7	66.9
Non-current assets	346.1	209.8	1,208.2	325.4	44.3	666.5
Current liabilities	1,681.7	4,428.7	99.6	1,192.1	2,230.1	293.6
Non-current liabilities	1,312.6	63.5	9.0	1,541.5	35.3	
Equity	88.8	10.9	1,247.0	76.8	5.6	439.8
Proportional share of equity	22.4	2.0	224.5	19.4	1.1	79.2
Reconciliation	2.3		–5.6	3.5		28.3
Carrying amount of companies accounted for using the equity method	24.7	2.0	218.9	22.9	1.1	107.5
Income statement						
Revenues	4,771.0	1,538.2	136.6	3,536.9	377.4	53.0
Net income	6.1	4.8	64.2	4.7	3.1	33.9
Other comprehensive income						
Total comprehensive income	6.1	4.8	64.2	4.7	3.1	33.9

Joint ventures

Information on the principal joint ventures in which MTU holds an equity share is provided in the tables below:

[T89] Principal joint ventures

Name of joint venture	Domicile	Share-holding
MTU Maintenance Zhuhai Co. Ltd.	Zhuhai, China	50 %
Airfoil Services Sdn. Bhd.	Kota Damansara, Malaysia	50 %
Ceramic Coating Center S.A.S.	Paris, France	50 %
AES Aerospace Embedded Solutions GmbH	Munich, Germany	50 %
Pratt & Whitney Canada Customer Service Centre Europe GmbH	Ludwigsfelde, Germany	50 %
EME Aero sp. z o.o.	Jasionka, Poland	50 %

All companies listed in the above table are accounted for using the equity method in the 2018 consolidated financial statements.

MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China, specializes in the maintenance, repair and overhaul of V2500 (IAE) and CFM56 (CFMI) engines, and serves the regions of China and Southeast Asia.

The business purpose of Airfoil Services Sdn. Bhd., Kota Damansara, Malaysia, is the repair of blades used in low-pressure turbines and high-pressure compressors.

Ceramic Coating Center S.A.S., Paris, France, specializes in high-tech coatings. One of its most important products is high-performance ceramic thermal insulation coatings for turbine parts.

AES Aerospace Embedded Solutions GmbH, Munich, develops safety-critical software and hardware for applications in military and commercial aviation. A focal point of the company is its access to numerous future development programs in the aerospace and defense industries around the globe.

The business purpose of Pratt & Whitney Canada Customer Service Centre Europe GmbH, Ludwigsfelde, is the marketing of engine maintenance services for selected Pratt & Whitney Canada engines to customers in Europe, Africa and the Middle East.

EME Aero sp. z o.o. will concentrate on providing maintenance services for the PW1000G series of Geared Turbofan™ engines, which power the Airbus A320neo family and other aircraft. The company is currently being set up.

The table below provides a summary of non-audited financial data concerning the principal joint ventures in the MTU group for the reporting period:

[T90] Income statement data, statements of comprehensive income and balance sheets of the principal joint ventures 2018

in € million	Pratt & Whitney Canada Customer Service Centre Europe GmbH	Ceramic Coating Center S.A.S.	AES Aerospace Embedded Solutions GmbH	Airfoil Services Sdn. Bhd.	Engine Maintenance Europe Aero sp. z o.o.	MTU Maintenance Zhuhai Co. Ltd.
Income statement data disclosures						
Revenues	207.3	6.5	18.9	37.7		1,049.0
Depreciation / amortization and write-downs	–0.9	–0.8	–0.2	–2.3	–0.3	–4.5
Interest income						0.2
Interest expense					–1.2	–8.2
Income tax credits					1.2	
Income tax expense	–0.3	–0.2	–0.1	–0.3		–11.3
Other income and expenses	–204.2	–5.1	–17.8	–30.9	–6.5	–952.9
Net income	**1.9**	**0.4**	**0.8**	**4.2**	**–6.8**	**72.3**
Other comprehensive income			0.1	0.1		
Total comprehensive income	**1.9**	**0.4**	**0.9**	**4.3**	**–6.8**	**72.3**
Balance sheet disclosures						
Non-current assets	0.9	4.1	1.3	18.6	59.7	77.8
Cash and cash equivalents	55.6	0.7	3.9	12.2	8.3	102.1
Other current assets	68.9	2.8	4.6	7.8	6.9	597.4
Total assets	**125.4**	**7.6**	**9.8**	**38.6**	**74.9**	**777.3**
Equity	13.7	6.3	3.6	21.1	22.5	301.4
Non-current financial liabilities						47.7
Other non-current liabilities			1.9		3.4	
Current financial liabilities	44.7	0.7	0.4	17.5	48.5	374.5
Other current liabilities	67.0	0.6	3.9		0.5	53.7
Total equity and liabilities	**125.4**	**7.6**	**9.8**	**38.6**	**74.9**	**777.3**
Reconciliation of carrying amount						
Proportional share of equity	6.8	3.2	1.8	10.5	11.3	150.7
Reconciliation of carrying amount	–0.1			–3.1	0.2	
Carrying amount of companies accounted for using the equity method	**6.7**	**3.2**	**1.8**	**7.4**	**11.5**	**150.7**
Dividend received from the joint ventures	**1.4**	**0.2**		**4.8**		**17.8**

The non-audited comparative data for 2017 are as follows:

[T91] Income statement data, statements of comprehensive income and balance sheets of the principal joint ventures 2017

in € million	Pratt & Whitney Canada Customer Service Centre Europe GmbH	Ceramic Coating Center S.A.S.	AES Aerospace Embedded Solutions GmbH	Airfoil Services Sdn. Bhd.	Engine Maintenance Europe Aero sp. z o.o.	MTU Maintenance Zhuhai Co. Ltd.
Income statement disclosures						
Revenues	185.8	6.0	17.6	34.0		876.6
Depreciation / amortization and write-downs	–0.2	–0.7	–0.3	–1.4		–4.4
Interest income	0.2		0.1			0.1
Interest expense						–6.7
Income tax expense	–0.8	–0.2		–2.9		–10.6
Other income and expenses	–182.2	–4.6	–16.8	–18.2		–794.6
Net income	**2.8**	**0.5**	**0.6**	**11.5**		**60.4**
Other comprehensive income			–0.1	–2.8		
Total comprehensive income	**2.8**	**0.5**	**0.5**	**8.7**		**60.4**
Balance sheet disclosures						
Non-current assets	0.8	4.0	1.3	15.3		78.6
Cash and cash equivalents	60.2	0.3	5.3	11.6	2.4	56.7
Other current assets	42.3	4.4	3.2	6.5		560.6
Total assets	**103.3**	**8.7**	**9.8**	**33.4**	**2.4**	**695.9**
Equity	14.6	6.5	3.6	25.2	2.4	267.4
Non-current financial liabilities						70.4
Other non-current liabilities			1.9	2.0		
Current financial liabilities	31.4	1.5	0.4	6.2		294.1
Other current liabilities	57.3	0.7	3.9			64.0
Total equity and liabilities	**103.3**	**8.7**	**9.8**	**33.4**	**2.4**	**695.9**
Reconciliation of carrying amount						
Proportional share of equity	7.3	3.2	1.8	12.6	1.2	133.7
Reconciliation of carrying amount					0.2	
Carrying amount of companies accounted for using the equity method	**7.3**	**3.2**	**1.8**	**12.6**	**1.4**	**133.7**
Dividend received from the joint ventures	**2.1**			**4.7**		**12.6**

The reporting date for Ceramic Coating Center S.A.S., Paris, France, and for Pratt & Whitney Canada Customer Service Centre Europe GmbH, Ludwigsfelde, Germany, is November 30 of each calendar year.

Other financial assets

The carrying amounts of financial assets included in the consolidated financial statements are presented below:

[T92] Composition of other financial assets

	Total		Non-current		Current	
in € million	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017
Financial assets measured at amortized cost	**117.3**	**190.2**	**86.0**	**127.0**	**31.3**	**63.2**
Loans to third parties[1]	59.7	133.5	59.7	101.6		31.9
Loans to related companies[1]	19.5	20.3	19.5	20.3		
Receivables from employees	1.0	1.1			1.0	1.1
Receivables from suppliers	1.1	2.1			1.1	2.1
Sundry other financial assets	36.0	33.2	6.8	5.1	29.2	28.1
Financial assets at fair value through other comprehensive income	**16.4**	**3.4**	**16.4**	**3.4**		
Other interests in related companies	16.4	3.4	16.4	3.4		
Derivatives without hedging relationship	**0.3**	**1.8**		**1.5**	**0.3**	**0.3**
Derivatives with hedging relationship	**11.0**	**85.6**	**2.0**	**35.9**	**9.0**	**49.7**
Total other financial assets	**145.0**	**281.0**	**104.4**	**167.8**	**40.6**	**113.2**

[1] Included in net financial debt

The decrease in loans to third parties relates primarily to repayments received under loan arrangements for the purpose of financing aircraft and aircraft engines within the context of MTU's stake in commercial engine programs.

Loans to related companies concern the funding of newly created businesses and/or the expansion of existing operations.

The receivables from suppliers primarily include short-term credit notes which were received for returned goods, amendments to invoices, and trade discounts.

Sundry other financial assets amounting to € 36.0 million (2017: € 33.2 million) relate mainly to outstanding credit notes for trade discounts as well as to a multiplicity of separate non-significant items.

Other interests in related companies include the carrying amounts of MTU's share in companies that are neither fully consolidated nor accounted for using the equity method. The increase in this item is due to the change in accounting policy resulting from the application of IFRS 9, and mainly concerns Sumisho Aero Engines Lease B.V., Amsterdam, Netherlands. Given that the investment in question is a long-term investment, it was decided to recognize it at fair value through other comprehensive income in order to avoid short-term earnings volatility.

At the reporting date, derivative financial assets comprised the following instruments:

[T93] Derivative financial instruments

	Total		Non-current		Current	
in € million	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017
Forward foreign exchange contracts	11.0	85.6	2.0	35.9	9.0	49.7
Currency options / nickel forward contracts	0.3	1.8		1.5	0.3	0.3
Total derivative financial instruments	**11.3**	**87.4**	**2.0**	**37.4**	**9.3**	**50.0**

17. Acquired program assets, capitalized development costs and other assets

In the reporting period, MTU spent € 44.8 million (2017: € 19.9 million) on the acquisition of program assets. The total amount of acquired program assets recognized in profit or loss at the reporting date was € 43.3 million (2017: € 42.8 million). In 2018, MTU acquired and capitalized development costs to the value of € 14.7 million (2017: € 25.6 million) in exchange for consideration paid to consortium leaders (OEMs). The total amount of payments for acquired development assets recognized in profit or loss at the reporting date was € 5.7 million (2017: € 4.5 million).

Additions to program assets include an amount of € 7.0 million (2017: € 2.6 million) arising from the value adjustment of the IAE-V2500 stake increase as a result of the revaluation of the resulting conditional purchase price obligation.

Other assets include claims for tax refunds amounting to € 28.4 million (2017: € 30.8 million) in respect of transactional taxes and prepaid maintenance charges, insurance premiums and rents.

18. Deferred tax assets

Deferred tax assets increased in 2018 by € 5.3 million to € 60.5 million (2017: € 55.2 million). More details are provided in *Note 34 (Deferred tax assets and liabilities).*

19. Inventories

The carrying amount of inventories, taking write-downs into account, comprises the following components:

[T94] Inventories – prior-year data adjusted

		Dec. 31, 2018			Dec. 31, 2017		
in € million	Change in write-downs	Gross amount	Write-downs	Carrying amount	Gross amount	Write-downs	Carrying amount
Raw materials and supplies	0.9	476.8	–54.5	422.3	409.4	–55.4	354.0
Work in progress	–7.0	431.0	–45.3	385.7	327.5	–38.3	289.2
Finished goods	–20.8	220.0	–52.1	167.9	213.7	–31.3	182.4
Advance payments		19.9		19.9	19.5		19.5
Total inventories	**–26.9**	**1,147.7**	**–151.9**	**995.8**	**970.1**	**–125.0**	**845.1**

Out of the total volume of inventories, an amount valued at € 261.3 million (2017: € 258.0 million) was considered to be impaired at the reporting date.

20. Trade receivables

[T95] Trade receivables – prior-year data adjusted

in € million	Dec. 31, 2018	Dec. 31, 2017	Jan. 1, 2017
Third parties	447.7	422.0	476.3
Related companies	603.5	492.5	351.2
Total trade receivables	**1,051.2**	**914.5**	**827.5**

Transactions with related companies are presented in more detail in *Note 39 (Relationships with related companies and persons).* The carrying amount of trade receivables includes write-downs amounting to € 18.1 million.

21. Contract assets

The contract assets result from performance obligations that have been satisfied and for which MTU's right to consideration is conditional on the customer's acceptance of the performance obligation in question and on the passage of time. The changes in the 2018 reporting period are attributable to ongoing business operations. In 2018, contract liabilities amounting to € 246.7 million (2017: € 220.2 million) were offset against the corresponding contract assets.

Taking into account the requirements of IFRS 9, the valuation allowances on trade receivables and contract assets changed as follows in 2018:

[T96] Valuation allowances

in € million	2018	2017
Balance at January 1 – reported	**11.8**	**14.7**
Adjustment to IFRS 9	2.9	
Balance at January 1 – adjusted	**14.7**	**14.7**
Translation differences	0.1	–0.2
Transferred	3.2	
Additions	5.5	4.8
Utilized	–1.9	–2.4
Reversed	–1.3	–5.1
Balance at December 31	**20.3**	**11.8**

Contract assets account for € 2.2 million of the stated amount of valuation allowances. The additions to this item in 2018 are consistent with changes in the credit standing of specific customers (non-payment risk) and changed country risk classifications (market risk) in the commercial OEM business. Trade receivables written off as uncollectable offset against corresponding collected revenues resulted in a net income of € 0.3 million (2017: net expense of € 0.3 million).

As in prior years, all expense and income amounts arising from valuation allowances and the write-off of uncollectable trade receivables are recognized as selling expenses.

In order to minimize the non-payment risk, an active receivables management system is operated both in the OEM segment, partly with the support of the consortium leaders, and in the MRO segment. Should doubts arise as to a debtor's creditworthiness, the corresponding receivables are written down to the amount that is likely to be recovered.

22. Income tax receivables

At the reporting date, recognized recoverable income taxes (income tax claims) amounted to € 43.2 million (2017: € 31.3 million). Of this amount, € 41.1 million (2017: € 29.9 million) relates to income tax claims against the German tax authority.

23. Cash and cash equivalents

The cash and cash equivalents amounting to € 99.0 million (2017: € 106.1 million) comprise cash in hand and bank deposits. This item also includes foreign currency holdings amounting to the equivalent of € 92.8 million (2017: € 105.8 million).

24. Equity

Changes in group equity are set out in the consolidated statement of changes in equity.

Subscribed capital

The company's subscribed capital (capital stock) is unchanged at € 52.0 million and is divided into 52.0 million non-par bearer shares.

Authorized capital

The Executive Board in authorized until April 14, 2020, to increase the company's capital stock by up to € 15.6 million (15.6 million shares), with the prior approval of the Supervisory Board, by issuing, either in a single step or in several steps, new registered non-par-value shares in return for cash contributions (Authorized capital 2015).

Conditional capital

At the Annual General Meeting on April 15, 2015, the Executive Board was authorized until April 14, 2020, to issue conditional capital increases with the prior approval of the Supervisory Board:

This authorization allows the Executive Board to increase the company's capital stock by up to € 5.2 million

through the issue of up to 5,200,000 new registered non-par-value shares, each corresponding to a proportional amount (one euro) of the company's total capital stock. The purpose of this conditional capital increase is to issue shares to holders or creditors of convertible bonds and/or bonds with warrants.

The Executive Board is authorized until April 14, 2020 to issue, in a single step or in several steps and with the prior approval of the Supervisory Board, bearer convertible bonds and/or bonds with warrants (collectively referred to as "securities") with or without maturity date, with a total nominal value of up to € 500 million. At the same time, the creditors are to be granted the right, obligation or option to convert the bonds into registered non-par-value shares of the company representing a stake in the capital stock of up to € 5.2 million under the conditions established for the issue of convertible bonds or bonds with warrants. The bonds may be issued in return for cash contributions only. They may be issued in euros or in any other legal currency. They may also be issued by an affiliated company in which MTU holds a controlling interest. In such cases, and subject to the prior approval of the Supervisory Board, the Executive Board is authorized to act on behalf of the company as guarantor for the bonds. In 2016, MTU made use of this authorization to increase the company's capital stock by issuing a convertible bond with a nominal value of € 500 million. More details are provided in *Note 28 (Financial liabilities).*

Capital reserves

Capital reserves include premiums from the issue of shares, the equity component (net of proportional transaction costs) of a bond already repaid/converted, and the equity component pursuant to IAS 32.31 of the convertible bond issued in the prior period. Capital reserves additionally include the difference between the fair value and the carrying amount of the treasury shares sold under the terms of the Restricted Stock Plan or the MAP employee stock program or the Stock Matching Plan (SMP) and, previously, the Matching Stock Plan (MSP).

Revenue reserves

Revenue reserves mainly comprise the post-acquisition and non-distributed earnings of consolidated group companies.

Treasury shares

Purchase of treasury shares in accordance with the authorization granted by the Annual General Meeting on April 15, 2015

The Executive Board of MTU Aero Engines AG, Munich, has been authorized by resolution of the Annual General Meeting to buy back treasury shares. These shares may be purchased on the stock market or by means of a public offering addressed to all shareholders. The purchase price paid in consideration of these shares must not exceed or undercut the market value by more than 10%, net of any supplementary transaction fees.

The Executive Board of MTU was thus authorized to purchase treasury shares with an aggregate nominal value not exceeding 10% of the company's issued capital stock, as applicable on the date of the resolution, during the period from April 15, 2015 through April 14, 2020, pursuant to Section 71 (1) item 8 of the German Stock Corporation Act (AktG). At no point in time may the value of the acquired shares, together with other treasury shares in the company's possession or which are assigned to it pursuant to Section 71a et seq. of the German Stock Corporation Act (AktG), exceed 10% of the company's capital stock.

Purchase of treasury shares

The shares purchased by MTU in prior years serve the purpose of issuing shares in connection with the MAP employee stock option program, and to make shares available for issue under the Restricted Stock Plan (RSP). As in 2017, MTU did not purchase any treasury shares in the financial year 2018.

