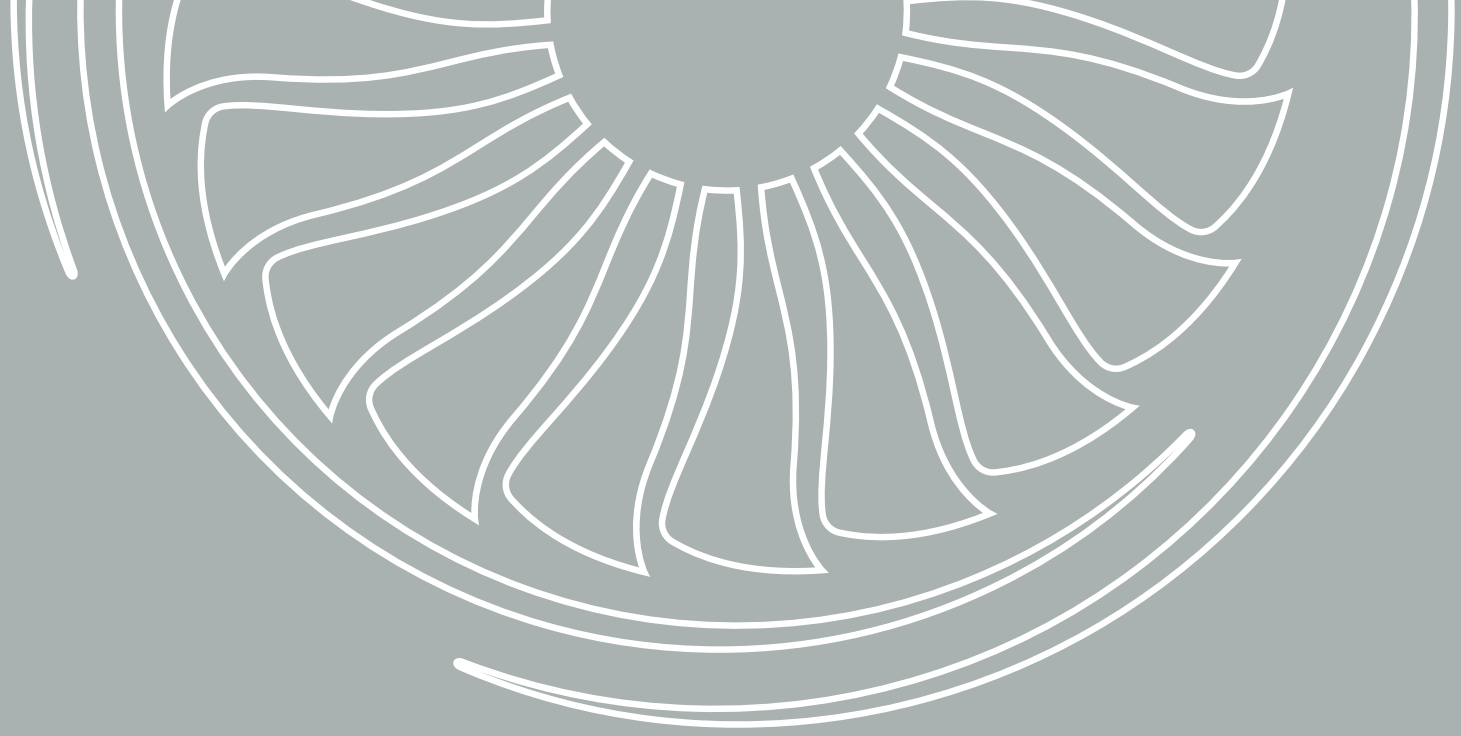
MTU Aero Engines

Passion for engines

Engine programs



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Driven by visions of tomorrow

Safer, more efficient, and more sustainable: MTU Aero Engines is actively shaping the future of aviation.

MTU Aero Engines
at a glance
www.mtu.de/about-us

More than 13,000 employees on five continents play a crucial role in ensuring safe flight operations, thus making global mobility possible.

MTU develops technologies that significantly reduce the climate impact of aircraft engines. Among other things, this means cutting CO_2 and NOx emissions as well as contrails; lowering energy consumption remains important.

