MTU Aero Engines – Lifetime Excellence

February 2019

Agenda

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2 Our **track record**

3 Our **expertise**

4 **Your** questions

1

Our environment

We shape the future of aviation!

A passenger aircraft is made up of up to

6 million components

Active fleet to double

to **46,000 aircraft** by 2036

Fuel consumption per 100 passenger kilometers:

2.9 liters of kerosene

~ 2 billion people

out of 7 billion have flown in an aircraft to date

The geared turbofan reduces

75% of the noise footprint

We shape the future of aviation!

What we do

Design, development, production and **support of aircraft engines** in all thrust categories

Commercial business: 30% of aircraft have MTU technology on board

Military business: full system capability, for more than 80 years

Commercial MRO: worldwide leader in customized engine service solutions

MRO portfolio: 1,000 shop visits per year for more than 30 different engine types

Fiscal year 2018: Revenue € 4,57 billion, EBIT adj. € 0.67 billion

How we do it

People: More than 10,000 engine experts at 15 locations

Partnerships: with all OEMs, airlines and the German Air Force (program shares from 5% up to 40%)

Technology: 150 technology projects, 400 patents and 200 invention disclosure reports per year

Products: High-pressure compressor, low-pressure turbine, turbine center frame

Process: Lifetime Excellence (lifecycles from 25 to 50 years)

Culture: innovative and competent

~ ninefold* increase in share value since 2005

€ 4 billion invested in approx. 10 years

* Basis: Fiscal 31. January 2019

The Geared Turbofan Is Setting New Standards

Noise Footprint

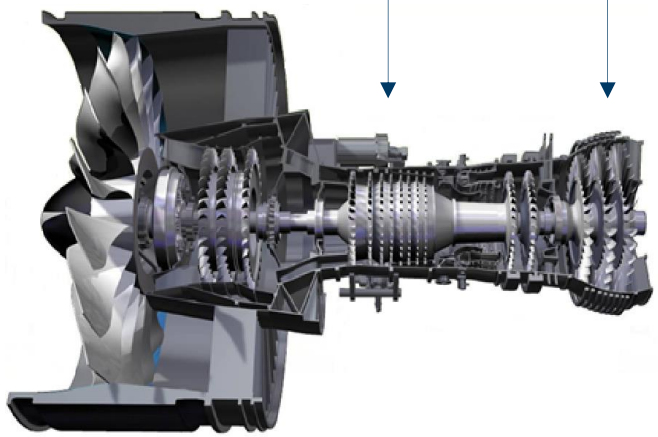
Munich International Airport (MUC)

Noise Simulation: Pratt & Whitney SEL Contour Source: Wyle Laboratories

MTU Contribution

High-speed low-pressure turbine

High-pressure compressor



Geared Turbofan reduces:
- Noise footprint by 75%
- Fuel consumption and CO_2-emissions by 16%
- NO_x-emissions by 50%

Chosen for five Airframes

MTU pursues a sustainable growth strategy in all of its business segments - based on stable and long-term customer relationships