Reconciliation of weighted average number of outstanding shares

In the financial year 2018, the weighted average number of outstanding shares totaled 51,580,929 (2017: 51,442,495). At December 31, 2018, the number of outstanding shares of MTU Aero Engines AG, Munich totaled 51,634,227 (December 31, 2017: 51,499,842). The number of treasury shares at December 31, 2018 amounted to 365,773 (December 31, 2017: 500,158).

Issue of shares

Based on the new compensation system for the Executive Board and senior managers in effect as from the financial year 2016, 21,026 (2017: 20,594) treasury shares were sold to the eligible senior managers, and 11,318 (2017: 9,932) to members of the Executive Board.

A total of 102,041 shares (2017: 113,213 shares) were sold to group employees in the financial year 2018 under the MAP employee stock program, of which 14,484 treasury shares (2017: 13,470 shares) were sold to eligible senior managers.

Accumulated other comprehensive income

In the financial year 2018, accumulated other comprehensive income was reduced by € 81.6 million to a negative balance of € 259.7 million (2017: € 178.1 million), in particular as a result of the decrease in the fair value of financial instruments designated as cash flow hedges used to hedge against foreign currency risks.

The table below shows the income and expenses recognized in other comprehensive income, including the associated deferred amounts of income taxes:

[T97] Items recognized in other comprehensive income

in € million	2018 before	2018 Income taxes	2018 after	2017 before	2017 Income taxes	2017 after
Translation differences arising from the financial statements of international entities accounted for using the equity method	0.4		0.4	–13.5		–13.5
Translation differences arising from the financial statements of other consolidated international entities	–5.0		–5.0	3.8		3.8
Translation differences arising from the financial statements of international entities	**–4.6**		**–4.6**	**–9.7**		**–9.7**
Actuarial gains and losses on pension obligations and plan assets	–6.1	2.1	–4.0	19.1	–6.3	12.8
Financial instruments designated as cash flow hedges	–118.7	35.5	–83.2	209.5	–58.5	151.0
Fair value gains and losses on equity investments	2.5		2.5			
Income and expense recognized in other comprehensive income	**–126.9**	**37.6**	**–89.3**	**218.9**	**–64.8**	**154.1**

Disclosures relating to capital management

MTU strives to maintain a strong financial profile in the interests of assuring the company's continued existence as a going concern within a flexible financing framework and of generating confidence on the part of its shareholders. It observes the statutory requirements on capital maintenance as part of its capital management and the company's articles of association do not stipulate any capital requirements. In general, the dividend policy is based on distributing between 30 and 40 % of the adjusted annual net income to shareholders if the financial situation permits this and the corporate bodies give their approval. The group's capital management activities are focused on optimizing the balance between equity and net financial debt. A description of the financial indicators MTU is obliged to meet in the context of its liabilities to banks can be found in *Note 28 (Financial liabilities).*

25. Pension provisions

Both defined benefit plans and defined contribution plans are in place for MTU employees. In the case of defined contribution plans, the company has no further obligations beyond the payment of contributions to the plan. In the case of defined benefit plans, the company has an obligation to fulfill commitments to current and former employees. For group companies in Germany, these benefits are financed primarily by provisions recognized in the financial statements, which are covered only to a minor extent by plan assets. In contrast, MTU Maintenance Canada Ltd., Richmond, Canada, has a fund-financed retirement benefit plan.

In some cases, it is difficult to differentiate between defined contribution and defined benefit plans. In Germany, for example, a minimum level of benefits is guaranteed for defined contribution plans, such that, even when the plan is organized via an external fund or insurance company, it is still the employer that remains liable. The so-called "ultimate liability of the employer" is governed by Section 1 (1) sentence 3 of the German Law on Retirement Pensions (BetrAVG). For financial reporting purposes, the term "defined benefit plan" is required to be interpreted on the basis of the underlying economic substance of the arrangement. Insofar as the MTU group has no major obligations beyond its so-called ultimate liability once the contributions have been paid to state

and private retirement funds, these plans are classified as defined contribution plans. Current contributions are recognized as expenses in the period in which they are paid.

Defined contribution plans

Since January 1, 2007, no direct pension commitments have been granted to new employees in Germany other than senior managers. Instead, for employees who joined the company after that date, MTU paid contributions in the amount of € 1.9 million in 2018 (2017: € 1.5 million) to a company-sponsored external fund. Other plans that exist within the MTU group are direct insurance contracts funded by employee contributions.

Employer's contributions to the state pension scheme in the financial year 2018 totaled € 45.9 million (2017: € 41.2 million).

Defined benefit plans

The pension obligations of MTU are measured using the projected unit credit method in accordance with IAS 19, taking account of future salary and pension increases and other adjustments expected to be made to benefits and pension plans. The provision for defined benefit plans recognized in the balance sheet corresponds to the present value of the benefits payable for current and past service (the defined benefit obligation) of beneficiaries less the fair value of plan assets at the reporting date. An extensive actuarial analysis is carried out annually for each pension plan by independent actuaries.

Actuarial gains or losses may arise in connection with increases or decreases either in the present value of the defined benefit obligation or in the fair value of the plan assets. Causes of actuarial gains or losses include the effect of changes in the measurement parameters, changes in the assessment of risks on pension obligations, and differences between the actual return on plan assets and the proportional share of interest on the net liability.

In order to calculate the funding status or the pension obligation recognized, the present value of the provision-financed and fund-financed obligations is offset against the fair value of the plan assets. In Germany, there are no laws or regulations stipulating a minimum required allocation of funds in this context.

The present value and funding status of the defined benefit obligation is as follows:

[T98] Present value of defined benefit obligation (DBO)

in € million	Dec. 31, 2018	Dec. 31, 2017
Present value of provision-financed pension obligations	879.1	870.9
Fair value of plan assets	–0.1	–0.2
Total Germany	**879.0**	**870.7**
Present value of fund-financed pension obligations	24.6	27.3
Fair value of plan assets	–25.5	–27.7
Total other countries (negative value = plan assets surplus)	**–0.9**	**–0.4**
Recognized pension obligations	**878.1**	**870.3**

The following parameters were applied to measure the pension obligations at December 31 of the respective year and to measure the pension plan expense in the respective reporting period:

[T99] Actuarial assumptions: Germany

in %	Dec. 31, 2018	Dec. 31, 2017
Interest rate for accounting purposes	1.58	1.52
Salary trend	2.70	2.70
Pension trend	1.75	1.75

[T100] Actuarial assumptions: other countries

in %	Dec. 31, 2018	Dec. 31, 2017
Interest rate for accounting purposes	3.50	3.00
Salary trend	3.00	3.00
Pension trend	2.50	2.50

The market yields on high-quality, fixed-interest corporate bonds with similar maturities in Germany increased slightly compared with 2017. In view of the duration of the obligations, which currently stands at 12 years, pension obligations were discounted at December 31, 2018, using a discount rate of 1.58%. The biometric tables issued by Prof. Dr. Heubeck (RT 2018G) were used for the purpose of measuring the obligations of pension plans in

Germany. In the case of group companies in other countries, up-to-date biometric assumptions for each relevant country were applied. The expected salary trend refers to the expected rate of increases in salaries and other compensation, which is estimated depending on inflation, the length of service of employees within the group, and other factors. Employee turnover, mortality and disability rates were estimated on the basis of statistical data.

The present value of pension obligations changed as follows in the financial year 2018:

[T101] Change in present value of pension obligations

in € million	2018	2017
Defined benefit obligation at January 1	**898.2**	**911.2**
Current service cost	16.0	17.4
Past service cost	2.3	
Contributions for pension plan subscribers	7.9	7.8
Interest expense on:	13.5	12.4
Translation differences / transfers	–1.0	–1.6
Actuarial gains (-) / losses (+)		
Financial assumptions	–2.0	–21.9
Assumptions based on experience	7.0	8.4
Plan settlements / transfers	–15.9	–13.7
Pension benefit and capital payments	–22.3	–21.8
Defined benefit obligation at December 31	**903.7**	**898.2**

The actuarial losses arising from updated assumptions based on experience relate in particular to the empirical behavior of beneficiaries of the company pension scheme when choosing the mode of payment.

The obligations resulting from plan settlements and curtailments are attributable to the conversion of pension benefits into fixed-sum payments and the group's employee turnover rate.

The fair value of plan assets changed as follows in the financial year 2018:

[T102] Fair value of plan assets

in € million	2018	2017
Fair value of plan assets at January 1	**27.9**	**27.9**
Interest income on plan assets	0.9	0.9
Actuarial gains / losses (-)	–1.1	1.8
Translation differences / transfers	–1.1	–1.6
Employer contributions	0.5	0.5
Employee contributions to plan	0.1	0.1
Pension benefit payments	–1.6	–1.7
Fair value of plan assets at December 31	**25.6**	**27.9**

[T103] Composition of plan assets

in %	2018	2017
Acquired pension benefits	75.0	
Fixed-interest securities	20.0	50.0
Shares	5.0	50.0
Total plan assets	**100.0**	**100.0**

Each year, the company's investment strategy for the plan assets is reviewed on the basis of a risk and reward profile for the purpose of asset/liability management and adjusted where necessary. The pension fund's statement of principles defines restrictions to be observed when choosing investments. In this respect, the group has made no changes to its risk management process compared with that used in previous years.

The expense from defined benefit pension plans and similar obligations recognized in the income statement for the relevant reporting period comprises the following items:

[T104] Expense from defined benefit pension plans and similar obligations

in € million	2018	2017
Current service cost	16.0	17.4
Past service cost	2.3	
Total service cost	**18.3**	**17.4**
Interest cost on pension provisions	13.5	12.4
Interest income on plan assets	–0.9	–0.9
Net interest cost	**12.6**	**11.5**
Interest expense for annuity capital payments (included in liabilities)	**1.2**	**0.9**
Total expense	**32.1**	**29.8**

Current and past service costs are recognized under personnel expenses. The other components of the expense from defined benefit pension plans and similar obligations are recognized in the financial result on other items. Actuarial gains and losses on plan assets and pension obligations are recognized in the statement of comprehensive income as part of other comprehensive income.

Expected future pension benefit payments

The company expects to amortize its pension obligations by the following distribution of pension benefit payments in the coming years:

[T105] Expected yearly amount of pension benefit payments

in € million	2019	2020	2021	2022
Expected yearly amount of pension benefit payments	35.5	35.1	38.6	44.8

The expected yearly amount of pension benefit payments is based on the assumption that beneficiaries will choose either the standard option or the initially agreed payment option, which in the case of staff means either receiving their retirement benefits by installment or, in the case of Executive Board members, as a one-time cash settlement or, if available, according to one of the alternative payment options offered at the reporting date.

The main actuarial assumptions used to calculate the defined benefit obligation (DBO) apart from the mode of payment are the discount rate, salary and pension trends, and assumed life expectancy. The following sensitivity analysis shows how the DBO would have been influenced by potential changes in the underlying assumptions:

[T106] Sensitivity analysis of the defined benefit obligation

in € million	2018	2017
Discount rate 50 basis points higher	–53.4	–54.4
Discount rate 20 basis points lower	22.8	22.0
Pension trend 50 basis points higher	13.0	12.8
Assumed life expectancy 1 year higher	13.9	12.9

There are interdependencies between certain of the actuarial assumptions, especially between changes in the discount rate and the expected pension and salary trends. The sensitivity analysis does not take these interdependencies into account.

26. Income tax liabilities

The income tax payable amounting to € 9.9 million at the reporting date (2017: € 2.9 million) comprises German corporation and municipal trade tax plus taxes on the income of group companies outside Germany.

[T107] Income tax liabilities – prior-year data adjusted

in € million	2018	2017
Balance at January 1	**2.9**	**5.8**
Utilized	–2.9	–5.8
Allocated	9.9	2.9
Balance at December 31	**9.9**	**2.9**

Income tax liabilities are due within one year.

To comply with DRSC Interpretation 4 (IFRS), issued in 2018, income tax liabilities do not include ancillary tax obligations as defined in article 3 (4) of the German tax code. Such obligations are henceforth presented under other provisions as part of the line item other obligations.

27. Other provisions

[T108] Other provisions – prior-year data adjusted

in € million	Total		Non-current		Current	
	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017
Warranty obligations and risks from pending losses on onerous contracts	36.1	37.1		2.9	36.1	34.2
Personnel obligations	76.3	74.4	9.5	7.3	66.8	67.1
Unpaid invoices / overdue accounts	104.8	93.4	38.2	27.4	66.6	66.0
Sundry other liabilities	7.8	8.3			7.8	8.3
Total other provisions	**225.0**	**213.2**	**47.7**	**37.6**	**177.3**	**175.6**

Non-current other provisions developed as follows:

[T109] Non-current other provisions 2018

in € million	Balance at Jan. 1, 2018	Transferred	Utilized	Allocated	Discount reversed	Balance at Dec. 31, 2018
Warranty obligations and risks from pending losses on onerous contracts	2.9		–2.9			
Personnel obligations	7.3	–3.0		5.1	0.1	9.5
Unpaid invoices / overdue accounts	27.4	0.6	–2.7	12.9		38.2
Total non-current other provisions	**37.6**	**–2.4**	**–5.6**	**18.0**	**0.1**	**47.7**

The following cash outflows are expected from the carrying amounts of non-current other provisions:

[T110] Expected cash outflow from non-current other provisions

in € million	Carrying amount Dec. 31, 2018	Expected cash outflow 2020
Personnel obligations	9.5	3.1
Unpaid invoices / overdue accounts, warranty obligations and risks from pending losses on onerous contracts	38.2	11.0
Total expected cash outflow from non-current other provisions	**47.7**	**14.1**

[T111] Expected cash outflow from non-current other provisions

in € million	Carrying amount Dec. 31, 2017	Expected cash outflow 2019
Personnel obligations	7.3	2.9
Unpaid invoices / overdue accounts, warranty obligations and risks from pending losses on onerous contracts	30.3	14.8
Total expected cash outflow from non-current other provisions	**37.6**	**17.7**

MTU expects that the stated personnel obligations will become due within the next five years.

Current other provisions developed as follows:

[T112] Current other provisions 2018

in € million	Balance at Jan. 1, 2018	Transferred	Utilized	Reversed	Allocated	Translation differences	Balance at Dec. 31, 2018
Warranty obligations and risks from pending losses on onerous contracts	34.2		–13.1	–1.8	17.0	–0.2	36.1
Personnel obligations	67.1	3.0	–65.1	–0.7	62.5		66.8
Unpaid invoices / overdue accounts	66.0	0.2	–13.7	–14.4	28.5		66.6
Sundry other liabilities	8.3	–1.6	–4.1	–0.4	5.4	0.2	7.8
Total current other provisions	**175.6**	**1.6**	**–96.0**	**–17.3**	**113.4**		**177.3**

The cash outflows relating to current other provisions are expected to be realized in the calendar year following the reporting period.

Warranty obligations and risks from pending losses on onerous contracts
The main component of this item of provisions is an amount of € 33.8 million (2017: € 31.3 million) for liabilities associated with warranty obligations in connection with the delivery of goods and services.

MTU has furthermore identified onerous contracts in its commercial maintenance business in which the unavoidable costs of fulfilling contractual obligations are higher than the expected inflow of economic benefits from these contracts. A provision of € 2.3 million (2017: € 5.8 million) was recognized to cover the difference.

Personnel obligations
The provisions for personnel expenses include provisions for long-service awards amounting to € 3.9 million (2017: € 4.1 million) and provisions for preretirement part-time working arrangements based on the collective agreement on phased retirement and related works agreements. On the basis of these agreements, obligations amounting to € 7.9 million (2017: € 6.3 million) were recognized at December 31, 2018. The obligation takes account of relevant plan assets amounting to € 11.0 million (2017: € 11.2 million). A further line item is provisions for profit-sharing bonuses, which amounted to € 61.8 million (2017: € 62.4 million). These relate to the short-term incentive (STI) for the Executive Board and the profit-sharing bonus for senior managers and the bonus for employees covered by the collective wage agreement and exempt employees.

Under the terms of the current compensation system, members of the Executive Board and senior managers receive a target direct compensation comprised of fixed and variable components. The variable component consists of short-term and long-term employee benefits.

The long-term portion of the target direct compensation is granted in the form of a cash payment, which must be immediately re-invested in MTU shares. These shares are subject to a specific vesting period, defined according to the beneficiary's rank in the management hierarchy. The amount of target direct compensation granted for the purchase of shares also depends on the performance targets achieved at corporate level during the three financial years preceding the grant date.

The short-term portion of the target direct compensation is based on the goal achievement level in respect of the group KPIs EBIT adjusted and free cash flow, and a component reflecting the employee's personal performance in the reporting year.

Detailed explanatory comments on the compensation system for members of the Executive Board are provided in the management compensation report, in *the corporate governance section of the combined management report.*

Unpaid invoices / overdue accounts
This item is used to create provisions for accrued amounts of cost of sales in respect of unpaid invoices / overdue accounts arising in particular from contracts with suppliers and service providers. The rise in the carrying amount of this provision is mainly attributable to revenue growth in the reporting period.

Other obligations
This item includes a multitude of accrued obligations which, considered individually, are judged to be of immaterial importance.

28. Financial liabilities

[T113] Financial liabilities

	Total		Non-current		Current	
in € million	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017
Corporate bonds and notes	100.2	100.0	98.2	98.0	2.0	2.0
Convertible bond	482.5	478.5	482.1	478.1	0.4	0.4
Financial liabilities arising from increased or new stakes in engine programs	350.4	370.5	251.1	272.9	99.3	97.6
Financial liabilities to banks						
Note purchase agreement	30.1	30.1	30.0	30.0	0.1	0.1
Revolving credit facility	14.5	77.9			14.5	77.9
Sundry other liabilities to banks	9.8	0.2	9.8			0.2
Loans from third parties	34.7	18.2			34.7	18.2
Finance lease liabilities	10.0	11.5	8.6	10.0	1.4	1.5
Total gross financial debt	**1,032.2**	**1,086.9**	**879.8**	**889.0**	**152.4**	**197.9**
Derivatives without hedging relationship	0.4	0.9	0.1	0.9	0.3	
Derivatives with hedging relationship	33.2	0.1	8.9		24.3	0.1
Personnel-related financial liabilities	59.6	48.8	39.6	31.2	20.0	17.6
Repayment of grants toward development costs	14.2	22.2	6.3	13.6	7.9	8.6
Sundry other financial liabilities	23.9	18.4	0.3	0.5	23.6	17.9
Total other financial liabilities	**131.3**	**90.4**	**55.2**	**46.2**	**76.1**	**44.2**
Total financial liabilities	**1,163.5**	**1,177.3**	**935.0**	**935.2**	**228.5**	**242.1**

Gross financial debt

Bonds and notes

MTU Aero Engines AG issued a registered bond on June 12, 2013 for a total nominal amount of € 100.0 million. The registered bond is repayable on June 12, 2028, and is subject to interest of 3.55 % p.a. Interest is payable in arrears on June 12 of each year, for the first time on June 12, 2014. The registered bond, including transaction costs and a discount of € 2.7 million, was recognized at amortized cost.