The company focuses on refining the highly efficient geared turbofan as well as on developing completely new technologies, such as the Revolutionary Turbofan and the Flying Fuel Cell™ (FFC). Sustainable aviation fuels and hydrogen also play an important role.

In addition, MTU makes a key contribution to national security and sovereignty in Europe with high-performance next-generation military propulsion systems.

Driven by cutting-edge technology

MTU looks to innovative technologies and propulsion concepts as it creates solutions for the challenges of tomorrow.

Driven by
innovation
www.mtu.de/innovation

In the aviation industry, three letters stand for world-class technology: MTU. By providing top-notch technologies, high-tech products, and comprehensive services, the company brings safety, efficiency, and sustainability to the skies.

MTU is a technology leader in high-pressure compressors, low-pressure turbines, turbine center frames, as well as manufacturing and repair techniques. Its technological and innovative strength make MTU an indispensable global partner. Close networking with partners from industry and research, as well as long-term funding from the public sector, play a key role, as they are essential to successful technology development.

To benefit from sustained growth in the aviation industry over the years ahead, MTU is investing in its expertise, industrial capacity, and future commercial and military propulsion concepts, both in Germany and around the world.

Driven by perfection

High-tech expertise and innovation driver: MTU technology reliably provides thrust in one-third of commercial aircraft worldwide.

MTU Aero Engines is recognized around the world as an expert in commercial and military aircraft engines—a global player with strong roots in Germany. Its high-tech expertise ranges from developing and manufacturing high-quality engine components and handling final assembly of complete engines to maintaining aircraft engines and stationary gas turbines.

In the commercial OEM business, MTU collaborates with international partners to develop innovative technologies and propulsion systems. As a leading global maintenance provider, the company maintains around 1,500 engines and industrial gas turbines a year and has the broadest engine portfolio on the market.

Together with other European manufacturers, MTU has been ensuring the operational readiness of air forces for decades. It works hand in hand with the German Bundeswehr on engine maintenance for the majority of fighter jets and helicopters.

Eengine portfolio
at a glance
www.mtu.de/engines

Driven by passion

With the passion and innovative strength of its employees, MTU is shaping aviation today and in the future.

MTU's strength resides in its employees. Their expertise and passion enable the company to offer its customers and partners innovative solutions and top service—today, tomorrow, and in the decades to come.

Fair and safe working conditions, equal opportunities, and training and further education are a matter of course for MTU. Respect, tolerance, and cohesion characterize its corporate culture and underpin the actions it takes every day. MTU promotes internationality and openness so that it can develop innovative solutions and strengthen democratic values.

MTU places great emphasis on providing products and services that are safe, reliable, and of the highest quality. Every day, it works to produce them in an even more environmentally-friendly and resource-conserving way. As a signatory to the UN Global Compact, MTU acknowledges its responsibility to protect the environment, tackle the climate crisis, and combat corruption.

Your future at MTU
starts right here
www.mtu.de/careers

Consolidated expertise in engines

Full power ahead for innovation: MTU's advanced technologies and first-class products are on board in all thrust and power categories.

State-of-the-art technology for commercial engines

One-third of the world's commercial aircraft takes to the skies with MTU technology on board. MTU's cutting-edge technology can be found in all common aircraft types–in engines for business jets, engines with geared turbofan technology for narrowbody aircraft, and in the world's most powerful propulsion systems. MTU secures its position as a technology leader through its committed, dedicated research and development work.

Innovative and capable: power for the military

Innovative, capable and reliable–with its first-class technologies, products and services, MTU ensures that its military partners can count on the full availability of their fleets at all times. The company brings its skills and expertise to the fore as the leading industrial company for practically all aircraft engines operated by the German Armed Forces. MTU is involved in the New Generation Fighter Engine (NGFE), which will power Europe's New Generation Fighter.

Tailored service for maintenance

In the commercial maintenance sector, MTU Maintenance is the world's leading provider of customized services for aircraft engine.

No two engines are alike, which is why MTU Maintenance offers tailored MRO services covering the entire engine lifecycle.