Balanced portfolio

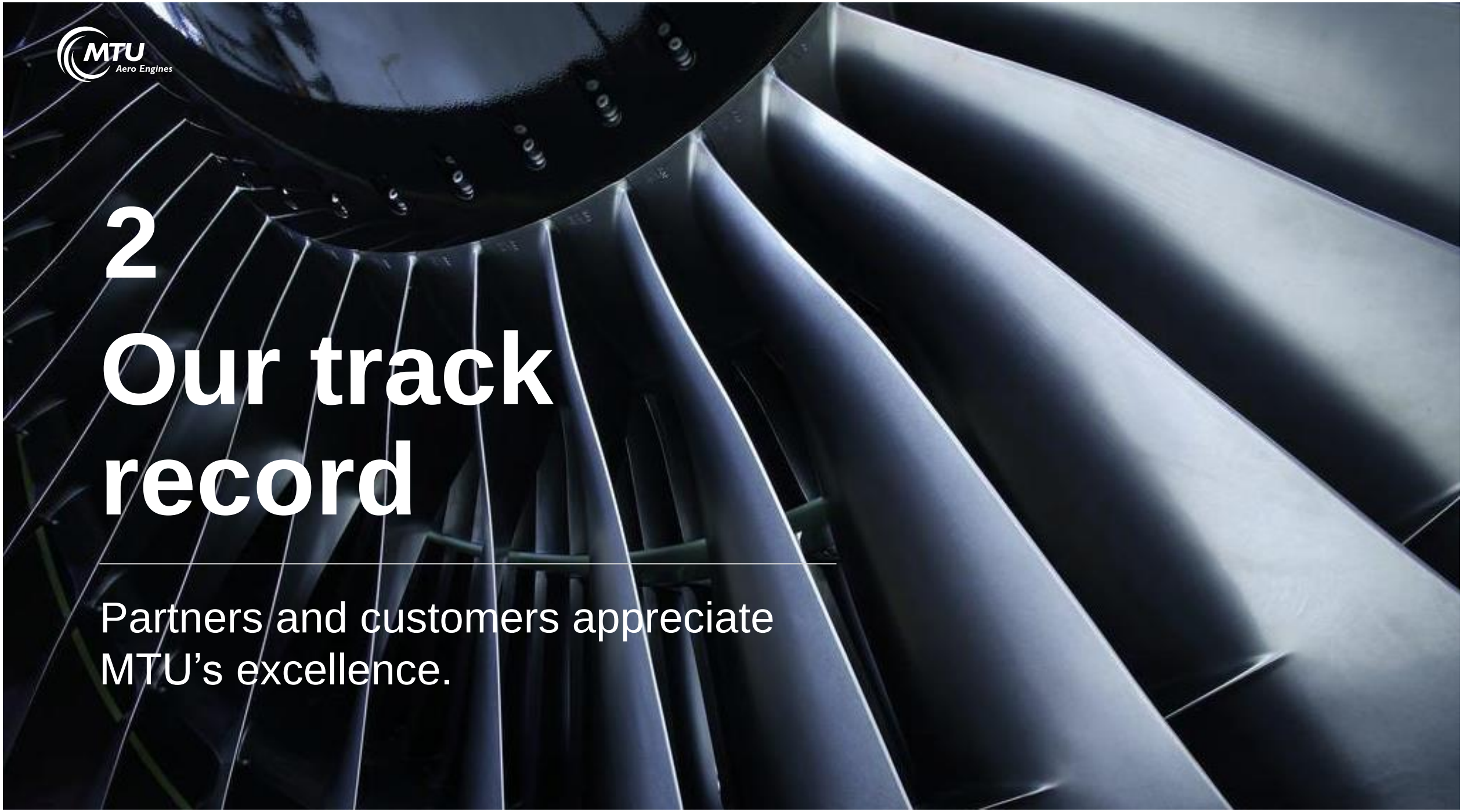
Leading technology

Benchmark competitiveness

Innovative culture

Profitable growth

Customer satisfaction



2 Our track record

Partners and customers appreciate MTU’s excellence.

MTU looks back on many important names from the German industrial history – from 1934 to date

1934
BMW Flugmotorenbau GmbH is founded

1965
MAN takes over BMW Triebwerkbau

1969
MTU
50% Daimler Benz
50% MAN

1989
MTU becomes an affiliate of Deutsche Aerospace, later renamed DaimlerChrysler Aerospace (DASA)

2005
MTU goes public

Today
Shareholder structure
93% Institutional investors
6% Private shareholders
1% MTU-owned shares