The following rules apply in the event of a change of control: every bondholder is entitled to declare due part or all of his/her bond units for the nominal amount plus any accrued interest. This does not apply if the issuer has already called in the bond. A change-of-control event occurs if the rating is lowered in the course of the change of control. A lowering of the rating occurs if (1) during the change-of-control period a rating previously granted by a rating agency to MTU or to one of its outstanding non-current liabilities is withdrawn or is changed from an investment grade rating (equivalent to or higher than Baa3 (Moody's) or BBB- (Fitch or S&P), or if (2) at the time of the change of control, no investment grade rating has been awarded by a rating agency to the bond or to MTU and no rating agency awards an investment grade rating to the bond within the change-of-control period.

Convertible bond

In 2016, MTU Aero Engines AG issued a convertible bond in the form of a preferential unsecured debenture, for a total nominal amount of € 500.0 million. This bond is convertible into registered non-par-value shares in MTU.

The convertible bond has an original maturity of 7 years and is divided into units of € 100,000. It bears an interest rate of 0.125 % per annum, payable annually in arrears.

Bondholders have been entitled to convert their certificates into common shares of MTU Aero Engines AG since June 27, 2016. The initial conversion price was set at € 124.7701 which represents a premium of 50 % above the reference rate.

Under the terms of issue of the convertible bond, MTU has the right to recall the issued bond units at their nominal value (plus accrued unpaid interest) at any time on or after June 16, 2020, subject to a period of notice of minimum 30 days and maximum 60 days, either (i) if the quoted price of the common share rises to or above

130 % of the applicable conversion price or (ii) if no more than 20 % of the nominal value of the convertible bond issue is outstanding. In such case, and within the above-mentioned period of notice of minimum 30 days and maximum 60 days, the bondholders have the right to demand that MTU converts their investment into shares, rather than a cash consideration.

Financial liabilities arising from increased or new stakes in engine programs

These items include the deferred payment components arising from the IAE-V2500 stake increase and the acquisition of shares in new engine programs. The latter are referred to in the following as financial liabilities arising from other program participations.

Financial liabilities arising from IAE-V2500 stake increase

The agreement signed by MTU in the financial year 2012 in order to increase its share in the IAE-V2500 engine program by five percentage points to 16 % included a deferred payment component contingent upon the number of flight hours per-formed over the next 15 years by the V2500 engine fleet in service at time of the stake increase.

Financial liabilities arising from other program participations

The financial liabilities arising from other program participations mainly relate to program-lifetime-related payments for the acquisition of shares in commercial engine programs, which are deemed to represent financing agreements in view of their long-term nature.

Financial liabilities to banks

Note purchase agreement

MTU Aero Engines AG issued a note purchase agreement on March 28, 2014 for a total nominal amount of € 30.0 million and with a maturity date of March 27, 2021. The note purchase agreement has a variable interest rate corresponding to the 6-month Euribor rate plus a percentage margin. The initial interest rate amounts to 1.72 %. The interest is calculated and paid twice a year, in March and September.

Revolving credit facility

The company has access to a revolving credit facility of € 600.0 million with five banks, which runs until October 28, 2023. The term of this line of credit was extended by an additional year in 2018. Any credit utilized is subject to interest at the customary market reference rates plus an additional margin. Unused credit facilities are subject to a loan commitment fee. A total of € 51.1 million had been drawn down under this facility at December 31, 2018, of which € 36.6 million in the form of guarantees in favor of third parties (2017: draw-downs totaling € 90.6 million, of which € 12.7 million in the form of guarantees).

MTU has undertaken to ensure that certain financial indicators remain within defined boundaries throughout the respective terms of the revolving credit facility as follows: MTU's debt-equity ratio (consolidated net financial debt in relation to EBITDA adjusted) at the end of each quarter shall not exceed 3.0; the times interest earned ratio (EBITDA adjusted in relation to the consolidated net interest expense) at the end of each quarter shall not fall below 4.0.

Sundry other liabilities to banks

Sundry other liabilities to banks relate to loan commitments in connection with MTU's share in a trade agreement concluded in 2018 with a manufacturer of business jets.

Loans from third parties

As in the previous year, loans from third parties relate to a release of obligation granted in connection with the premature termination of a maintenance contract originally concluded on the basis of successive payments over the duration of the contract.

Finance lease liabilities

Finance lease liabilities represent obligations under finance lease arrangements that are capitalized and amortized using the effective interest rate method; for more details, see *Note 15 (Property, plant and equipment).*

Changes in gross financial debt are shown in the following table:

[T114] Changes in gross financial debt

			Non-cash items				
in € million	Balance at Jan. 1, 2018	Deposits and withdrawals	Addition	Discount reversed	Transferred	Translation differences	**Balance at Dec. 31, 2018**
Bonds and notes	100.0	–3.6		3.8			100.2
Convertible bond	478.5	–0.6		4.6			482.5
Financial liabilities arising from increased or new stakes in engine programs	370.5	–69.9	23.5	11.1		15.2	350.4
Financial liabilities to banks							
Note purchase agreement	30.1	–0.3		0.3			30.1
Revolving credit facility	77.9	–63.4					14.5
Other liabilities to banks	0.2	–0.2			9.8		9.8
Loans from third parties	18.2	–18.0			34.7	–0.2	34.7
Finance lease liabilities	11.5	–1.5					10.0
Total gross financial debt	**1,086.9**	**–157.5**	**23.5**	**19.8**	**44.5**	**15.0**	**1,032.2**

Other financial liabilities

Liabilities arising out of derivatives

The increase in financial liabilities arising out of derivatives to € 33.6 million (2017: € 1.0 million) is accounted for by the cancelation of items that had become due and a decrease in the fair value of forward foreign exchange contracts.

Personnel-related financial liabilities

Personnel-related financial liabilities amounting to € 59.6 million (2017: € 48.8 million) mainly result from claims for one-time and instalment payments under the company pension scheme amounting to € 45.6 million (2017: € 34.9 million).

In addition, obligations under the MAP employee stock program of € 7.8 million (2017: € 7.5 million), which the Executive Board of MTU Aero Engines AG, Munich, offered again in the financial year 2018, are also carried here. Under this program, MTU offers all eligible employees covered by the collective wage agreement, exempt employees and member of senior management the opportunity to invest in MTU shares. At the end of a two-year vesting period, employees covered by the collective wage agreement and exempt employees receive a taxable "matching" payment corresponding to 50 % of the amount invested by the employee in MTU shares at the beginning of the program. Members of senior management receive a taxable "matching" payment at the end of the two-year vesting period corresponding to one third of the amount individually invested.

The number of shares sold to group employees under the terms of the MAP employee stock program in the financial years 2018 and 2017 was as follows:

[T115] MAP employee stock option program

Issue date	Number of shares sold	Average cost of acquisition in € million	Total proceeds of sale in € million	Selling price per share in €
June 2018	102,041	4.6	16.3	159.90
June 2017	113,213	1.7	14.3	126.14

The total expense for the issue of matching shares in connection with the MAP employee stock program in the financial year 2018 amounted to € 7.1 million (2017 € 5.8 million).

The purchase price for the MTU shares allocated in the financial year 2018 amounted to € 159.90 per share. The shares transferred to the employees, measured at the average acquisition cost, were removed from the equity item “treasury shares”. The difference of € 11.7 million (2017: € 12.6 million) between the proceeds of the sale and the original acquisition cost was allocated to capital reserves.

Repayment of grants toward development costs
In the financial years from 1976 through 1991, MTU received grants from the German Federal Ministry of Economics and Technology toward the development costs of the PW2000 engine. Once the sales figures of PW2000 production engines for the Boeing 757 and C-17 as set down in the grant notice have been reached, MTU is obliged to reimburse the full sum of the grants received within a timeframe of ten years. In the financial years 2011 through 2017 a total amount of € 43.7 million was repaid and in 2018 a further € 8.7 million.

Sundry other financial liabilities
This item is used to present a multitude of liabilities hat are immaterial when viewed separately.

29. Trade payables

[T116] Trade payables – prior-year data adjusted

in € million	Dec. 31, 2018	Dec. 31, 2017	Jan. 1, 2017
Accounts payable to:			
Third parties	230.4	234.5	230.6
Related companies	0.2	72.6	14.1
Total trade payables	**230.6**	**307.1**	**244.7**

Trade payables include open purchase invoices and amounts payable for purchased goods and services.

The total amount of trade payables is due within one year.

30. Contract liabilities

Contract liabilities include advance payments for the delivery of engine modules and components and for maintenance services. Where corresponding contract assets exist, they are offset against these liabilities in accordance with IFRS 15. The changes in the 2018 reporting period are attributable to ongoing business operations. In 2018, contract liabilities amounting to € 246.7 million (2017: € 220.2 million) were offset against the corresponding contract assets.

31. Refund liabilities

[T117] Refund liabilities – first-time reporting

	Total			Non-current			Current		
in € million	Dec. 31, 2018	Dec. 31, 2017	Jan. 1, 2017	Dec. 31, 2018	Dec. 31, 2017	Jan. 1, 2017	Dec. 31, 2018	Dec. 31, 2017	Jan. 1, 2017
Warranty and liability risks	390.0	309.5	241.1				390.0	309.5	241.1
Invoice corrections	453.5	364.4	305.0				453.5	364.4	305.0
Subsequent costs	693.0	482.8	663.1	30.3	1.4	2.0	662.7	481.4	661.1
Total refund liabilities	**1,536.5**	**1,156.7**	**1,209.2**	**30.3**	**1.4**	**2.0**	**1,506.2**	**1,155.3**	**1,207.2**

The refund liabilities in respect of warranty and liability risks represent customers' rights to compensation for unsatisfied performance obligations and/or similar payments made to the consortium leader (OEM) in risk- and revenue-sharing partnerships.

Invoice corrections relate to retrospective price adjustments in contracts with customers. The increase in the reporting period is consistent with the revenues realized from spare parts sales, which due to accounting factors are regularly subject to retrospective price adjustments in the context of MTU's partnerships in commercial engine programs. The amount recognized in this item corresponds to the outstanding portion of such price adjustments at the reporting date.

Subsequent costs mainly relate to discounts on list prices granted to customers, in cases where the invoiced amount has not been fully recognized and an allowance for these discounts has already been deducted from revenues.

32. Other liabilities

[T118] Other liabilities

	Total		Non-current		Current	
in € million	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017
Personnel-related liabilities						
Social security	1.0	0.6			1.0	0.6
Other personnel-related liabilities	38.3	33.3			38.3	33.3
Other tax liabilities	35.6	30.2			35.6	30.2
Sundry other liabilities	2.8	2.4	0.7		2.1	2.4
Total other liabilities	**77.7**	**66.5**	**0.7**		**77.0**	**66.5**

Personnel-related liabilities

Personnel-related liabilities in particular concern vacation entitlements and flex-time credits.

Other tax liabilities

The other tax liabilities concern payable wage and church taxes, solidarity surcharges and transactional taxes.

33. Additional disclosures relating to financial instruments

Carrying amounts, measurement/recognition methods and fair value aggregated by category
In the following tables, the carrying amounts of financial instruments are aggregated by category, irrespective of whether or not the instruments fall within the scope of IFRS 7 or IFRS 9 (2017: IAS 39). The information presented also includes separate amounts for each category as a function of the measurement/recognition method applied. Finally, the carrying amounts are set opposite the fair values for comparison.

[T119] Disclosures relating to financial instruments
Carrying amounts, measurement / recognition methods and fair values at December 31, 2018

in € million	Carrying amount Dec. 31, 2018	Amount carried in balance sheet			Amount carried in balance sheet IAS 17	Financial instruments not within the scope of IFRS 9 or IFRS 7	Total	Fair value Dec. 31, 2018
		Measured at amortized cost	Fair value recognized in other comprehensive income	Fair value recognized in profit or loss				
ASSETS								
Other financial assets								
Loans and receivables	117.3	112.2				5.1	117.3	117.3
Other interests in related companies	16.4		16.4				16.4	16.4
Trade receivables	1,051.2	1,051.2					1,051.2	1,051.2
Derivative financial assets								
Derivatives without hedging relationship	0.3			0.3			0.3	0.3
Derivatives with hedging relationship	11.0		11.0				11.0	11.0
Cash and cash equivalents	99.0	99.0					99.0	99.0
EQUITY AND LIABILITIES								
Refund liabilities	1,536.5	1,536.5					1,536.5	1,536.5
Trade payables	230.6	230.6					230.6	230.6
Financial liabilities								
Bonds and notes	100.2	100.2					100.2	113.4
Convertible bond	482.5	482.5					482.5	696.3
Financial liabilities arising from increase and acquisitions of program shares	350.4	350.4					350.4	344.2
Financial liabilities to banks	54.4	54.4					54.4	54.4
Loans from third parties	34.7	34.7					34.7	34.7
Finance lease liabilities	10.0				10.0		10.0	10.0
Derivative financial liabilities								
Derivatives without hedging relationship	0.4			0.4			0.4	0.4
Derivatives with hedging relationship	33.2		33.2				33.2	33.2
Sundry other financial liabilities	97.7	38.1				59.6	97.7	98.2

Financial instruments not within the scope of IFRS 7 or IFRS 9 (2017: IAS 39) comprise liabilities arising from employee benefits and the corresponding plan assets accounted for in accordance with IAS 19.

[T120] Disclosures relating to financial instruments – prior year data adjusted
Carrying amounts, measurement / recognition methods and fair values at December 31, 2017

in € million	Category as defined in IAS 39 / other category	Carrying amount Dec. 31, 2017	Amount carried in balance sheet			Amount carried in balance sheet IAS 17	Financial instruments not within the scope of IAS 39 or IFRS 7	Total	Fair value Dec. 31, 2017
			Measured at amortized cost	Fair value recognized in other comprehen-sive income	Fair value recognized in profit or loss				
ASSETS									
Other assets									
Loans and receivables	LaR	190.2	187.2				3.0	190.2	190.2
Other interests in related companies	AfS	3.4	3.4					3.4	3.4
Trade receivables	LaR	914.5	914.5					914.5	914.5
Derivative financial assets									
Derivatives without hedging relationship	FAHfT	1.8			1.8			1.8	1.8
Derivatives with hedging relationship	n.a.	85.6		85.6				85.6	85.6
Cash and cash equivalents	LaR	106.1	106.1					106.1	106.1
EQUITY AND LIABILITIES									
Refund liabilities	FLAC	1,156.7	1,156.7					1,156.7	1,156.7
Trade payables	FLAC	307.1	307.1					307.1	307.1
Financial liabilities									
Bonds and notes	FLAC	100.0	100.0					100.0	121.6
Convertible bond	FLAC	478.5	478.5					478.5	675.4
Financial liabilities arising from increased or new stakes in engine programs	FLAC	370.5	370.5					370.5	374.7
Financial liabilities to banks	FLAC	108.2	108.2					108.2	108.2
Loans from third parties	FLAC	18.2	18.2					18.2	18.2
Finance lease liabilities	n.a.	11.5				11.5		11.5	11.5
Derivative financial liabilities									
Derivatives without hedging relationship	FLHfT	0.9			0.9			0.9	0.9
Derivatives with hedging relationship	n.a.	0.1		0.1				0.1	0.1
Sundry other financial liabilities	FLAC/n.a.	89.4	40.6				48.8	89.4	90.7

Abbreviations:
LaR = Loans and Receivables
HtM = Held-to-Maturity
AfS = Available-for-Sale Financial Assets
FAHfT = Financial Assets Held for Trading
FLAC = Financial Liabilities Measured at Amortized Cost
FLHfT = Financial Liabilities Held for Trading
FLtPL = Financial Liabilities Measured at Fair Value through Profit or Loss

Cash and cash equivalents, trade receivables, other receivables as well as trade payables and other payables are generally due within a relatively short time. The carrying amounts of these assets therefore correspond approximately to their fair value at the reporting date.

With the exception of the convertible bond, which is traded on the stock market and therefore allocated to level 1 of the fair-value hierarchy, all other financial instruments are allocated to level 2. The fair value of these assets, which differs from the carrying amount in these cases, is determined using the discounted cash flow method.

Classification of fair-value measurements of financial assets and liabilities according to the fair-value hierarchy

In order to evaluate the relevance of the parameters used when estimating financial assets and liabilities at their fair value, MTU assigns these assets and liabilities to three levels of a fair-value hierarchy.

The three levels of the fair-value hierarchy are described below, together with their utilization when measuring financial assets and liabilities:

Level 1 Quoted prices in active markets for identical assets or liabilities (unadjusted input);

Level 2 Prices of assets or liabilities that can be observed directly or indirectly (derived);

Level 3 Unobservable inputs used to measure prices of assets or liabilities.

The following tables show the allocation of financial assets and liabilities measured at fair value to the three levels of the fair-value hierarchy for 2018 and 2017:

[T121] Classification within the fair-value hierarchy for the financial year 2018

in € million	Level 1	Level 2	Level 3	Total
Financial assets measured at fair value				
Derivative financial instruments		11.3		11.3
Other interests in related companies			16.4	16.4
Total financial assets		**11.3**	**16.4**	**27.7**
Financial liabilities measured at fair value				
Derivative financial instruments		33.6		33.6
Total financial liabilities		**33.6**		**33.6**

[T122] Classification within the fair-value hierarchy for the financial year 2017

in € million	Level 1	Level 2	Level 3	Total
Financial assets measured at fair value				
Derivative financial instruments		87.4		87.4
Total financial assets		**87.4**		**87.4**
Financial liabilities measured at fair value				
Derivative financial instruments		1.0		1.0
Total financial liabilities		**1.0**		**1.0**

The fair value of the derivative financial instruments and securities assigned to level 2 is measured using the discounted cash flow (DCF) method. In the previous year, the fair value of available-for-sale financial assets corresponded approximately to their nominal value, due to the interest rate conditions and creditworthiness of the respective contractual partners. Equity investments, which are allocated to level 3, are also measured using the discounted cash flow (DCF) method, based on internal planning figures. The discount rate is calculated using both internal planning data and available market data.