Commercial engines

	Widebody jet	Narrowbody / regional jet	Business jet
Development / Manufacture	CF6	JT8D-200	PW300
	GE9X	GTF engine	PW500
	GEnx	PW2000	PW800
	GP7000	V2500	
	PW4000		

	Widebody jet	Narrowbody / regional jet	Business jet
Maintenance	CF6-80C2[1]	CF34-8/-10E	PW300
	GE90-110B/-115B	CFM56-5B/-7B	PW500
	GE9X - TCF MRO (planned)	GTF engine	PW800
	GEnx - TCF MRO	LEAP-1A/-1B	
	GP7000 - LPT MRO	V2500-A5[1]	**Helicopter**
			PW200

Military engines

	Fighter aircraft	Helicopter	Transport aircraft
Development / Manufacture	EJ200	MTR390	TP400-D6
	F110	T408	
	F414	T64	
	Larzac 04		
	RB199		

	Fighter aircraft	Helicopter	Transport aircraft
Maintenance[2]		T64	TP400-D6

	Fighter aircraft	Helicopter
MRO under the cooperation with the German Armed Forces	EJ200	MTR390
	RB199	

[1] incl. military applications: F138 or V2500-E5 [2] Maintenance is carried out at MTU Aero Engines [3] Cooperation with the German Armed Forces = Maintenance, repair and overhaul under the cooperation with the German Armed Forces. LPT = low-pressure turbine, LPC = low-pressure compressor, HPC = high-pressure compressor, HPT = high-pressure turbine, TCF = turbine center frame, IPC = intermediate-pressure compressor, IPT = intermediate-pressure turbine

Commercial engines

CF6

Widebody jet

This success story is one of the best-selling engines in its class and is used in medium- and long-haul widebody aircraft. MTU manufactures parts of the CF6 turbine and compressor–and has now produced over a million of these components.

CFM56 -5B/-7B

Narrowbody / regional jet

The CFM56 engine family comprises five different models, two of which are looked after by MTU Maintenance. CFM International, a 50/50 cooperation between GE and Safran Aircraft Engines, has delivered more than 30,000 engines to date.

CF34 -8/-10E

Narrowbody / regional jet

The CF34-family is the world's most common and best-selling engine familiy in its class. It has logged more than 200 million flight hours since its entry intoservice. MTU Maintenance Berlin-Brandenburg looks after the CF34-8 and CF34-10E models.

Application	e.g. Airbus A300, Boeing 747, C-5M Super Galaxy	e.g. Boeing 737, Airbus A320 family	e.g. Embraer 170/190, Bombardier CRJ700/900/1000
Thrust category	41,500–69,800 lbf	18,500–34,000 lbf	13,800–20,400 lbf
EIS	1971	1982	2001
Development	–	–	–
Manufacture	Components of LPC/HPC and HPT	–	–
Maintenance	Engine MRO	Engine MRO	Engine MRO

GEnx

Widebody jet

The GEnx-1B version was designed for medium-capacity widebody aircraft, while the GEnx-2B version was developed for the Boeing 747-8. MTU is responsible for the development, manufacture and repair of the turbine center frame.

GE9X

Widebody jet

The GE9X will be the engine for the new Boeing 777X long-haul aircraft. MTU is responsible for the development, manufacture, assembly and repair of the turbine center frame.

GE90 -110B/-115B

Widebody jet

The GE90 Growth is one of the largest and most powerful engines in the world. MTU Maintenance Hannover is one of the first maintenance providers worldwide licensed to repair and undertake overhaul of the GE90 Growth. And provides comprehensive MRO and ON-SITE[Plus].

Application	Boeing 787 Dreamliner, Boeing 747-8	Boeing 777X	Boeing 777-200LR/-300ER/Freighter
Thrust category	66,500–76,100 lbf	100,000 lbf	100,000 lbf
EIS	2012	planned	2004
Development	TCF	TCF	–
Manufacture	TCF	TCF	–
Maintenance	TCF MRO	TCF MRO (planned)	Engine MRO

GP7000

Widebody jet

The GP7000 is used in the long-haul sector and powers what is currently the world's largest passenger aircraft, the Airbus A380. It is lead developed, produced and distributed by the Engine Alliance. MTU is involved in the development and manufacture of various components.