Focus on **commercial** applications

Focus on **military** applications

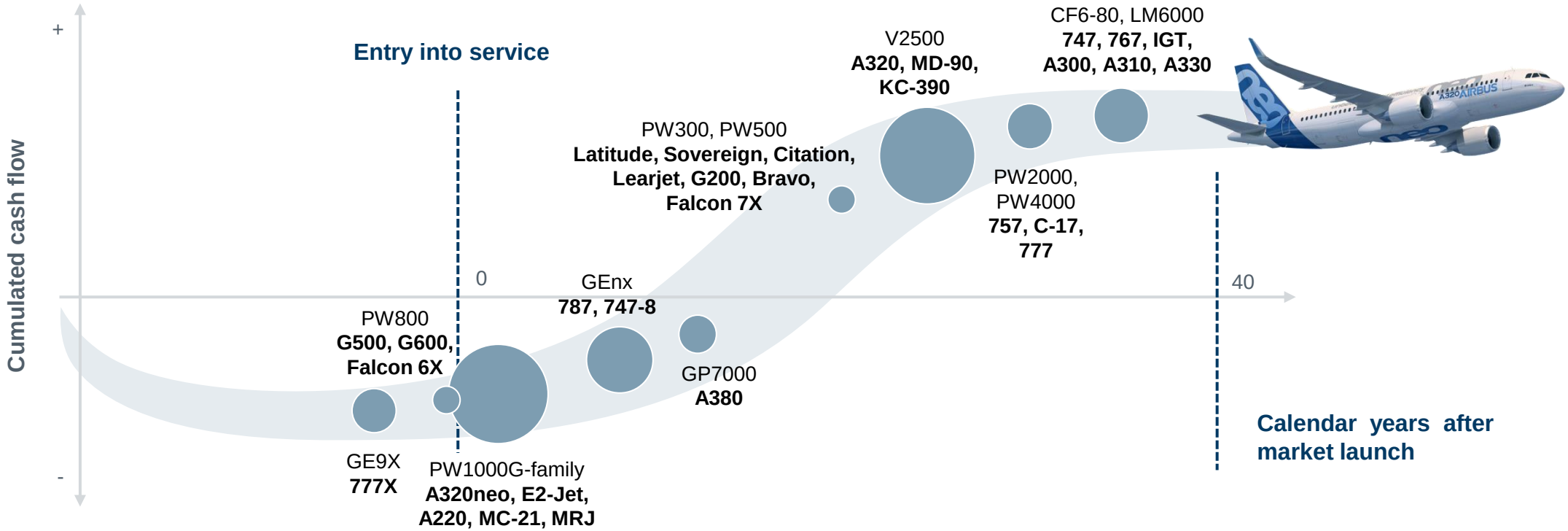
MTU is an essential partner in the engine value chain

Material suppliers*	Engine component suppliers*	**Subsystem/module suppliers***	Engine OEMs*	Airframers*	**Airline operations**
CPP	senior Aerospace	KAWASAKI HEAVY INDUSTRIES, LTD.	GE Aviation	AIRBUS	
PCC	Hanwha Techwin	IHI	Pratt & Whitney	BOEING	
ALCOA	MB AEROSPACE	MITSUBISHI HEAVY INDUSTRIES, LTD.	Rolls-Royce	BOMBARDIER	MRO
ATI		MTU Aero Engines	SAFRAN	EMBRAER	Engine MRO MTU Maintenance

OEM market | **Aftermarket**

*selected market participants

A balanced portfolio and products in all thrust categories ensure MTU's long-term success



Our track record: partners and customers appreciate MTU's excellence

Commercial OEM business

Share of total revenues ca. 33 %

Balanced product portfolio in all thrust categories

Decades of partnership with OEMs

Military OEM business

Share of total revenues ca. 9 %

European and U.S. engine programs

Full system capability

Leading partner of the German Armed Forces

Commercial MRO business

Share of total revenues ca. 58 %

Services: maintenance, leasing and asset management

Global network

Direct customer business, partner of OEMs and airlines

MTU group fiscal year 2018: Revenue € 4.57 billion / EBIT € 0.67 billion

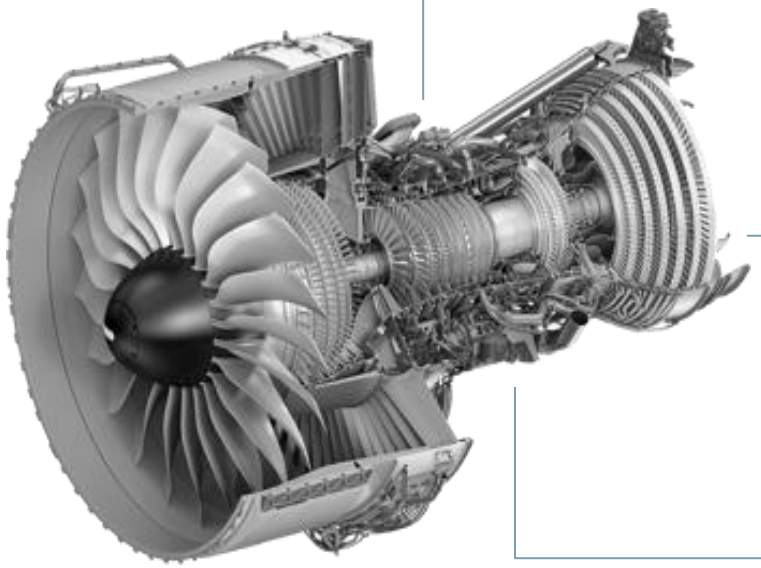
3 Our expertise

MTU possesses unique capabilities and has a wealth of know-how.