Payment cash flows for financial liabilities

The following tables list the contractually agreed payments of interest and principal on the financial liabilities measured at fair value through profit or loss at the reporting date.

[T123] Payment cash flows for financial liabilities 2018

		Cash flow 2019			Cash flow 2020			Cash flow 2021			Cash flow 2022 et. seq.		
in € million	Carrying amount Dec. 31, 2018	Fixed interest	Variable interest	Principal	Fixed interest	Variable interest	Principal	Fixed interest	Variable interest	Principal	Fixed interest	Variable interest	Principal
Refund liabilities	1,536.5			1,506.4			10.6			10.3			9.4
Trade payables	230.6			230.6									
Corporate bonds and notes	100.2	3.6			3.6			3.6			24.8		100.0
Convertible bond	482.5	0.6			0.6			0.6			1.3		500.0
Financial liabilities arising from increased or new stakes in engine programs	350.4			99.3			53.6			51.4			183.1
Financial liabilities to banks	54.4		0.3	14.5		0.3	9.8		0.1	30.0			
Loans from third parties	34.7	0.7		34.7									
Finance lease liabilities	10.0	0.3		1.4	0.3		1.8	0.2		1.0	2.1		5.8
Derivative financial liabilities													
Derivatives without hedging relationship	0.4			0.3			0.1						
Derivatives with hedging relationship	33.2			24.3			8.9						
Sundry other financial liabilities	97.7			51.5			15.6			6.4			31.4

[T124] Payment cash flows for financial liabilities 2017

		Cash flow 2018			Cash flow 2019			Cash flow 2020			Cash flow 2021 et. seq.		
in € million	Carrying amount Dec. 31, 2017	Fixed interest	Variable interest	Principal	Fixed interest	Variable interest	Principal	Fixed interest	Variable interest	Principal	Fixed interest	Variable interest	Principal
Refund liabilities	1,156.7			1,155.3			0.5			0.5			0.5
Trade payables	307.1			307.1									
Corporate bonds and notes	100.0	3.6			3.6			3.6			28.3		100.0
Convertible bond	478.5	0.6			0.6			0.6			1.9		500.0
Financial liabilities arising from increased or new stakes in engine programs	370.5			97.6			50.6			48.5			219.0
Financial liabilities to banks	108.2		0.3	78.1		0.3			0.3			0.2	30.0
Loans from third parties	18.2	0.7		17.9									
Finance lease liabilities	11.5	0.3		1.5	0.3		1.6	0.3		1.7	2.3		6.7
Derivative financial liabilities													
Derivatives without hedging relationship	0.9						0.9						
Derivatives with hedging relationship	0.1			0.1									
Sundry other financial liabilities	89.4			44.1			15.2			11.9			24.6

The statement includes all instruments in the portfolio at December 31, 2018 for which payment terms had been contractually agreed. Amounts denominated in a foreign currency are translated at the exchange rate prevailing on the respective reporting date. The variable-rate interest payments on the financial instruments are based on the most recent interest rate fixed prior to December 31, 2018. Financial liabilities with no fixed repayment date are always assigned to cash flows on the basis of the earliest likely repayment dates.

Within the scope of its partnerships in engine programs, MTU is a party to aircraft financing agreements for the purpose of promoting sales. Such loan commitments are only ever entered into jointly and with respect to the consortium leader (OEM). They are provided in two basic forms: predelivery payment (PDP) and backstop commitments. In both cases, any funds made available to the purchaser of the aircraft are always transferred directly to the aircraft manufacturer by the consortium leader (OEM).

MTU classifies loan commitments offered up to the reporting date totaling a nominal amount, translated into euros, of € 832.0 million (December 31, 2017: € 535.8 million) as part of its gross liquidity risk in accordance with the requirements of IFRS 7. However, based on experience, it is considered to be very unlikely that these notional loan amounts will actually be utilized to their full extent.

The agreed conditions of the loan are linked to market conditions applicable when the loan is utilized and in the case of the backstop commitments are cost-prohibitive. In the case of PDP financing, the consortium has collateral rights to the aircraft while it is still in production and thus in the possession of the aircraft manufacturer – in the case of backstop commitments, the consortium retains direct ownership of the asset up to the delivery date. After delivery the lender retains a security interest in the aircraft. MTU also assumes that other lenders will become third parties to any loans that are established, particularly in view of the offered modes of financing. Another factor that will tend to limit credit risks is the incorporation of supplementary restrictive clauses in the proposed agreements, which require the aircraft purchaser to provide evidence that their financial means are sufficient before the loan contract is signed.

With respect to the impact on MTU's liquidity of the notional loan amounts of the proposed financing agreements, the company makes sure that its lines of

credit (see Note 28) provide adequate liquidity reserves, even in the unlikely case that all offers of financing agreements are taken up at the same time, and bears in mind the possibility of extending these lines of credit in order to back up additional offers. In the event that loan commitments are utilized, MTU considers the associated liquidity and credit risks to be manageable.

Explanatory comments relating to net gain/loss on financial instruments by category

The tables below show the gains/losses arising from transactions involving financial instruments, aggregated by category, for 2018 and 2017. Interest income and expense in connection with financial assets and liabilities that are measured at fair value through profit or loss are not included here:

[T125] Net gain / loss on financial assets and liabilities 2018

in € million	from interest	from investments	from remeasure-men	currency translation	valuation allowances	Net gain / loss 2018
Financial assets measured at cost	8.3			84.9	–2.3	90.9
Financial assets measured at fair value through other comprehensive income		1.7				1.7
Financial assets measured at fair value through profit or loss			36.3			36.3
Financial liabilities measured at cost	–8.2		–13.6	–118.3		–140.1
Financial liabilities at fair value through profit or loss			–31.5			–31.5
Financial instruments not within the scope of IFRS 7 or IFRS 9		43.8		4.7		48.5
Total	**0.1**	**45.5**	**–8.8**	**–28.7**	**–2.3**	**5.8**

[T126] Net gain / loss on financial liabilities and assets 2017

in € million	from interest	from investments	from remeasure-men	currency translation	valuation allowances	Net gain / loss 2017
Loans and receivables	6.1			–135.8	2.4	–127.3
Available-for-sale financial assets		1.5				1.5
Financial assets held for trading			30.2			30.2
Financial liabilities measured at amortized cost	–13.0		–19.0	158.6		126.6
Financial liabilities held for trading			–22.3			–22.3
Financial instruments not within the scope of IFRS 7 or IAS 39		42.4		–5.4		37.0
Total	**–6.9**	**43.9**	**–11.1**	**17.4**	**2.4**	**45.7**

The interest component of financial instruments is recognized under net interest expense (*see Note 8.*). Other components of net income or loss are presented in MTU's financial statements in the financial result on other items *(see Note 9.)*, with the exception of the expense for valuation allowances on financial assets, which is recognized under selling expenses (*see Note 4.*).

Moreover, gains/losses arising from translation differences on trade receivables and payables are recognized under revenues (*see Note 1.*) or cost of sales (*see Note 2.*) respectively.

Explanatory comments relating to net interest expense

The net interest expense on financial assets and liabilities includes interest income from long-term loans and interest expenses arising from the corporate bond, borrowing agreements with banks and from finance lease agreements.

Explanatory comments relating to measurement subsequent to initial recognition

The net gain / loss on financial instruments measured at fair value mainly comprises exchange rate gains and losses arising from the measurement of derivatives without hedging relationship. The amount stated for "financial liabilities measured at amortized cost" mainly results from the compounding of interest rates on this category of financial instruments.

Gains amounting to € 84.9 million (2017: losses amounting to € 135.8 million) from the currency translation of financial assets are mainly attributable to the measurement of trade receivables. These gains are offset principally by currency translation losses amounting to € 118.3 million (2017: gains amounting to € 158.6 million) on trade payables and refund liabilities.

Offsetting financial assets and financial liabilities

The following financial assets and financial liabilities subject to offsetting agreements existed at the reporting date:

[T127] Offset amounts of financial assets and financial liabilities at December 31, 2018

	(a)	(b)	(c)	(d)	(e) = (c) – (d)
in € million	Gross amounts of recognized financial assets / liabilities	Gross amounts of recognized financial liabilities / assets offset in the balance sheet	Net financial assets / liabilities recognized in the balance sheet	Related amounts not offset in the balance sheet	Net amount
Other assets					
Loans and receivables	117.4	0.1	117.3		117.3
Other interests in related companies	16.4		16.4		16.4
Trade receivables	1,700.9	649.7	1,051.2		1,051.2
Derivative financial assets					
Derivatives without hedging relationship	0.3		0.3	0.3	0.0
Derivatives with hedging relationship	11.0		11.0	11.0	0.0
Cash and cash equivalents	119.6	20.6	99.0		99.0
Refund liabilities	1,536.5		1,536.5		1,536.5
Trade payables	880.3	649.7	230.6		230.6
Financial liabilities					
Corporate bonds and notes	100.2		100.2		100.2
Convertible bond	482.5		482.5		482.5
Financial liabilities arising from increased or new stakes in engine programs	350.4		350.4		350.4
Financial liabilities to banks	75.0	20.6	54.4		54.4
Finance lease liabilities	10.0		10.0		10.0
Derivative financial liabilities					0.0
Derivatives without hedging relationship	0.4		0.4	0.1	0.3
Derivatives with hedging relationship	33.2		33.2	11.2	22.0
Sundry other financial liabilities	97.8	0.1	97.7		97.7

[T128] Offset amounts of financial assets and financial liabilities at December 31, 2017

in € million	(a) Gross amounts of recognized financial assets / liabilities	(b) Gross amounts of recognized financial liabilities / assets offset in the balance sheet	(c) Net financial assets / liabilities recognized in the balance sheet	(d) Related amounts not offset in the balance sheet	(e) = (c) – (d) Net amount
Other assets					
Loans and receivables	190.3	0.1	190.2		190.2
Other interests in related companies	3.4		3.4		3.4
Trade receivables	1,206.2	291.7	914.5		914.5
Derivative financial assets					
Derivatives without hedging relationship	1.8		1.8		1.8
Derivatives with hedging relationship	85.6		85.6	0.1	85.5
Cash and cash equivalents	115.9	9.8	106.1		106.1
Refund liabilities	1,156.7		1,156.7		1,156.7
Trade payables	598.8	291.7	307.1		307.1
Financial liabilities					
Corporate bonds and notes	100.0		100.0		100.0
Convertible bond	478.5		478.5		478.5
Financial liabilities arising from increased or new stakes in engine programs	370.5		370.5		370.5
Financial liabilities to banks	118.0	9.8	108.2		108.2
Loans from third parties	18.2		18.2		18.2
Finance lease liabilities	11.5		11.5		11.5
Derivative financial liabilities					
Derivatives without hedging relationship	0.9		0.9		0.9
Derivatives with hedging relationship	0.1		0.1	0.1	0.0
Sundry other financial liabilities	89.5	0.1	89.4		89.4

The related amounts not offset in the balance sheet refer to financial assets and liabilities arising from derivatives that can be offset against debt in the case that the issuer becomes insolvent.

34. Deferred tax assets and liabilities

Deferred tax assets and liabilities arise on temporary differences between the tax bases of assets and liabilities of the individual group companies and their carrying amounts in the consolidated balance sheet. Deferred tax assets were also recognized for tax credits and losses available for carry-forward.

Deferred tax assets and liabilities were recognized in OCI in connection with the subsequent measurement of pension obligations and the corresponding plan assets and in connection with the fair-value measurement of derivative financial instruments for which an effective hedging relationship was established, and in respect of the difference between the fair value and carrying amount of the equity component of the convertible bond.

[T129] Changes in deferred tax assets and liabilities

	Dec. 31, 2018		Dec. 31, 2017		2018	
	Deferred tax assets	Deferred tax liabilities	Deferred tax assets	Deferred tax liabilities	Tax income / expense (-)	Recognized in equity / OCI
in € million	in equity		in equity		in other comprehensive income	
Assets						
Intangible assets		210.1		197.7	–12.4	
Property, plant and equipment	6.9	48.2	6.1	49.8	2.5	–0.1
Financial assets		1.3	1.5	1.1	–0.2	–1.5
Inventories	66.5		78.3		–11.9	0.1
Receivables and other assets	31.4	72.4	22.5	77.1	10.2	3.4
Total assets	**104.8**	**332.0**	**108.4**	**325.7**	**–11.8**	**1.9**
Equity						
Balance of hedging instrument assets and liabilities	11.0			24.5		35.5
Equity portion of convertible bond		7.7		7.7		
Actuarial gains and losses on pension obligations and plan assets	118.1		116.0			2.1
Total equity	**129.1**	**7.7**	**116.0**	**32.2**		**37.6**
Liabilities						
Pension provisions		5.2	0.3	1.7	–3.8	
Other provisions	15.7	0.1	13.5	0.1	2.5	–0.3
Liabilities	124.4		137.0		–10.4	–2.2
Total liabilities	**140.1**	**5.3**	**150.8**	**1.8**	**–11.7**	**–2.5**
Deferred taxes on assets and liabilities	**374.0**	**345.0**	**375.2**	**359.7**	**–23.5**	**37.0**
Tax credits and tax losses available for carry-forward						
Tax credits available for carry-forward	33.0		33.0		0.9	–0.9
Tax losses available for carry-forward	9.9		21.7		–11.7	–0.1
Valuation allowances and unrecognized recoverable tax payments						
Valuation allowances on tax credits carried forward	–6.4		–11.3		4.7	0.2
Valuation allowances on tax losses carried forward	–2.2		–7.1		5.0	–0.1
Temporary differences for which no deferred tax assets were recognized	–11.2		–13.5		2.0	0.3
Total tax credits and losses carried forward	**23.1**		**22.8**		**0.9**	**–0.6**
Deferred tax assets / liabilities before offset	**397.1**	**345.0**	**398.0**	**359.7**	**–22.6**	**36.4**
Offset	–336.6	–336.6	–342.8	–342.8		
Net deferred tax assets / liabilities	**60.5**	**8.4**	**55.2**	**16.9**	**–22.6**	**36.4**

Reference is made to Note 10 (Income taxes) for further information relating to actual and deferred tax assets and liabilities resulting from the balance sheet and other items listed above and to the reconciliation between expected and recognized tax expense.

Tax assets and liabilities are offset against one another only if they relate to the same type of tax levied by the same tax jurisdiction and are due within the same period.

Deferred tax assets were recognized for deferred tax losses/credits available for carry-forward in the case of the following group companies:

[T130] Deferred tax assets recognized for tax losses / credits available for carry-forward at December 31

in € million	U.S. 2018	Poland 2018	**Total 2018**	Total 2017
Tax credits available for carry-forward	1.2	31.8	33.0	33.0
Tax losses available for carry-forward	2.4	7.5	9.9	21.7
Potential tax impact of tax losses / credits available for carry-forward	**3.6**	**39.3**	**42.9**	**54.7**
Valuation allowances on tax credits carried forward		–6.4	–6.4	–11.3
Valuation allowances on tax losses carried forward	–2.1	–0.1	–2.2	–7.1
Deferred tax assets recognized for tax losses / credits available for carry-forward	**1.5**	**32.8**	**34.3**	**36.3**

USA

MTU Aero Engines North America Inc., Rocky Hill, USA, (AENA) and Vericor Power Systems LLC., Alpharetta, USA have been a fiscal unit since July 1, 2016. Tax losses available for carry-forward at December 31, 2018 relate exclusively to state tax, which after the application of valuation allowances amounted to the equivalent of € 8.1 million (2017: € 7.8 million).

Recoverable tax credits continue to be recognized for the fiscal unit. These mainly result from development activities. Deferred tax assets were similarly recognized in respect of these recoverable tax credits.

Poland

MTU Aero Engines Polska sp. z o.o. receives government support in the context of Poland's economic development program by virtue of its location in a special economic zone. Because its business investments help to create jobs, the company has been awarded tax credits in respect of the profits it expects to achieve through its production activities, with separate amounts being accorded each year through to 2026. Deferred tax assets amounting to € 25.4 million (2017: € 20.6 million) were recognized on the basis of the business investments realized up to the reporting date, taking into account the currently expected earnings from the activities for which tax credits were awarded.

In addition to the activities for which tax advantages are granted, the company also provides services that are subject to normal taxation. In the financial years 2012 through 2016, this area of business resulted in tax losses, while in 2017 and 2018 taxable profit was generated. These tax losses, which amount to € 39.3 million, can be carried forward for no more than five years and a ceiling is imposed on the amount carried forward each financial year. As a result, it was possible to recognize deferred tax assets amounting to € 7.4 million (2017: € 14.1 million), in view of the currently expected earnings from the relevant activities. A valuation allowance corresponding to the difference between this amount and the maximum allowable amount of deferred tax assets was therefore recognized in the balance sheet.

At the reporting date, there were temporary differences amounting to € 58.9 million (2017: € 70.8 million) for which no deferred tax assets were recognized, in view of the relevant income expectations for the next five years. The resulting potential tax impact of € 11.2 million (2017: € 13.5 million) was therefore not taken into account in the computation of income tax expense.

Deferred tax liabilities for taxable differences arising from investments in subsidiaries and joint ventures

In accordance with IAS 12, no deferred tax liabilities were recognized for temporary differences amounting to € 247.3 million (2017: € 186.3 million) that arose in connection with investments in subsidiaries and joint ventures. If these differences were to lead to the creation of deferred tax liabilities, they would result in a tax liability amounting to € 10.7 million (2017: € 8.1 million), based on the current tax legislation.

IV. Other disclosures

35. Measurement of the recoverable amount of operating segments to which goodwill has been attributed

The group tests the goodwill of its groups of cash-generating units (CGUs) for impairment annually.

Goodwill is deemed to be impaired if the carrying amount determined for each CGU exceeds its recoverable amount. At MTU, the identifiable groups of CGUs utilized for the purpose of the goodwill impairment test are its two operating segments – OEM (commercial and military engine business) and MRO (commercial maintenance business).

The value in use of each of the two operating segments at June 30, 2018, was calculated in order to determine their respective recoverable amounts, based on the operational planning data for the second half year of the assessment period. In the period between the impairment testing date and the reporting date, no new information came to our knowledge that might significantly affect goodwill measurement.