GTF engine

Narrowbody / regional jet

The Pratt & Whitney GTF™ engine family is among the most eco-efficient engines on the market today. It has so far saved more than 20 million tons of CO_2. MTU's contributions include the high-speed low-pressure turbine and the forward four stages of the high-pressure compressor.

JT8D-200

Narrowbody / regional jet

The JT8D family is one of the world's best-selling jet engine families and has already logged more than 673 million flight hours since entering service. MTU is involved in the -200 series and is responsible for manufacturing individual parts of various assemblies.

Application	Airbus A380	Airbus A320neo, Airbus A220, Embraer E-Jets E2	Boeing MD-80
Thrust category	70,000–81,500 lbf	14,000–33,000 lbf	18,500–21,700 lbf
EIS	2008	2016	1980
Development	LPT, TCF	Various stages HPC, LPT, brush seals	Modifications on LPT
Manufacture	LPT, TCF, HPT components	Various stages HPC, LPT, brush seals	Range of LPT parts, HPC parts, HPT parts, housings
Maintenance	LPT MRO	Engine MRO	–

LEAP-1A/-1B

Narrowbody / regional jet

CFM International's LEAP engine family is used in the Airbus A320neo (LEAP-1A) and the Boeing 737 MAX (LEAP-1B)), among others. Maintenance of both models is performed by MTU Maintenance Zhuhai and MTU Maintenance Fort Worth.

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PW200

Helicopter

Pratt & Whitney Canada's PW200 is an engine for light and medium helicopters. Its features include a simple and robust design and digital control.

PW300

Business jet

The PW300 family offers a wide range of applications for business and regional jets. MTU has been collaborating with Pratt & Whitney Canada on this engine family since 1985. MTU's involvement covers the PW305, PW306 and PW307 models.

Application	Airbus A320neo, Boeing 737 MAX	Airbus Helicopters H135/EC135P1, Bell 427	e.g. Dassault Falcon 7X/8X
Maximum power	–	700 shp	–
Thrust category	28,000–35,000 lbf	–	4,700–7,000 lbf
EIS	2016	1998	1992
Development / Manufacture	–	–	LPT, housing
Maintenance	Engine MRO	Engine MRO	Engine MRO

PW500

Business jet

The PW500 engines are two-shaft turbofans. MTU is contributing the development and production of the entire low-pressure turbine, including the exit case and mixer, for the PW530 and PW545 models.

PW800

Business jet

The PW800 engine features the same proven core technology as the efficient Pratt & Whitney GTF™ engine family. MTU's workshare in this engine encompasses the high-pressure compressor and the low-pressure turbine– its flagship products.

PW2000

Narrowbody / regional jet

The PW2000 engines are used in commercial and military applications for medium- and long-haul operations. MTU's low-pressure turbine for the PW2000 was the first the company had developed independently for a commercial application.

Application	e.g. Cessna Citation Bravo/ Excel/ XLS	Gulfstream G400/G500/G600, Dassault Falcon 6X	e.g. Boeing 757, Boeing C-17 military transport
Thrust category	3,000–4,500 lbf	10,000–20,000 lbf	37,500–43,000 lbf
EIS	1997	2018	1984
Development	LPT, exit case, mixer	LPT, various stages HPC	LPT, turbine exit case
Manufacture	LPT, exit case, mixer	LPT, various stages HPC	e.g. range of LPT parts, turbine exit case, HPC parts
Maintenance	Engine MRO	Engine MRO	

PW4000

Widebody jet

The PW4000 is one of the largest and most powerful engines in the world. MTU is responsible for its seven-stage low-pressure turbine–the largest ever developed by MTU.

V2500

Narrowbody / regional jet

MTU develops and manufactures the IAE V2500 in cooperation with Pratt & Whitney and Japanese Aero Engines Corporation. The engine has already logged more than 300 million flight hours and is maintained at various MTU locations.

Application	Boeing 777-200/-200ER/-300	Airbus A319/320/321, Boeing MD-90, C-390 Millennium
Thrust category	74,000–98,000 lbf	22,000–33,000 lbf
EIS	1995	1989
Development	LPT, turbine exit case	LPT, housing, accessories, externals
Manufacture	Range of LPT parts	Range of LPT parts, housing
Maintenance	–	Engine MRO

Military engines

EJ200

Fighter aircraft

The EJ200, which powers the Eurofighter, is built by EUROJET Turbo GmbH, a consortium with MTU, Rolls-Royce, Avio Aero and ITP Aero as stakeholders. It was for the EJ200 that MTU first engineered compressor stages in blisk design; these are now also used in MTU components for commercial engines.