Boasting comprehensive system expertise, MTU focuses on five core engine competencies - three core components and on unique manufacturing and maintenance processes

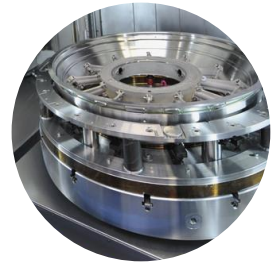
Manufacturing

Maintenance



High-pressure compressor (HPC)

Low-pressure turbine (LPT)



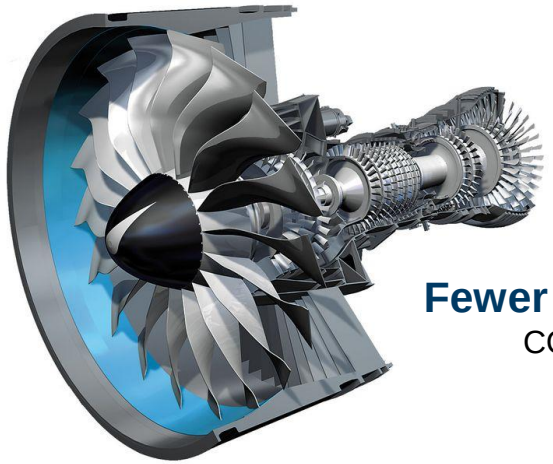
Turbine center frame (TCF)

The geared turbofan is setting new standards - together with our partners, MTU will continue to expand its technological leadership in the future