The calculations of the recoverable amounts are based on the following assumptions: The first step involves the use of models to predict future changes in the engine fleet and the corresponding market share of engines for which MTU holds or expects to hold the responsibility for supplying series-production modules and components, including an estimation of the present and future value of related contracts of present or future significance to its service business, especially in the MRO segment. MTU applies these forecasts systematically as a basis for its capacity planning and corresponding revenue forecasts, from which the planned EBIT and cash flow for each of the two operating segments are derived. The outcome of this process is therefore necessarily based on expectations as regards future market shares, growth in the individual markets, the profitability of products as well as macroeconomic developments such as trends in exchange rates, interest rates and commodity prices. The values in use, and the corresponding carrying amounts, are determined without reference to financing activities. In the reporting period, these amounts were measured on the basis of revenues determined in accordance with IFRS 15, whereas in 2017 revenues were measured in accordance with IAS 18 in conjunction with IAS 11. In particular, this calls for changes in the presentation of cost of sales and components of revenues. More information is provided in *Part I. Accounting policies and principles under the heading IFRS 15, Revenue from contracts with customers.*

The payment cash flow on which the value in use of the OEM segment (commercial and military engine business) is based included an average growth rate for revenues within the detailed planning horizon of a percentage in the low double digits, an EBIT margin at the current level and a discount rate before tax of 8.7 %. The value of the perpetuity for the OEM segment was derived from the estimated revenues in the final year of the detailed planning period (2023), assuming an annual growth rate of 1.0 %, plus an annuity to account for actual revenues in the period up the long-term strategic planning horizon based on the average cost of capital. The EBIT margin used to determine the perpetuity for the OEM segment corresponds to the current level.

The corresponding payment cash flow for the MRO segment is based on a growth rate for revenues within the detailed planning horizon in the mid-single digits, an EBIT margin moderately higher than the current level, and a discount rate before tax of 8.8 %. The value of the perpetuity for the MRO segment, given its shorter business cycles, was derived from the revenues and EBIT margin of the last year of the detailed planning period (2023) plus a growth rate of 1.0 %.

When applying the discounted cash flow (DCF) method, the weighted average cost of capital (WACC) before tax for each segment is determined iteratively on the basis of a corresponding after-tax discount rate. This is derived from the cost of equity capital after tax, which is based on a risk-free base interest rate and a risk premium for the company (market risk premium multiplied by the beta coefficient calculated on the basis of a peer group analysis). The cost of debt capital, taken as the average cost of debt capital of the peer-group companies, is also factored into the calculation. Cost of equity and cost of debt capital are weighted according to the average capital structure of the peer-group companies when determining the WACC after tax. In order to determine the weighted average cost of capital (WACC) in the reporting period, MTU used a risk-free base interest rate of 1.25 %, a market risk premium of 6.50 %, and a beta coefficient of 0.87. The cost of debt capital utilized in this calculation was 1.98 % after tax.

The recognized amount of goodwill for the OEM segment (commercial and military engine business) was unchanged compared with the prior year, at € 304.4 million, while that for the MRO segment (commercial maintenance business) was € 87.4 million (2017: € 87.2 million). The increase in the amount of goodwill recognized for the MRO segment is due to the effect of currency translation. The value in use of the OEM segment is € 6,955.5 million, and that of the MRO segment is € 3,298.1 million. The corresponding carrying amounts of the cash-generating units are € 2,539.5 million for the OEM segment and € 1,007.2 million for the MRO segment. There is therefore no indication that the recognized amounts of goodwill are impaired.

36. Sensitivity analysis of goodwill

Sensitivity analyses were carried out to determine the possible impact that a sustained reduction in planned earnings before interest and tax (EBIT) might have on the goodwill amounts allocated to each of the two operating segments. This analysis included sensitivity factors affecting the calculation of the weighted average cost of capital.

Assuming an unchanged weighted average cost of capital (WACC), the sensitivity analyses concluded that there would be no necessity to recognize an impairment loss on goodwill either in the OEM or MRO operating segment, even in the event of a sustained reduction in EBIT ranging to 30 % below the earnings forecast established by management. This similarly applies in the hypothetical case in which EBIT in both segments remains unchanged while the weighted average cost of capital rises by 30 %.

37. Financial risks

In the course of its ordinary business activities, MTU is exposed to credit risks, liquidity risks, and market risks. The objective of financial risk management is to minimize the risks arising from operating activities and the resulting financing requirements through the use of selected derivative and non-derivative hedging instruments.

Risks in connection with the procurement, financing, and sale of MTU's products and services are described in detail in the combined management report. In order to counter financial risks, MTU has put in place an integrated risk management system, which is monitored by the Supervisory Board. The principles of this system aim at rapidly identifying, analyzing, and communicating risks and taking countermeasures. Market risks, particularly commodity price risks, currency risks, and interest risks, are analyzed in respect of their potential impact on earnings before interest and tax (EBIT) and on the interest result, and managed through the targeted use of derivative financial instruments.

Credit risk

MTU is exposed to credit risks arising from its operating activities in both the OEM and MRO segments. The company strives to minimize these risks by means of an integrated, structured risk management system.

Consequently, all financial transactions are embedded in a detailed process environment with a clearly defined separation of functions.

In view of the importance of managing credit risks in the case of engine and aircraft financing agreements, to which MTU is a party in connection with its partnership in engine programs and MRO cooperations, oversight is provided by the central treasury department. More detailed information on engine and aircraft financing agreements is provided in *Note 32 (Additional disclosures relating to financial instruments) and in the risk and opportunity report that forms part of the combined management report.*

Financing transactions in connection with liquidity management, e.g. time deposits or forward foreign exchange contracts, also expose the group to a certain degree of credit risk. MTU's internal guidelines therefore stipulate that such transactions may only be conducted by the central treasury department, and only with partners with a credit rating of at least investment grade.

The maximum credit risk is represented by the carrying amounts of the financial assets recognized in the balance sheet, plus the amount of loan warranties and granted loans. No non-payment risk was associated with the group's trade receivables and contract assets, which amounted to € 1,155.7 million at December 31, 2018, because they are balanced by the same amount of trade payables and contract liabilities. Security interests provide partial coverage of contract assets, to an amount of € 277.1 million, and full coverage of loans to third parties. Credit insurance was in place for receivables to the amount of € 46.4 million.

Relevant unsecured portions of financial assets were included in the calculation of the expected credit losses using an impairment matrix. For this purpose, groups with credit standings A, B, and C were formed for which the respective credit loss rate was determined:

[T131] Expected credit losses at December 31, 2018

in € million	Credit standing A	Credit standing B	Credit standing C	Total
Expected credit loss rate	0.24%	1.10%	3.07%	
Gross amount in the event of default of payment	60.2	286.3	61.0	407.5
Expected credit losses	0.2	3.1	1.9	5.2

[T132] Expected credit losses at December 31, 2017

in € million	Credit standing A	Credit standing B	Credit standing C	Total
Expected credit loss rate	0.32%	0.61%	2.44%	
Gross amount in the event of default of payment	33.4	227.7	55.2	316.3
Expected credit losses	0.1	1.4	1.4	2.9

No material agreements, other than security rights in the context of issued engine and aircraft financing loans, existed at the reporting date that could reduce the maximum credit risk. Nonetheless, MTU is exposed to other, shared liability risks and hence potential additional credit risks as a result of its membership in engine consortia. More details concerning these risks are provided in *Note 37 (Contingent liabilities and other financial liabilities).*

Market risks

Currency risk

More than 80 % of MTU's revenues are generated in U.S. dollars. Approximately half of this currency risk is offset in the normal course of business by costs invoiced likewise in U.S. dollars. Most other costs are incurred in euros, and to a lesser extent in Canadian dollars and Polish zloty. Changes in currency exchange rates in the unhedged portion of the portfolio have a direct impact on net income and cash flow.

Hedging strategy
MTU uses a hedging model to protect certain portions of its expected net foreign currency surplus in order to minimize the effects of the volatility of the U.S. dollar exchange rate on the company's net income and cash flow.

The forward foreign exchange contracts and currency options used for this purpose are designated as financial instruments to hedge cash flows from expected sales realized in U.S. dollars. The hedge ratio decreases the longer the hedging horizon is. In 2018 it was 99 % of the net foreign currency surplus. At December 31, 2018, the hedge ratio was calculated at 74 % for 2019 and 31 % for 2020.

An economic relationship exists between the financial instrument and the underlying transaction, since the terms of the forward foreign exchange contracts and currency options correspond to the terms of the highly probable future transactions (this is true for the nominal amount and the expected payment date). MTU uses the hypothetical derivative method to measure the effectiveness of the hedging relationship and prospectively compares the changes in fair value of the hedging instrument with the changes in fair value of the hedged items that are attributable to the hedged risk.

Hedge ineffectiveness can arise for a number of reasons:

- when the timing of the cash flows from the hedged item and the hedging instruments differs or the expected amount of cash flows from the hedged item and the hedging instrument changes. MTU considers it unlikely that this will arise, since only the net foreign currency surplus is hedged and sufficient gross foreign currency payments are available to service the hedging instruments.
- different effects of the counter-party credit risk on the changes in fair value of the hedged item and the hedging instrument. MTU currently considers it unlikely that this will arise, since all banks with which MTU concludes hedging transactions, like MTU itself, must have an investment grade rating. The priced credit risk between MTU and the commercial banks is therefore currently very low and can be deemed insignificant.

Translation differences arising from the translation of financial statements of international subsidiaries into the group's functional currency are not included here.

Forward foreign exchange contracts
At December 31, 2018, MTU held forward foreign exchange contracts for a contractual period up to May 2020 to sell a nominal volume of U.S. $ 1,570.0 million (which translates to € 1,371.2 million at the exchange rate prevailing at the reporting date). The total fair value of the forward foreign exchange contracts decreased in 2018 by € 108.8 million (2017: increased by € 171.5 million). At December 31, 2017, MTU had hedged cash flows for the financial years 2018–2020 amounting to U.S. $ 1,580.0 million (which translates to € 1,317.4 million at the exchange rate prevailing at December 31, 2017).

Currency option transactions
Option transactions entitle (long-position option) or oblige (short-position option) MTU to sell a defined quantity of U.S. dollars at agreed euro exchange rates at a specific time. The risk of financial loss from a long-position option is limited to the premiums that have already been paid. Exercising a short-position option entitles MTU to a premium. Losses can be incurred if the exchange rate at maturity, compared with that agreed when the option is sold, falls at a rate exceeding the amount of premiums received for these options. At December 31, 2018, MTU held long-position options amounting to U.S. $ 90.0 million (2017: U.S. $ 20.0 million) and short-position options in an amount of U.S. $ 70.0 million (2017: U.S. $ 20.0 million).

The open forward foreign exchange contracts and currency options at the reporting date have the following maturities:

[T133] Cash flow hedges

	Dec. 31, 2018			
	due within 1 year	due within 1 and 2 years	due after 2 years	Total
Forward foreign exchange contracts				
Nominal amounts in U.S. $ million	1,090.0	480.0		1,570.0
Average forward rate (€/US $)	1.18	1.21		1.19
thereof recognized as				
Financial assets				
Nominal amounts in U.S. $ million				420.0
Carrying amounts in € million				8.2
Financial liabilities				
Carrying amounts in € million				1,150.0
Carrying amount in Mio. €				31.5
Currency option transactions				
Nominal amounts in U.S. $ million	20.0	70.0		90.0
Average forward rate (€/US $)	1.10	1.20		1.18
thereof recognized as				
Financial assets				
Nominal amounts in U.S. $ million 1)				90.0
Carrying amounts in € million				2.8
Financial liabilities				
Nominal amounts in U.S. $ million 1)				70.0
Carrying amounts in € million				1.7

1) Combination of buy and sell options which partially cancel one another out

Financial instruments designated as cash flow hedges
In addition, the liability arising from the deferred purchase price components in connection with the IAE-V2500 stake increase, which is to be serviced in U.S. $, serves as an instrument for hedging cash flows arising from revenues generated in U.S. $. This liability extends to 2027 and represents a nominal amount of U.S. $ 387.8 million (2017: U.S. $ 473.9 million), which translates to € 338.7 million (2017: € 365.1 million) at the exchange rate prevailing at the reporting date. At December 31, 2018, the carrying amount of the purchase price liability was € 301.9 million (2017: € 320.0 million) and is recognized under financial liabilities.

At the 2018 reporting date, the following amounts were recognized in equity in respect of the fair value of forward foreign exchange contracts and other financial instruments designated as cash flow hedges:

[T134] Impact of hedging relationships on equity

in € million	Hedge reserves	Hedging costs reserves	Currency translation reserves	Total
Carrying amount at Jan. 1, 2017	**–44.3**		**–55.0**	**–99.3**
Changes in fair value of forward foreign currency sales and options	153.7			153.7
Amounts recycled to profit or loss	–12.4		6.6	–5.8
Foreign currency translation of the financial liability arising from the IAE-V2500 stake increase			61.6	61.6
Deferred tax liabilities	–45.6		–12.9	–58.5
Carrying amount at Jan. 1, 2018	**51.4**	**0.0**	**0.3**	**51.7**
Changes in fair value of forward foreign currency sales and options	–59.6	–36.6		–96.2
Amounts recycled to profit or loss	–17.8	16.1	2.2	0.5
Foreign currency translation of the financial liability arising from the IAE-V2500 stake increase			–23.0	–23.0
Deferred tax liabilities	25.0	6.6	3.9	35.5
Carrying amount at Dec. 31, 2018	**–1.0**	**–13.9**	**–16.6**	**–31.5**

There were no transactions for which hedging relationships were established in prior periods that are no longer expected to occur.

As a further element of its hedging strategy, MTU employs derivative financial instruments that do not form part of a hedging relationship as defined by IFRS 9:

Currency swaps
During the financial year 2018, U.S.-dollar holdings were sold at the daily rate and repurchased after a short time using a swap. As the selling and purchase prices differ marginally, these swaps are immaterial in terms of risk. The purpose of these transactions was to optimize the hedging of currency risk. At December 31, 2018, a currency swap line was in place covering a total nominal amount of U.S. $ 134.0 million (2017: U.S. $ 30.0 million), with a maturity date of January 2, 2019.

Exchange rate sensitivity analysis
The sensitivity analysis showing the effects of hypothetical changes in exchange rates on net income and equity is related to the foreign currency holdings included in the respective balance sheet items at the reporting date. In this context, it is assumed that the holding at the reporting date is representative of the whole year.

A significant proportion of trade receivables and payables, refund liabilities and finance lease liabilities, is invoiced in U.S. dollars, and is thus exposed to exchange rate fluctuations. All other non-derivative financial instruments outside of hedging relationships are already denoted in the functional currency, the euro, and are hence not included in the exchange rate sensitivity analysis. The equity instruments held by the group are not of a monetary nature, and so consequently do not present a currency risk as defined by IFRS 7.

If it is assumed that the exchange rate of the euro to the U.S. dollar at December 31, 2018, or at the prior year's reporting date had been 10% higher or lower than the actual closing rate, this would have produced the following hypothetical effects on net income and equity:

[T135] Exchange rate sensitivity analysis

	2018		2017	
in € million	–10%	+10%	–10%	+10%
Exchange rate sensitivity (€ / U.S. $)				
Closing exchange rate Dec. 31, 2018: 1.1450 (Dec. 31, 2017: 1.1993)	1.03	1.26	1.08	1.32
Net income	**–44.4**	**36.3**	**–32.0**	**26.2**
Equity [1]	**–77.7**	**68.5**	**–89.6**	**74.5**
Thereof: hedge reserves (fair value) [1]	–112.7	97.1	–107.9	92.9

[1] after tax

Interest rate risk

MTU is exposed to interest rate risk principally in the euro zone, and to a lesser extent in Canada, China, Poland, and the United States. MTU's interest rate risks are mainly related to pension obligations and financial liabilities.

Interest rate sensitivity analysis

IFRS 7 requires the presentation of interest rate risk in the form of a sensitivity analysis. This demonstrates the effects of changes in market interest rates on interest payments, interest income and expense, other income statement items, net income, and equity. The interest rate sensitivity analysis is based on the following assumptions:

Changes in the market interest rate of non-derivative financial instruments bearing fixed interest rates have an effect on net income and equity only if these financial instruments are classified as "at fair value through profit or loss" or were so designated at initial recognition.

Consequently, all fixed-interest financial instruments measured at amortized cost have no interest-rate-induced effects on net income and equity that must be accounted for, beyond future amounts charged to the interest result.

In the financial year 2018, no significant risks were discernable with respect to the financial instruments bearing variable interest rates or financial instruments measured at fair value that were held by MTU at the reporting date.

Price risk

The risk of price increases is an inherent feature of the commodity markets.

This risk is minimized mainly through commodity sales contracts with appropriate price agreements and only to a small extent through derivative financial instruments for forward commodity sales contracts for nickel.

At December 31, 2018, MTU had concluded forward commodity sales contracts with financial institutions for a volume of 350 metric tons of nickel (2017: 350 metric tons) for the years 2019 to 2020 and contracted fixed prices for nickel between U.S. $ 9.7 and 13.5 per metric ton (2017: between U.S. $ 9.4 and 11.9 per metric ton).

If the market price for nickel on the respective due date exceeds the agreed fixed price, MTU will receive a payment for the difference from the bank. In the opposite case, MTU is obligated to compensate the bank. No effective hedging relationship as defined in IFRS 9 has been established for these transactions. The fair value loss of € 0.6 million (2017: fair value gain of € 1.0 million) arising from these forward commodity sales contracts is recognized in the financial result on other items (*see Note 9.*).

If it is assumed that the market price of forward commodity sales contracts for nickel had been 10% higher or lower, net income would have been € 0.2 million higher or lower, respectively (2017: € 0.3 million).

Liquidity risk

MTU's liquidity risk consists in non-compliance with past-due payment obligations on account of insufficient cash or cash equivalents. In order to ensure the solvency and financial flexibility of MTU at all times, long-term credit lines and liquid funds are held available based on multi-year financial planning and rolling monthly liquidity planning.