F110

Fighter aircraft

The F110-GE-129 powers the Boeing F-15 and Lockheed Martin F-16 fighter aircraft and has established itself as one of the most successful engines for combat aircraft in the history of the U.S. Air Force. MTU manufactures turbine disks for the low-pressure compressor for the F110-GE-129.

F414

Fighter aircraft

The F414 powers Boeing's F/A-18 Super Hornet twin-engine fighter and the E/A-18G Growler electronic warfare version, among others. MTU produces various parts of the F414's high- and low-pressure turbine.

Application	Eurofighter Typhoon	Lockheed Martin F-16, Boeing F-15	e.g. Boeing F/A-18 Super Hornet, Boeing EA-18G Growler
Thrust category	20,000 lbf	29,000 lbf	22,000 lbf
EIS	2003	1986	1995
Development	LPC, HPC, digital engine control and monitoring unit	LPC disks stage 2+3	–
Manufacture	LPC, HPC, digital engine control and monitoring unit	LPC disks stage 2+3	HPT+LPT parts
Maintenance	Cooperation with the German Armed Forces[3]	–	–

Larzac 04

Fighter aircraft

The Larzac 04 powers the Alpha Jet trainer and light ground-attack aircraft. MTU took over the production of about 25 percent of the parts and the development engineering support. MTU's manufacturing share primarily covers the hot section of the engine–from the combustor inlet to the turbine exit.

MTR390

Helicopter

This turboshaft engine powers the Tiger support helicopter co-developed by France and Germany. In 2011, an uprated version of the engine (the MTR390-E) was developed that delivers 14 percent more power. MTU develops and manufactures the high-pressure turbine and combustor, among other things.

RB199

Fighter aircraft

The RB199 was developed and produced to power the Panavia Tornado multirole fighter jet. This successful engine marked the first time that MTU had contributed independently developed and built components, such as the intermediate-pressure and high-pressure compressor and the intermediate-pressure turbine.

Application	Dornier-Dassault Alpha Jet	Airbus Helicopters Tiger	Panavia Tornado
Maximum power	–	1,467 shp (MTR390-E)	–
Thrust Category	3,000 lbf	–	16,000–17,000 lbf
EIS	1979	2013 (MTR390-E)	1979
Development	–	Combustor, HPT, TCF, engine control and monitoring unit (-E)	e.g. IPC, IPT, HPC, digital engine control and monitoring unit
Manufacture	Combustor, HPT, housing	Combustor, HPT, TCF, engine control and monitoring unit (-E)	e.g. IPC, IPT, HPC, digital engine control and monitoring unit
Maintenance	–	Cooperation with the German Armed Forces[3]	Cooperation with the German Armed Forces[3]

TP400-D6

Transport aircraft

The TP400-D6 is the most powerful turboprop in the West. It offers impressive robustness, efficiency and low lifecycle costs in tactical and strategic operations. MTU developed the TP400-D6 with ITP Aero, Rolls-Royce and Safran Aircraft Engines as part of the Europrop International (EPI) joint venture.

T408

Helicopter

The T408 is a turboshaft engine that has so far been installed in the U.S. Marine Corps' Sikorsky CH-53K heavy-lift helicopter. MTU contributes the power turbine.

T64

Helicopter

The T64 powers medium-weight transport helicopters. A total of 247 T64 engines were delivered. MTU manufactured its high-pressure turbine and high-pressure compressor, among other components. Today, MTU's T64 activities focus on maintenance.

Application	Airbus A400M	Sikorsky CH-53K	Sikorsky CH-53G, GS, GA
Maximum power	–	7,510 shp	4,330 shp
Power (at sea level)	11,000 shp	–	–
EIS	2013	2019	1972
Development / Manufacture	Intermediate-pressure compressor, turbine and shaft	Power turbine	HPC, combustor, HPT, gearbox
Maintenance	Engine MRO[2]	–	Engine MRO[2]