1st generation geared turbofan - today

16%
reduction in fuel burn

Approx. 75%
reduction of the noise footprint

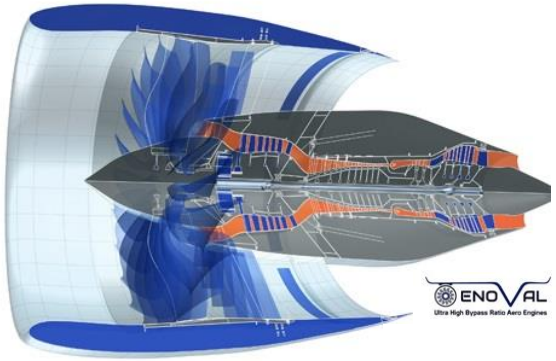


Fewer emissions
CO_2 / NO_x

MRO cost savings
25% fewer stages, 45% fewer blades, lower operating temperature

2nd generation geared turbofan – EIS 2030+

Lowest fan-pressure ratios at very high bypass ratios
BPR 14-20*

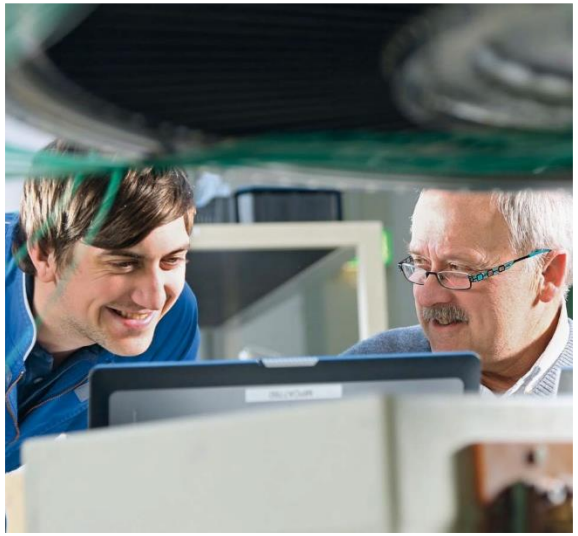


Temperature-resistant lightweight materials

High-speed,
highly efficient
expansion system

Source: P&W | * BPR = Bypass Ratio | ** OPR = Overall Pressure Ratio

We boast more than 10,000 innovative and competent engine experts

More than 60
different nations
work under the umbrella
of MTU Aero Engines

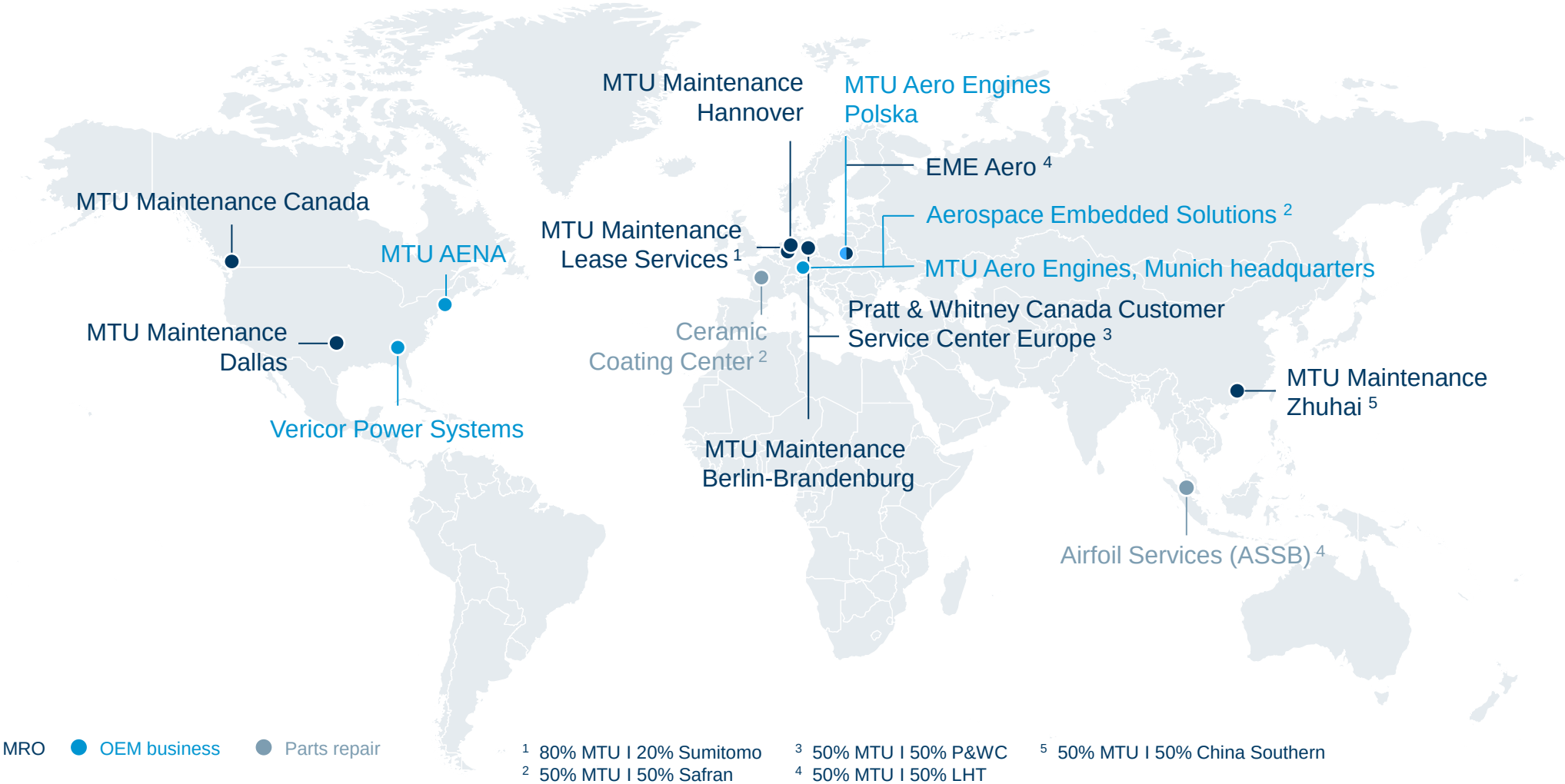
Approx. 20 years
is the average job tenure
of MTU's workforce
(in Germany)

Approx. 80%
of the total
workforce are
engineers or technicians*

350
apprentices at
German locations

*incl. scientists

With our locations worldwide we are close to our customers



1 80% MTU I 20% Sumitomo
2 50% MTU I 50% Safran
3 50% MTU I 50% P&WC
4 50% MTU I 50% LHT
5 50% MTU I 50% China Southern

4
For questions relating to…

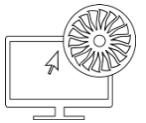
…our **company** 

…our **commercial engine business** 

…our **commercial service portfolio** 

…our **military engine business** 

…our **military service portfolio** 

…our **technological expertise** 

…the **sustainability** of our products 

…our **financial figures** 

…**job opportunities** at MTU 

Click the relevant icon for more information 

MTU Aero Engines

Let’s shape the future together!

Thank you.

February 2019

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