MTU has concluded long-term syndicated loans and bilateral credit agreements with a number of banks. The established lines of credit at the reporting date are considered sufficient to meet potential obligations arising from loans granted in connection with sales financing agreements in the years to come. Further details are presented in *Notes 28 (Financial liabilities) and 32 (Additional disclosures relating to financial instruments).*

38. Contingent liabilities and other financial obligations

Contingent liabilities

Proceedings are pending before the tax courts contesting land transfer tax assessments in connection with mergers. In view of these proceedings, processing of the land transfer tax statements in connection with the merger of MTU Aero Engines GmbH into MTU Aero Engines Holding AG has been suspended by the tax authorities. According to current estimates, the ultimate land transfer tax expense could, however, amount to € 15 million. As in 2017, MTU currently does not consider this eventuality to be a material tax risk.

The contingent liabilities with respect to IAE International Aero Engines AG (IAE) result from MTU's membership of the consortium formed to manage the V2500 engine program, which is constituted as a risk- and revenue-sharing partnership, and hence also include liabilities arising from MTU's indirect share in this program via Pratt & Whitney Aero Engines International GmbH, Lucerne, Switzerland (PWAEI).

Bank guarantees amounting to € 63.7 million (2017: € 12.9 million) mainly concern contract performance and customs bonds. The increase compared with the previous year relates to financing agreements concluded in the reporting period in connection with subsequent payments – in particular program-lifetime-related payments – to one OEM. Other entry payment and performance guarantees were established for newly acquired orders.

Guarantees and other contingent liabilities relate to investment grants and amount to € 8.3 million (2017 € 8.3 million). MTU also receives a minor amount in public sector grants and assistance in the form of grants toward research and development activities. The risk of repayment obligations exists until such time as the relevant project has been completed and all the conditions associated with it complied with. At the reporting date, the probability that risks of this kind could materialize was deemed to be very low.

[T136] Contingent liabilities

in € million	Dec. 31, 2018	Dec. 31, 2017
Contingent liabilities arising from risk- and revenue-sharing partnerships with:		
IAE International Aero Engines AG	13.7	14.7
Pratt & Whitney Aircraft Company	5.5	5.3
General Electric Company	0.8	0.8
Subtotal	**20.0**	**20.8**
Bank guarantees	63.7	12.9
Guarantees and other contingent liabilities	8.3	8.3
Total contingent liabilities	**92.0**	**42.0**

Other financial obligations

Obligations arising from operating lease arrangements

The rental and lease contracts for buildings, engines, machines, tools, office, and other equipment have terms of between three months and ten years and in certain cases contain extension and purchase options and/or price escalation clauses. With regard to rental and lease agreements, payments of € 69.7 million (2017: € 64.0 million) were expensed in the financial year 2018.

The nominal total of future minimum lease payments arising from ordinarily non-terminable operating lease agreements is as follows (based on due payment dates):

[T137] Nominal total of future minimum lease payments

in € million	Dec. 31, 2018	Dec. 31, 2017
Due in less than one year	37.0	24.5
Due in more than one year and less than five years	47.5	42.3
Due in more than five years	5.2	4.9
Total future minimum lease payments	**89.7**	**71.7**

The nominal total of future minimum lease payments amounted to € 89.7 million at December 31, 2018, which is € 18.0 million higher than the previous year's amount of € 71.7 million. This year-on-year increase was mainly attributable to the expansion of the pool of lease engines for MTU Maintenance Lease Services B.V., Amsterdam, Netherlands. The main individual obligations arising from operating lease arrangements are as follows:

/ Leasing of engines from MTU Maintenance Lease Services B.V., Amsterdam, Netherlands, under

contracts with durations of between 3 months and 7 years, some of which include price escalation clauses to account for increased use fees (but not lease fees). Some of these contracts are based on variable leasing rates, indexed to the 6-month U.S. dollar LIBOR rate and adjusted accordingly at 6-month intervals. None of these contracts contain material options permitting an extension of the originally agreed duration, but certain of them do include a purchase option when the leasing term expires.

- Rent for the buildings occupied by MTU Maintenance Canada Ltd., Richmond, Canada, under contracts with durations of between 1 and 10 years. Some of these contracts include price escalation clauses. None of these contracts contain renewal or purchase options.
- Rent for a production facility and office premises at MTU Maintenance Hannover GmbH, Hannover, under a contract with a fixed term to March 31, 2021. The resulting obligation is subject to escalation in line with the commercial rent index. This contract includes a renewal option for an additional 2 years.
- Two office buildings leased by MTU Aero Engines North America Inc., Rocky Hill, USA, under a 6-year contract which includes price escalation clauses. This contract contains neither renewal nor purchase options.
- Rental payments for offices occupied by MTU Aero Engines AG, Munich, under 5-year lease agreements. These contracts include price escalation clauses linked to the consumer price index. If the consumer price index rises by more than 10% since the last rent increase, the rental payments are increased accordingly. This contract includes renewal options for an additional 5 years.
- Lease payments for a building at the air base in Erding made available for an undetermined duration as part of a cooperative arrangement with the German air force. This contract contains neither renewal nor purchase options. The annual rent is fixed to the end of 2019.
- Rental payments for industrial trucks under a 5-year contract. This contract does not contain price escalation clauses, and includes neither renewal nor purchase options.

Future income and expenses arising from sublease agreements

At December 31, 2018, the future minimum income from sublease agreements from engine leasing agreements and for office space totaled € 35.6 million (2017: € 26.0 million). As in 2017, one half of this income relates to payments due within one year, and the remaining half is expected to be received in installments over the next 5 years. Payments amounting to € 59.7 million (2017: € 54.2 million) for these sublease agreements were recognized as an expense in the financial year 2018.

Order commitments for financial obligations

At December 31, 2018, order commitments for the purchase of intangible assets amounted to € 9.0 million (2017: € 5.0 million) and order commitments for the purchase of property, plant and equipment amounted to € 98.4 million (2017: € 65.7 million). They thus lay within the normal range.

39. Relationships with related companies and persons

Related companies

Transactions between group companies and joint ventures or associated companies were, without exception, conducted in the context of their normal business activities and made on terms equivalent to those that prevail in arm's length transactions.

Business transactions between companies included in the consolidated financial statements were eliminated in the course of the preparation of these statements and are therefore not disclosed separately in these Notes.

Business with related companies

During the course of the reporting period, intra-group transactions involving the delivery of goods and provision of services were conducted by group companies as part of their normal operating activities, e.g. development, repairs, assembly, IT support. The current receivables and liabilities that represent the outstanding balance of business transactions carried out with non-consolidated related companies in the financial years 2018 and 2017 are presented in the following tables:

[T138] Trade receivables from related companies

	Outstanding balance		Value of business transactions			
	Receivables		Revenues / income / sales		Expenses / purchases	
in € million	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017
EUROJET Turbo GmbH, Hallbergmoos	26.7	15.6	140.9	138.3	–0.3	–1.2
EPI Europrop International GmbH, Munich	31.1	29.6	71.5	85.9	–7.7	–5.7
IAE International Aero Engines AG, Zurich, Switzerland	109.8	210.9	1,137.9	804.3	–654.4	–524.9
International Aero Engines LLC, East Hartford, Connecticut, USA	405.5	213.8	640.6	107.7	–150.9	–57.9
MTU Turbomeca Rolls-Royce ITP GmbH, Hallbergmoos	0.9	0.1	10.5	14.4		–0.9
MTU Turbomeca Rolls-Royce GmbH, Hallbergmoos		0.2	3.7	3.9		–0.6
Pratt & Whitney Canada Customer Service Centre Europe GmbH, Ludwigsfelde	9.8	2.6	65.8	60.6	–0.2	–0.1
Ceramic Coating Center S.A.S., Paris, France	0.2	0.2			–2.3	–1.8
Turbo Union Ltd., Bristol, England	10.2	16.6	74.1	62.9		
MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China	1.0		8.6		–359.4	
EME Aero sp. z.o.o., Jasionka, Poland			7.6		–2.7	
Gesellschaft zur Entsorgung von Sondermüll in Bayern GmbH, Munich					–0.2	–0.2
Sumisho Aero Engines Lease B.V., Amsterdam, Netherlands	6.8	1.4	4.4	0.9	–7.2	–5.5
MTU Maintenance Service Centre Australia Pty. Ltd., Perth, Australia	0.1		0.1	0.8	–1.6	–0.8
AES Aerospace Embedded Solutions GmbH, Munich		0.2	0.7	0.7	–2.1	–1.9
MTU Maintenance Dallas Inc., Grapevine, USA	1.0	0.3	0.7	0.2	–2.2	–2.1
MTU Maintenance IGT Service do Brasil Ltda., São Paulo, Brazil	0.1	0.6		0.3	–0.6	–0.6
MTU Maintenance Service Center Ayutthaya Ltd., Ayutthaya, Thailand	0.3	0.4	0.1	0.2	–1.8	–1.4
Total	**603.5**	**492.5**	**2,167.2**	**1,281.1**	**–1,193.6**	**–605.6**

[T139] Trade payables to related companies

	Outstanding balance		Value of business transactions			
	Liabilities		Revenues / income / sales		Expenses / purchases	
in € million	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017
MTU Versicherungsvermittlungs- und Wirtschaftsdienst GmbH, Munich, Germany					–8.8	–8.3
MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China		39.4		11.1		–264.8
PW1100G-JM Engine Leasing, LLC, East Hartford, USA[1)]		33.0				
Airfoil Services Sdn. Bhd., Kota Damansara, Malaysia	0.2	0.2	0.3	0.3	–8.2	–9.1
MTU Aero Engines Shanghai Ltd., Shanghai, China					–1.0	–0.7
Total	**0.2**	**72.6**	**0.3**	**11.4**	**–18.0**	**–282.9**

[1)] Capital injection outstanding

Major shareholdings

The list of major shareholdings shows MTU Aero Engines Munich's capital share in each company and, unless otherwise specified, the equity that this represents at December 31, 2018, and the profit or loss generated by each company in the reporting period:

[T140] Major shareholdings

Name and registered office of entity	Consolidation method [7]	Shareholding in % Dec. 31, 2018	Equity in 000 € Dec. 31, 2018	Profit / loss in 000 € Dec. 31, 2018
I. Investments in subsidiaries				
MTU Maintenance Hannover GmbH, Langenhagen	Full	100.00	65,470	[2]
MTU Maintenance Berlin-Brandenburg GmbH, Ludwigsfelde	Full	100.00	88,620	[2]
MTU Aero Engines North America Inc., Rocky Hill, USA	Full	100.00	37,275 [3]	336 [4]
MS Engine Leasing LLC., Rocky Hill, USA [8]	Full	69.06	212,709 [3]	–41 [4]
MTU Maintenance Canada Ltd., Richmond, Canada	Full	100.00	62,244 [3]	8,523 [4]
Vericor Power Systems LLC., Alpharetta, USA [8]	Full	100.00	30,297 [3]	1,781 [4]
MTU Aero Engines Polska sp. z o.o., Rzeszów, Poland	Full	100.00	291,231 [3]	59,053 [4]
MTU Maintenance Lease Services B.V., Amsterdam, Netherlands	Full	80.00	26,016	14,155
MTU Versicherungsvermittlungs- und Wirtschaftsdienst GmbH, Munich, Germany	Fair value	100.00	26	[2]
MTU Maintenance Service Centre Ayutthaya Ltd., Ayutthaya, Thailand	Fair value	100.00	271 [1,5]	300 [1,6]
MTU Maintenance Dallas Inc., Grapevine, USA	Fair value	100.00	–1,101 [3]	–121 [4]
MTU Maintenance IGT Service do Brasil Ltda., São Paulo, Brazil	Fair value	100.00	300 [1,5]	105 [1,6]
MTU Aero Engines Finance Netherlands B.V., Amsterdam, Netherlands	Fair value	100.00	8 [1]	–7 [1]
MTU Maintenance Service Centre Australia Pty. Ltd., Perth, Australia	Fair value	100.00	529 [1,5]	41 [1,6]
MTU Aero Engines Shanghai Ltd., Shanghai, China	Fair value	100.00	135 [3]	16 [4]
II. Investments in associated companies				
IAE International Aero Engines AG, Zurich, Switzerland	at equity	25.25	77,081 [1,5]	2,519 [1,6]
IAE International Aero Engines LLC., East Hartford, USA	at equity	18.00	10,891 [3]	4,840 [4]
PW 1100G-JM Engine Leasing LLC., East Hartford, USA	at equity	18.00	1,247,004 [3]	64,237 [4]
III. Equity investments in joint ventures				
MTU Maintenance Zhuhai Co. Ltd., Zhuhai, China	at equity	50.00	263,331 [3]	72,900 [4]
MTU Maintenance Hong Kong Ltd., Hong Kong, China [8]	Fair value	50.00	–3 [3]	25 [4]
Pratt & Whitney Canada Customer Service Centre Europe GmbH, Ludwigsfelde [8]	at equity	50.00	13,683	1,919
Ceramic Coating Center S.A.S., Paris, France	at equity	50.00	6,316	390
Airfoil Services Sdn. Bhd., Kota Damansara, Malaysia	at equity	50.00	21,084 [3]	4,327 [4]
AES Aerospace Embedded Solutions GmbH, Munich	at equity	50.00	3,618	675
EME Aero sp. z.o.o., Jasionka, Poland	at equity	50.00	23,711 [3]	–5,543 [4]
Turbo Union Ltd., Bristol, England	Fair value	39.98	278 [1]	–3 [1]
EUROJET Turbo GmbH, Hallbergmoos	Fair value	33.00	1,809 [1]	702 [1]
EPI Europrop International GmbH, Munich, Germany	Fair value	28.00	3,796 [1]	459 [1]
MTU Turbomeca Rolls-Royce GmbH, Hallbergmoos	Fair value	33.33	61 [1]	23 [1]
MTU Turbomeca Rolls-Royce ITP GmbH, Hallbergmoos	Fair value	25.00	77 [1]	50 [1]
IV. Other equity investments				
Sumisho Aero Engines Lease B.V., Amsterdam, Netherlands	Fair value	10.00	82,129 [1,5]	5,517 [1,6]

[1] Data for previous year, actuals not yet available
[2] Profit / loss according to German GAAP transferred 2018
[3] Translated at closing exchange rate Dec. 31, 2018
[4] Translated at annual average exchange rate for 2018
[5] Translated at closing exchange rate Dec. 31, 2017
[6] Translated at annual average exchange rate for 2017
[7] - Full = fully consolidated
- Fair value = measured at fair value
- at equity = carrying amount of investment increased or reduced to reflect changes in equity of group's percentage interest
[8] Indirect shareholding

Related persons

No group company has conducted any business subject to disclosure requirements with members of the group's Executive Board or Supervisory Board or with any other individuals holding key management positions, or with companies in which these persons hold a seat on the managing or supervisory board, with the exception of the transactions presented later in this Note, under *"Other related party transactions".*

This also applies to close family members of this group of persons.

Members of the Executive Board

At December 31, 2018, the Executive Board of MTU Aero Engines AG, Munich, comprised the following members:

[T141] Members of the Executive Board

Reiner Winkler Chief Executive Officer	Munich
Peter Kameritsch Chief Financial Officer and Chief Information Officer	Munich
Lars Wagner Chief Operating Officer	Munich
Michael Schreyögg Chief Program Officer	Munich

Executive Board compensation

More detailed information on the compensation system for MTU's Executive Board, including their company pension entitlements, is provided in the management compensation report in the Corporate Governance section of this Annual Report.

The members of the Executive Board received total compensation amounting to € 10.6 million (2017: € 8.0 million) for their services as board members in the financial year 2018.

This total amount can be broken down into the following components:

[T142] Executive Board compensation

	2018		2017	
	in € million[1]	in %	in € million[1]	in %
Short-term employee benefits				
Non-performance-related components	2.1		1.8	
Performance-related components without long-term incentive effect[2]	2.2		2.1	
Performance-related components with long-term incentive effect[3]	3.2		3.6	
Total	**7.5**	**70.8**	**7.5**	**93.7**
Post-employment benefits				
Service cost / past service cost	3.1		0.5	
Total	**3.1**	**29.2**	**0.5**	**6.3**
Total compensation	**10.6**	**100.0**	**8.0**	**100.0**

[1] Amounts relate to compensation awarded to active members of the Executive Board in the respective financial years for their services as board members.

[2] Non-deferred portion of short-term incentive (STI) for the financial year 2018; will be paid in 2019.

[3] Previous year: Deferred portion of STI for the financial year 2015 to be paid in 2018.

Members of the Executive Board did not receive any compensation for mandates on boards of the group's own companies.

In the reporting period, as in the previous year, no loan facilities or advances were granted to members of the Executive Board.

Similarly, as in the previous year, no contingent liabilities were assumed by the company in favor of members of the Executive Board.

At December 31, 2018, the provisions for current and future pension obligations toward former members of the Executive Board amounted to € 16.3 million (2017: € 8.0 million).

Members of the Supervisory Board

As in 2017, the members of the Supervisory Board did not receive any additional compensation for mandates over and above that received for their supervisory board mandate with MTU Aero Engines AG, Munich. This compensation amounted to € 1.1 million (2017: € 1.0 million).

In the financial year 2018, the MTU employees who held seats as employee representatives on the Supervisory Board of MTU Aero Engines AG received salaries under their normal employment contracts (excluding Supervisory Board compensation) totaling € 0.5 million (2017: € 0.5 million). This amount represents the sum of their respective gross salaries.

In 2018, no loan facilities or advances were granted to members of the Supervisory Board. Similarly, as in the previous year, no contingent liabilities were assumed by the company in favor of members of the Supervisory Board.

Details of the compensation awarded to individual members of the Supervisory Board, and other related information, are presented in the *management compensation report in the Corporate Governance section of this Annual Report.*

Other related party transactions

MTU shares and options bought or sold by members of the Executive Board and the Supervisory Board in the financial year 2018 were bought or sold under terms equivalent to those that prevail in arm's length transactions. The transactions were published in the commercial registry and posted on the *MTU website at www.mtu.de > Investor Relations > Corporate Governance > Directors' Dealings.*

Shareholders

Pursuant to Section 160 (1) item 8 of the German Stock Corporation Act (AktG), information must be provided on the existence of shareholdings which have been notified to the company pursuant to Section 21 (1) or (1a) of the German Securities Trading Act (WpHG). Detailed information is provided in this *Annual Report in the section entitled The MTU share.*

V. Segment information

40. Segment reporting

MTU reports on two operating segments: the OEM segment (commercial and military engine business) and the MRO segment (commercial maintenance business). Segmentation is based on classifications used in the internal organizational structure and reporting system, which takes into account the risks and returns to which the segments are subject. A detailed description of the operating segments is provided after the consolidated financial statements in the section headed “Reporting by operating segment”.

Commercial and military engine business (OEM)

In the commercial and military engine business, the group develops, manufactures, assembles and delivers commercial and military engines and components. The maintenance, repair and overhaul of military engines is also included in this segment.

Commercial maintenance business (MRO)

In the commercial maintenance business, the group maintains, repairs and overhauls aircraft engines and industrial gas turbines. In addition to complete engine maintenance, the services provided also include engine module and parts repairs as well as related services.

Profit/loss of companies accounted for using the equity method

The carrying amount and the share in profit/loss of consolidated group companies accounted for using the equity method are included in reporting by operating segment if such companies can be directly allocated to an operating segment.

Segment assets and segment liabilities

Segment assets comprise all assets that can be directly allocated to specific operating activities and whose positive or negative operating results have an impact on earnings before interest and tax (EBIT / EBIT adjusted). Assets and liabilities are allocated to the operating segment in which they are used to generate business. The consolidation/reconciliation amount in the segment assets line relates to the consolidation of the carrying amount of subsidiaries and of accounts receivable from intersegment sales of € 1,029.6 million (2017: € 794.1 million) and to segment liabilities of € 688.8 million (2017: € 453.1 million).

The cash and cash equivalents of the German group companies are managed centrally by the parent company in a cash pooling system. The parent company’s operating activities are allocated to the OEM segment, which is why the associated interest income and expense mainly arises in that segment.

Segment capital expenditure

Segment capital expenditure relates to additions to intangible assets and to property, plant and equipment, acquired programs assets and acquired development assets.

[T143] Capital expenditure on intangible assets, property, plant and equipment, acquired program assets and development assets

in € million	2018	2017
Germany	280.6	249.5
Europe (excluding Germany)	44.5	26.1
North America	7.2	12.5
Total capital expenditure	**332.3**	**288.1**

Approximately 84 % (2017: approximately 87 %) of the capital expenditure on intangible assets and on property, plant and equipment relates to expenditure by group companies in Germany.

Consolidation/reconciliation column

The amounts in the “consolidation/reconciliation” column for earnings before interest and tax (EBIT/EBIT adjusted) are used to eliminate the effect of intersegment sales.

Segment information by geographical area

External revenues, capital expenditure on intangible assets and property, plant and equipment, and non-current assets are divided into the following regions: Germany, Europe (excluding Germany), North America, Asia and other regions. Revenues from business with third parties are allocated to the geographical area in which the customer is domiciled. Further details relating to the breakdown of revenues by geographical region are presented in Note 1 (Revenues).

Capital expenditure on intangible assets and on property, plant and equipment as well as non-current assets are allocated to the geographical area in which the respective asset is located.

[T144] Non-current assets

in € million	2018	2017
Germany	2,733.8	2,647.5
Europe (excluding Germany)	715.3	748.2
North America	266.8	146.1
Total non-current assets	**3,715.9**	**3,541.8**

VI. Events after the reporting date

No events of material importance with any significant impact on the financial situation, net assets or operating results of the MTU group occurred after the end of the reporting period.

VII. Determination of the net profit available for distribution on the basis of the German GAAP annual financial statements

Unlike the consolidated financial statements, which are based on the IFRSs issued by the IASB and endorsed by the EU, the annual financial statements of MTU Aero Engines AG, Munich, are prepared in accordance with the requirements of the German Commercial Code (HGB) and German Stock Cooperation Act (AktG).

[T145] Income statement of MTU Aero Engines AG

			Change 2018 - 2017	
in € million	2018	2017	in € million	in %
Revenues	**3,639.7**	**2,786.1**	**853.6**	**30.6**
Cost of sales	–3,417.7	–2,373.0	–1,044.7	–44.0
Gross profit	**222.0**	**413.1**	**–191.1**	**–46.3**
Selling expenses	–90.5	–71.5	–19.0	–26.6
General administrative expenses	–45.8	–36.8	–9.0	–24.5
Balance of other operating income and expenses	81.3	–19.8	101.1	>100
Financial result	209.9	132.0	77.9	59.0
Earnings from ordinary operating activities	**376.9**	**417.0**	**–40.1**	**–9.6**
Tax expense	–115.4	–131.6	16.2	12.3
Net profit for the year	**261.5**	**285.4**	**–23.9**	**–8.4**
Allocations to other reserves [1]	–114.0	–142.7	28.7	20.1
Net profit available for distribution	**147.5**	**142.7**	**4.8**	**3.4**

[1] For allocation to other revenue reserves in accordance with Section 58 II of the German Stock Corporation Act (AktG) following approval by the Supervisory Board

Allocation to revenue reserves
In accordance with Section 58 (2) of the German Stock Corporation Act (AktG), a total of € 114.0 million of the 2018 net profit was allocated to other reserves by the Executive Board and the Supervisory Board of MTU Aero Engines AG (2017: € 142.7 million).

Proposed profit distribution
Furthermore, the Executive Board recommends that the Supervisory Board propose to the Annual General Meeting on April 11, 2019 that a dividend of € 2.85 (2017: € 2.30) per share be distributed for the financial year 2018. On the condition that this proposal is accepted by the Annual General Meeting, the total dividend payment for the 51,634,227 shares entitled to a dividend will amount to € 147.2 million. Based on the quoted share price at the close of 2018 of € 158.40 (2017: € 149.40), this is equivalent to a dividend yield of 1.8 % (2017: 1.5 %).

Pending approval by the Annual General Meeting, the dividend for the financial year 2018 is to be paid on April 16 , 2019.

Federal Gazette (Bundesanzeiger)
The annual financial statements, consolidated financial statements and combined management report of MTU Aero Engines AG, Munich, are published in the Electronic Federal Gazette (elektronischer Bundesanzeiger). Print copies can be obtained on request from MTU Aero Engines AG, 80995 Munich, Germany.

Declaration of conformity with the German Corporate Governance Code
The declaration of conformity by the Executive Board and Supervisory Board of MTU Aero Engines AG, Munich, pursuant to Section 161 of the German Stock Corporation Act (AktG) is published in the MTU Annual Report 2018 and also permanently available to shareholders on the MTU website at www.mtu.de.

Munich, February 18, 2019

Reiner Winkler
Chief Executive Officer

Peter Kameritsch
Chief Financial Officer and Chief Information Officer

Michael Schreyögg
Chief Program Officer

Lars Wagner
Chief Operating Officer

Translation of the German independent auditor's report concerning the audit of the consolidated financial statements and combined management report prepared in German:

Independent auditor's report

To MTU Aero Engines AG

Report on the audit of the consolidated financial statements and of the combined management report

Opinions

We have audited the consolidated financial statements of MTU Aero Engines AG, Munich, and its subsidiaries (the "Group"), which comprise the consolidated income statement and consolidated statement of comprehensive income for the fiscal year from 1 January 2018 to 31 December 2018, the consolidated balance sheet as of 31 December 2018, the consolidated statement of changes in equity and the consolidated cash flow statement for the fiscal year from 1 January 2018 to 31 December 2018, and the notes to the consolidated financial statements, including the recognition and measurement principles presented therein. In addition, we have audited the group management report, which is combined with the management report of MTU Aero Engines AG, Munich ("combined management report"), for the fiscal year from 1 January 2018 to 31 December 2018. In accordance with the German legal requirements, we have not audited the content of the non-financial statement contained in the "Business environment" section of the combined management report or the "Declaration of conformity" and "Statement by the legal representatives" in the "Other disclosures" section of the combined management report.

In our opinion, on the basis of the knowledge obtained in the audit,

- the accompanying consolidated financial statements comply, in all material respects, with the International Financial Reporting Standards (IFRSs) as adopted by the EU and the supplementary provisions of German law pursuant to Sec. 315e (1) HGB ["Handelsgesetzbuch": German Commercial Code] and give a true and fair view of the assets, liabilities and financial position of the Group as of 31 December 2018 and of its financial performance for the fiscal year from 1 January 2018 to 31 December 2018 in accordance with German legally required accounting principles, and
- the accompanying combined management report as a whole provides an appropriate view of the Group's position. In all material respects, this combined management report is consistent with the consolidated financial statements, complies with German legal requirements and appropriately presents the opportunities and risks of future development. Our opinion on the combined management report does not cover the content of the non-financial statement contained in the "Business environment" section of the combined management report or the "Declaration of conformity" and "Statement by the legal representatives" in the "Other disclosures" section of the combined management report.

Pursuant to Sec. 322 (3) Sentence 1 HGB, we declare that our audit has not led to any reservations relating to the legal compliance of the consolidated financial statements and of the combined management report.

Basis for the opinions

We conducted our audit of the consolidated financial statements and the combined management report in accordance with Sec. 317 HGB and the EU Audit Regulation (No 537/2014, referred to subsequently as "EU Audit Regulation") and in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer [Institute of Public Auditors in Germany] (IDW). Our responsibilities under those requirements and principles are further described in the "Auditor's responsibilities for the audit of the consolidated financial statements and of the combined management report" section of our auditor's report. We are independent of the Group in accordance with the requirements of European law and German commercial and professional law, and we have fulfilled our other German professional responsibilities in accordance with these requirements.

In addition, in accordance with Art. 10 (2) f) of the EU Audit Regulation, we declare that we have not provided non-audit services prohibited under Art. 5 (1) of the EU Audit Regulation. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinions on the consolidated financial statements and on the combined management report.

Key audit matters in the audit of the consolidated financial statements

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the consolidated financial statements for the fiscal year from 1 January 2018 to 31 December 2018. These matters were addressed in the context of our audit of the consolidated financial statements as a whole, and in forming our opinion thereon; we do not provide a separate opinion on these matters.

Below, we describe what we consider to be the key audit matters:

1. Recognizing revenue from risk- and revenue-sharing partnerships

Reasons why the matter was determined to be a key audit matter

The MTU Group primarily generates its revenue in the commercial and military engine business (OEM segment (Original Equipment Manufacturing)) from risk- and revenue-sharing partnerships with other engine manufacturers. Revenue is recognized when the Company fulfills the performance obligation identified in the contract by delivering the goods. Revenue is therefore recognized when the customer has gained control of the asset pursuant to IFRS 15.31. Furthermore, risk- and revenue-sharing partnerships mean that MTU is obliged to provide other partners with licenses to its technology. MTU receives variable remuneration for these licenses. Pursuant to IFRS 15.58, this variable remuneration is recorded based on reports from the risk- and revenue-sharing partnerships, because this is when there is no longer any uncertainty surrounding the amount. If this reporting is delayed, revenue from the provision of this license is allocated based on qualified estimates that take the contractual arrangements into account.

There is a risk of error when allocating revenue as well as of fraud on account of incentives to achieve certain performance targets and forecasts. The significance of revenue for the consolidated financial statements, the discretionary scope involved in estimates and the fact that revenue and EBIT are financial performance indicators for the Group in terms of corporate management and forecasts meant that the recognition of revenue from variable license fees from risk- and revenue-sharing partnerships as of the reporting date was a key audit matter.

Auditor's response

We took a substantive audit approach to assess the appropriateness of revenue recognition from risk- and revenue-sharing partnerships. We evaluated the structure of the underlying corporate processes. Considering the requirements of IFRS 15, we also assessed the accounting effects of the performance obligations identified from the risk- and revenue-sharing partnerships. To assess the amount of revenue estimated for the month of December 2018, we carried out substantive audit procedures by reconciling the estimated values with the reporting of the risk- and revenue-sharing partnerships from January 2019 on a sample basis. We also analyzed the interim transaction data for anomalies. In this context, our procedures included correlation analyses and time series analyses. We reconciled non-standard transactions, journal entries and closing entries to the underlying documents on a sample basis.

Our audit procedures did not lead to any reservations relating to the recognition of revenue from risk- and revenue-sharing partnerships.

Reference to related disclosures

The disclosures in the notes to the consolidated financial statements on the principles of revenue recognition are contained in section I. "Accounting policies and principles" in the subsections on "IFRS 15, Revenue from Contracts with Customers", "Revenue" as well as "Discretionary scope, measurement uncertainties and sensitivity". The significance of revenue in connection with corporate management as well as with regard to the business development and forecast is also presented in the "Group internal control system" and "Financial performance indicators" sections of the combined management report.

2. Measurement of liabilities from warranty obligations as well as risks from pending transactions

Reasons why the matter was determined to be a key audit matter

In the consolidated financial statements of MTU Aero Engines AG, liabilities from warranty obligations and risks from pending transactions are reported as "Refund liabilities" and "Other provisions" under non-current and current liabilities in the balance sheet. They relate to statutory and agreement-specific obligations and comprise estimates made on both a case-by-case and general basis. During the audit, we determined the measurement of liabilities from warranty obligations as well as risks from pending transactions relating to specific individual matters and subject to high levels of estimation uncertainty to be a key audit matter because the measurement of these items, the amounts of which are significant, is based to a large extent on the executive directors' estimates and assumptions, in particular with regard to the technical risks as well as the amount of the anticipated costs.

Auditor's response

To assess the measurement of liabilities from warranty obligations as well as risks from pending transactions, we examined the process of preparing the separate and consolidated financial statements, interviewed representatives of MTU Aero Engines AG and inspected agreements, correspondence and other documentation. In particular, we assessed the underlying measurement methods and key valuation parameters and checked the calculations for arithmetical accuracy. We also obtained and evaluated confirmations from lawyers and interviewed representatives from the legal department to assess the measurement.

Our audit procedures did not lead to any reservations relating to the measurement of liabilities from warranty obligations as well as risks from pending transactions.

Reference to related disclosures
The disclosures in the notes to the consolidated financial statements on refund liabilities as well as other provisions are contained in section I. "Accounting policies and principles" in the subsections on "Other provisions", "Refund liabilities" as well as "Discretionary scope, measurement uncertainties and sensitivity" and in section III. "Notes to the consolidated balance sheet" in the subsections "27. Other provisions" and "31. Refund liabilities".

3. Recoverability of payments to customers based on the program term and capitalized development costs from risk- and revenue-sharing partnerships
Reasons why the matter was determined to be a key audit matter
The MTU Group participates in risk- and revenue-sharing partnerships with other engine manufacturers. The risk- and revenue-sharing partnership is a customer as defined by IFRS 15.6. Payments are made and proportionate costs are assumed in order to enter into these partnerships. These payments to customers based on the program term are recognized as "Acquired program assets, acquired development costs and other assets" under non-current assets in the consolidated financial statements. Furthermore, internally-funded development services are rendered, which are capitalized as development costs. The management board of MTU Aero Engines AG analyzes these assets for impairment at each reporting date. The basis for this is the planning of the individual engine programs over the remaining program term. An asset's or overarching cash-generating unit's discounted cash surpluses are compared to the corresponding carrying amount. The Company determines the discount rate (WACC) using external valuation experts. The assessment of whether the assets are impaired is based to a large extent on estimates by the Company's executive directors. The resulting discretionary scope gives rise to a generally higher risk for accounting misstatements. Against this background, the assessment of whether the payments to customers based on the program term and capitalized development costs from risk- and revenue-sharing partnerships were impaired was a key audit matter.

Auditor's response
We examined the planning process of MTU Aero Engines AG in order to assess the impairment of payments to customers based on the program term and capitalized development costs. We also requested evidence to show to what extent external sources are included in the planning process. Building on this, we used variance analyses to compare the program planning with the prior-year planning and assessed the planning assumptions based on interviews with the responsible program officers. We assessed the WACC department by consulting internal valuation specialists, in particular by comparing the peer group with comparable companies from an external database, reconciled market data and checked for arithmetical accuracy. We checked the completeness of the net assets' carrying amount. We examined the underlying valuation models to test impairment both in terms of clerical accuracy and the methods used. We checked the results of the impairment testing performed by the executive directors using sensitivity analyses for plausibility and compared these with the sensitivity analyses performed by the Company on a sample basis.

Our audit procedures did not lead to any reservations relating to whether the payments to customers based on the program term and capitalized development costs from risk- and revenue-sharing partnerships were impaired.

Reference to related disclosures
The disclosures in the notes to the consolidated financial statements on program assets and capitalized development costs are contained in section I. " Accounting policies and principles" in the subsections on "IFRS 15, Revenue from Contracts with Customers", "Research and development costs", "Intangible assets", "Acquired program assets and acquired development costs", "Impairment of intangible assets, property, plant and equipment, acquired program assets and acquired development costs" as well as "Discretionary scope, measurement uncertainties and sensitivity". There are also disclosures in the notes to the consolidated financial statements in section II. "Notes to the consolidated income statement" in the subsection on "3. Research and development costs" as well as in section III. "Notes to the consolidated balance sheet" in the subsections on "13. Development of intangible assets and property, plant and equipment", "14. Intangible assets" and "17. Acquired program assets, acquired development costs and other assets". Further disclosures on capitalized research and development costs are presented in the "The enterprise MTU / Research and development" as well as "Business environment / Financial situation" sections of the combined management report.

Other information
The Supervisory Board is responsible for the Report of the Supervisory Board in the "Corporate governance" section of the 2018 annual report. In all other respects, the executive directors are responsible for the other information. The other information, of which we received a version prior to issuing this auditor's report, includes:

- Non-financial statement in the "Business environment" section of the combined management report
- "Declaration of conformity" and "Statement by the legal representatives" in accordance with Sec. 297 (2) Sentence 4 HGB as well as Sec. 315 (1) Sentence 5 HGB in the "Other disclosures" section of the combined management report
- The "MTU share", "Selected consolidated financial information and key figures with year-on-year comparison", "Prospects – products, processes and projects for a successful future" as well as "Letter to our shareholders" sections of the 2018 annual report
- "Corporate governance report", "Declaration of conformity", "Report of the Supervisory Board" and "The Supervisory Board" in the "Corporate governance" section of the 2018 annual report
- The "Other information" section of the 2018 annual report

Our opinions on the consolidated financial statements and combined management report do not cover the other information, and we therefore do not provide an opinion or any other form of audit conclusion on these matters.

In connection with our audit, our responsibility is to read the other information and to assess whether the other information

- is inconsistent in any material respect with the consolidated financial statements, the combined management report or our knowledge obtained in the audit, or
- otherwise appears to be misstated in any material respect.

If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Responsibilities of the executive directors and the Supervisory Board for the consolidated financial statements and the combined management report
The executive directors are responsible for the preparation of the consolidated financial statements that comply, in all material respects, with IFRSs as adopted by the EU and the supplementary provisions of German law pursuant to Sec. 315e (1) HGB, and for the preparation of consolidated financial statements that give a true and fair view of the assets, liabilities, financial position and financial performance of the Group in accordance with these requirements. In addition, the executive directors are responsible for such internal control as they have determined necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, the executive directors are responsible for assessing the Group's ability to continue as a going concern. They also have the responsibility for disclosing, as applicable, matters related to going concern. In addition, they are responsible for financial reporting based on the going concern basis of accounting unless there is an intention to liquidate the Group or to cease operations, or there is no realistic alternative but to do so.

Furthermore, the executive directors are responsible for the preparation of the combined management report that, as a whole, provides an appropriate view of the Group's position and is, in all material respects, consistent with the consolidated financial statements, complies with German legal requirements and appropriately presents the opportunities and risks of future development. In addition, the executive directors are responsible for such arrangements and measures (systems) as they have considered necessary to enable the preparation of a combined management report that is in accordance with the applicable German legal requirements, and to be able to provide sufficient appropriate evidence for the assertions in the combined management report.

The Supervisory Board is responsible for overseeing the Group's financial reporting process for the preparation of the consolidated financial statements and of the combined management report.

Auditor's responsibilities for the audit of the consolidated financial statements and of the combined management report

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and whether the combined management report as a whole provides an appropriate view of the Group's position and, in all material respects, is consistent with the consolidated financial statements and the knowledge obtained in the audit, complies with the German legal requirements and appropriately presents the opportunities and risks of future development, as well as to issue an auditor's report that includes our opinions on the consolidated financial statements and on the combined management report.

Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Sec. 317 HGB and the EU Audit Regulation and in compliance with German Generally Accepted Standards for Financial Statement Audits promulgated by the Institut der Wirtschaftsprüfer (IDW) will always detect a material misstatement. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements and this combined management report.

We exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements and of the combined management report, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinions. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit of the consolidated financial statements and of arrangements and measures (systems) relevant to the audit of the combined management report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of these systems.
- Evaluate the appropriateness of accounting policies used by the executive directors and the reasonableness of estimates made by the executive directors and related disclosures.
- Conclude on the appropriateness of the executive directors' use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in the auditor's report to the related disclosures in the consolidated financial statements and in the combined management report or, if such disclosures are inadequate, to modify our respective opinions. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Group to cease to be able to continue as a going concern.
- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements present the underlying transactions and events in a manner that the consolidated financial statements that comply with IFRSs as adopted in the EU and the additional requirements of German commercial law pursuant to Sec. 315e (1) HGB give a true and fair view of the assets, liabilities, financial position and financial performance of the Group.
- Obtain sufficient appropriate audit evidence regarding the financial information of the businesses or business activities within the Group to express opinions on the consolidated financial statements and on the combined management report. We are responsible for the direction, supervision and performance of the group audit. We remain solely responsible for our opinions.
- Evaluate the consistency of the combined management report with the consolidated financial statements, its conformity with [German] law and the view of the Group's position it provides.
- Perform audit procedures for the forward-looking disclosures made by the executive directors in the combined management report. On the basis of sufficient appropriate audit evidence we evaluate, in particular, the significant assumptions used by the executive directors as a basis for the prospective information, and evaluate the proper derivation of the prospective information from these assumptions. We do not

express a separate opinion on the prospective information and on the assumptions used as a basis. There is a substantial unavoidable risk that future events will differ materially from the prospective information.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We provide those charged with governance with a statement that we have complied with relevant ethical requirements regarding independence, and communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and related safeguards.

From the matters communicated with those charged with governance, we determine those matters that were of most significance in the audit of the consolidated financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditor's report unless law or regulation precludes public disclosure about the matter.

Other legal and regulatory requirements

Further information pursuant to Art. 10 of the EU Audit Regulation

We were elected as auditor of the consolidated financial statements by the annual general meeting on 11 April 2018. We were engaged by the Supervisory Board on 14 November 2018. We have been the auditor of MTU Aero Engines AG for an uninterrupted period since the audit of the consolidated financial statements for fiscal year 2014.

We declare that the opinions expressed in this auditor's report are consistent with the additional report to the audit committee pursuant to Art. 11 of the EU Audit Regulation (long-form audit report).

German Public Auditor responsible for the engagement

The German Public Auditor responsible for the engagement is Siegfried Keller.

Munich, February 26, 2019,

Ernst & Young GmbH
Wirtschaftsprüfungsgesellschaft

Keller	Westermeier
Wirtschaftsprüfer [German Public Auditor]	Wirtschaftsprüfer [German Public Auditor]

Independent Auditor's Limited Assurance Report

The assurance engagement performed by Ernst & Young (EY) relates exclusively to the German version of the non-financial statement 2018 of MTU Aero Engines AG. The following text is a translation of the original German Independent Assurance Report.

To MTU Aero Engines AG, Munich

We have performed a limited assurance engagement on the non-financial statement of MTU Aero Engines AG according to § 289b HGB ("Handelsgesetzbuch": German Commercial Code), which is combined with the non-financial statement of the group according to § 315b HGB, consisting of the chapter "Non-financial statement" in the group management report as well as the section "The enterprise MTU" in the group management report being incorporated by reference, for the reporting period from 1 January 2018 to 31 December 2018 (hereafter non-financial statement).

Management's responsibility

The legal representatives of the Company are responsible for the preparation of the non-financial statement in accordance with §§ 315c in conjunction with 289c to 289e HGB.

This responsibility includes the selection and application of appropriate methods to prepare the non-financial statement as well as making assumptions and estimates related to individual disclosures, which are reasonable in the circumstances. Furthermore, the legal representatives are responsible for such internal controls that they have considered necessary to enable the preparation of a non-financial statement that is free from material misstatement, whether due to fraud or error.

Auditor's declaration relating to independence and quality control

We are independent from the Company in accordance with the provisions under German commercial law and professional requirements, and we have fulfilled our other professional responsibilities in accordance with these requirements.

Our audit firm applies the national statutory regulations and professional pronouncements for quality control, in particular the by-laws regulating the rights and duties of Wirtschaftsprüfer and vereidigte Buchprüfer in the exercise of their profession [Berufssatzung für Wirtschaftsprüfer und vereidigte Buchprüfer] as well as the IDW Standard on Quality Control 1: Requirements for Quality Control in audit firms [IDW Qualitätssicherungsstandard 1: Anforderungen an die Qualitätssicherung in der Wirtschaftsprüferpraxis (IDW QS 1)].

Auditor's responsibility

Our responsibility is to express a limited assurance conclusion on the non-financial statement based on the assurance engagement we have performed.

We conducted our assurance engagement in accordance with the International Standard on Assurance Engagements (ISAE) 3000 (Revised): Assurance Engagements other than Audits or Reviews of Historical Financial Information, issued by the International Auditing and Assurance Standards Board (IAASB). This Standard requires that we plan and perform the assurance engagement to obtain limited assurance about whether the non-financial statement of the Company has been prepared, in all material respects, in accordance with §§ 315c in conjunction with 289c to 289e HGB. In a limited assurance engagement the assurance procedures are less in extent than for a reasonable assurance engagement and therefore a substantially lower level of assurance is obtained. The assurance procedures selected depend on the auditor's professional judgment.

Within the scope of our assurance engagement, which has been conducted between October 2018 and February 2019, we performed amongst others the following assurance and other procedures:

- Inquiries of employees regarding the selection of topics for the non-financial statement, the risk assessment and the concepts of MTU for the topics that have been identified as material,
- Inquiries of employees responsible for data capture and consolidation as well as the preparation of the non-financial statement, to evaluate the reporting processes, the data capture and compilation methods as well as internal controls to the extent relevant for the assurance of the non-financial statement,
- Identification of likely risks of material misstatement in the non-financial statement,
- Inspection of relevant documentation of the systems and processes for compiling, analyzing and aggregating data in the relevant areas, e.g. compliance and employees in the reporting period and testing such documentation on a sample basis,
- Analytical evaluation of disclosures in the non-financial statement,
- Inquiries and inspection of documents on a sample basis relating to the collection and reporting of selected data during site visits in Munich and Ludwigsfelde,
- Evaluation of the presentation of disclosures in the non-financial statement.

Assurance conclusion
Based on our assurance procedures performed and assurance evidence obtained, nothing has come to our attention that causes us to believe that the non-financial statement of MTU Aero Engines AG for the period from 1 January 2018 to 31 December 2018 has not been prepared, in all material respects, in accordance with §§ 315c in conjunction with 289c to 289e HGB.

Intended use of the assurance report
We issue this report on the basis of the engagement agreed with MTU Aero Engines AG. The assurance engagement has been performed for the purposes of the Company and the report is solely intended to inform the Company as to the results of the assurance engagement and must not be used for purposes other than those intended. The report is not intended to provide third parties with support in making (financial) decisions.

Engagement terms and liability
The "General Engagement Terms for Wirtschaftsprüfer and Wirtschaftsprüfungsgesellschaften [German Public Auditors and Public Audit Firms]" dated 1 January 2017 are applicable to this engagement and also govern our relations with third parties in the context of this engagement (www.de.ey.com/general-engagement-terms). In addition, please refer to the liability provisions contained there in no. 9 and to the exclusion of liability towards third parties. We assume no responsibility, liability or other obligations towards third parties unless we have concluded a written agreement to the contrary with the respective third party or liability cannot effectively be precluded.

We make express reference to the fact that we do not update the assurance report to reflect events or circumstances arising after it was issued unless required to do so by law. It is the sole responsibility of anyone taking note of the result of our assurance engagement summarized in this assurance report to decide whether and in what way this result is useful or suitable for their purposes and to supplement, verify or update it by means of their own review procedures.

Munich, 26 February 2019

Ernst & Young GmbH
Wirtschaftsprüfungsgesellschaft

Nicole Richter
Wirtschaftsprüferin
(German Public Auditor)

ppa. Dr. Patrick Albrecht

Additional information

Glossary of engine terms

Blisk
Blisks, or blade integrated disks, are high-tech components where disk and blades are manufactured as a single part. This configuration delivers greater strength and better aerodynamic properties at less weight.

Combustor
A combustor or combustion chamber consists of an outer casing and an inner liner within which the actual combustion takes place. Inside, the inflowing air from the compressor is mixed with fuel and ignited. The combustion process generates temperatures of over 2,000 degrees Celsius. In order to withstand these high temperatures, especially the inner liner of the combustor must be cooled and must be protected by special thermal barrier coatings.

Compressor
The task of the compressor is to ingest air and compress it before it is fed into the combustor. Compressors consist of bladed disks (rotors) that rotate at very high speed between stationary guide vanes (stators). In order to achieve a compression ratio of over 40:1, which is standard in all modern two-shaft engines, it is necessary to use multi-stage low-pressure and high-pressure compressors rotating at different speeds on dual concentric shafts. These are driven by the corresponding turbines.

Fan
The first rotor of the low-pressure compressor is called the fan. It accelerates the bypass stream flowing aftward and provides the engine's main thrust. It is driven by the low-pressure turbine via the low-pressure shaft.

Geared Turbofan™
What sets the Geared Turbofan™ propulsion system apart is that it features a reduction gearbox between the fan and low-pressure shaft on which the low-pressure compressor and low-pressure turbine that drives the fan are seated. The gearbox allows the fan with its large diameter to rotate more slowly, and at the same time the low-pressure compressor and turbine to rotate much faster. This enables lower fan pressure ratios and therefore higher bypass ratios to be achieved, and the individual components to operate at their respective optimum speeds. As a result, the efficiency of the Geared Turbofan™ is greatly boosted, and fuel consumption as well as carbon dioxide and noise emissions are significantly reduced. The propulsion system is moreover lighter than a conventional engine owing to the reduced compressor and turbine stage count.

Industrial gas turbines
The operating principle of an industrial gas turbine is essentially the same as that of an aero engine. However, instead of the customary low-pressure turbine used in aircraft, industrial gas turbines have a power turbine. This turbine delivers the power, either directly or via a gear unit, to an additional attached power unit such as a pump or generator. Nearly all industrial gas turbines of the lower and intermediate power classes are aero-engine derivatives.

MRO business
MRO stands for maintenance, repair and overhaul. At MTU, the term "MRO business" is also used more specifically to designate one of the company's two operating segments, where it refers to maintenance services for commercial engines, or commercial MRO.

OEM business
OEM stands for original equipment manufacturer. At MTU, the term "OEM business" is used to designate one of the company's two operating segments, where it refers to the development, manufacture and assembly of (new) commercial and military engines. Spare parts for (in-service) commercial and military engines and maintenance services for military engines are also included in this operating segment.

Risk- and revenue-sharing partnership
In a risk- and revenue-sharing partnership, each partner contributes a certain share of the resources needed for a specific engine program (work capacity and funding), thus bearing part of the risk. In return, each partner is entitled to a corresponding percentage of the overall sales revenue from that program.

Subsystem
A complete aircraft engine is made up of a number of subsystems. These include the high-pressure and low-pressure compressors, the combustor, the high-pressure and low-pressure turbines and the engine control system.

Thrust class
Jet engines are generally grouped into three thrust classes: engines with a thrust of between 2,500 and around 20,000 pounds (roughly 10 to 90 kN), mainly used to power business and regional jets, engines with a thrust of between 20,000 and approximately 50,000 pounds (roughly 90 to 225 kN), used to power medium-haul aircraft, and engines with a thrust ranging from 50,000 to over 100,000 pounds (roughly 225 to 450 kN), used to power long-haul aircraft.

Turbine
In a turbine, the energy contained in the gases emerging at high pressure and velocity from the combustor is converted into mechanical energy. Like the compressor, the turbine is subdivided into a high-pressure and a low-pressure section, each of which is directly connected to the corresponding compressor via the respective shaft. The turbine has to withstand much higher stresses than the compressor, as it has to deal not only with the high gas temperatures but also with extreme centrifugal forces of several tons acting on the outer rim of its disks.

Turbine center frame
The turbine center frame connects the high-pressure to the low-pressure turbine. It has to be able to withstand high mechanical and thermal loads. The center frame includes struts to support the shaft bearings, clad with an aerodynamic fairing, and the air and oil supply lines.

Turbofan engine
The turbofan is an advancement of the turbojet principle, the main difference being its enlarged first compressor stage, the fan. While in turbojet engines all of the ingested air flows consecutively through the compressor, the combustor and the turbine, turbofans separate the air stream behind the fan. A fraction of the air reaches the combustor via a number of further compressor stages and is burned. The rest, however – which constitutes a much larger fraction – is channeled around the inner components. The ratio between these two airflows is known as the bypass ratio. The greater the bypass ratio, the more economical, environmentally compatible and silent the engine.

Turboprop engine
The most noticeable external feature of a turboprop is its propeller. Inside, however, the engine differs only slightly from the turbojet and the turbofan. The turbine is larger, and drives not only the compressor but also the propeller, the latter via a gear unit. Consequently, more energy has to be drawn from the exhaust gas stream in the turbine of a turboprop than in that of other engine types. Over 90 % of the energy is required for the compressor and the propeller. Turboprop airplanes can achieve flight speeds of up to 800 km/h. They are thus slower than turbojets or turbofans, but they do have the advantage of consuming far less fuel. This predestines them for use in roles where speed is less important, such as on short-haul routes or for air freight.

Turboshaft engine
Turboshaft engines are used in helicopters and are similar to turboprops.

Overview of engines

Commercial engines

Long-haul airliners

CF6	Airbus A300, A310, A330, Boeing 747, 767, DC-10, MD-11, KC-10
GE90-110B/-115B*	Boeing 777-200LR, 777-200F, 777-300ER
GE9X	Boeing 777X
GEnx	Boeing 787, 747-8
GP7000	Airbus A380
PW4000Growth	Boeing 777

Short- and medium-haul aircraft

CF34*	Business and regional jets
CFM56*	Boeing 737, Airbus A318–A321
JT8D-200	Boeing MD-80
PW1000G	Airbus A320neo, A220, Mitsubishi Regional Jet, Embraer E-Jets Gen 2, Irkut MC-21
PW2000	Boeing 757, C-17
PW6000	Airbus A318
V2500	Airbus A319, A320, A321, Boeing MD-90, Embraer KC-390

Business jets

PT6A**	Business and regional jets
PW100/150A**	ATR42, 72, Fokker 50, Bombardier Q400
JT15D**	Cessna Citation I/II/V/Ultra, Beechjet 400
PW300	Medium-weight business and regional jets
PW500	Light and medium-weight business jets
PW600**	Cessna Mustang, Eclipse 500, Embraer Phenom 100
PW800	Gulfstream G500, G600, Dassault Falcon 6X

Helicopters

PT6B/-C/-T**	AgustaWestland 119, 139, Airbus Helicopters H175
PW200/PW210**	Light- to medium-weight helicopters

* *MRO only*
** *MRO only: via Pratt & Whitney Canada Customer Service Centre Europe GmbH*

Military engines

Fighter jets

EJ200	Eurofighter
F110	Lockheed Martin F-16, Boeing F-15
F414	Boeing F/A-18E/F Super Hornet, Boeing EA-18G Growler, Saab Gripen next generation
Larzac 04	Dornier-Dassault Alpha Jet
RB199	Panavia Tornado

Helicopters

T408	Sikorsky CH-53K
MTR390/MTR390 Enhanced	Airbus Helicopters Tiger
T64	Sikorsky CH-53G, GS, GA, GE

Transporters

TP400-D6	Airbus A400M
Tyne	Transall C-160, Breguet Atlantic

Industrial gas turbines

ASE8/40/50, TF40/50, ETF40	Electrical power systems, power systems for ships, mechanical power systems, generator sets
LM2500/LM2500+	Electrical power stations, mechanical power systems, oil and gas industry, power systems for ships
LM5000	Electrical power stations, mechanical power systems, oil and gas industry
LM6000/LM6000-PF+	Electrical power stations

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List of charts and illustrations

Financial calendar

April 11, 2019	Annual General Meeting
April 30, 2019	Quarterly Statement as at March 31, 2019
	Conference call with analysts and investors
July 25, 2019	Interim Report as at June 30, 2019
	Conference call with analysts and investors
October 31, 2019	Quarterly Statement as at September 30, 2019
	Conference call with analysts and investors
November 28, 2019	MTU Investor and Analyst Day

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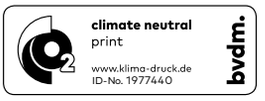

This Annual Report published by MTU Aero Engines AG is available in print form in German and English. We would be happy to send you copies on request. The report is also available on the internet in German and English.

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