Welcome to Langenhagen
Investor & Analyst Day 2019
### Agenda – MTU Investor & Analyst Day 2019

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MTU´s market environment

Reiner Winkler | Chief Executive Officer (CEO)
Slow down in world economy in 2019 but positive outlook for 2020

GDP growth of top 3 economies (y-o-y)

- Strong US growth but softening, US yield curve inverted
- Eurozone in a downturn since 2018
- China’s growth is moderating, partly because of the trade war, no fast resolution expected

Global GDP growth

- The IMF acknowledges risks but expects a pick-up in growth in 2020 based on a recovery in the emerging markets that have been underperforming in 2019

Source: OECD, International Monetary Fund (IMF)
Freight traffic and oil are a concern but passenger demand remains strong

Global freight traffic growth

Freight traffic (10% of commercial fleet) experiencing negative growth in 2019 (Jan-Sept.)

Global passenger traffic growth

Passenger traffic growth (90% of the commercial fleet) has moderated but remains robust and in line with historical and OEM forecasts

Oil price (Brent)

Oil price volatility increased by geopolitics in the Middle-East

Source: IATA, Airbus, Boeing
Global freight traffic is slowing down but North America is most influential to MTU

Freight traffic growth

- North American freight traffic has only started to moderate this year and less dramatically than the global metric
- Operators such as FedEx, UPS, Atlas Air or more recently Prime Air are benefiting from the continued e-commerce boom and the relative strength of the US economy

MTU fleet in cargo service – 2,200 engines

The large majority or ~ 60% of the 2,200 engines encompassed by MTU programs and powering freighter aircraft are operating in and out of North America

Source: IATA, Cirium Fleets Analyzer

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Softening of economic growth offer several silver linings

US interest rates are being reduced, supporting the OE backlog as well as emerging markets (weaker USD cushioning USD-denominated debt)

Source: OECD, The Economist Intelligence Unit

- The current slowdown is keeping energy prices and supply disruptions in check while US shale oil continues to limit oil prices, benefiting the aftermarket
- Following several years of production ramp-up, we see signs of moderation, which could additionally offer potential relief to the supply chain in terms of capacity and pricing of procured parts as well as support the aftermarket
MTU revenues have returned to above-average growth following short periods of decline

Global GDP, traffic and MTU revenue growth 2000-2017

<table>
<thead>
<tr>
<th></th>
<th>CAGR</th>
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</thead>
<tbody>
<tr>
<td>MTU revenues $</td>
<td>6.5%</td>
</tr>
<tr>
<td>RPK</td>
<td>4.9%</td>
</tr>
<tr>
<td>GDP</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

- Strong underlying travel demand growth with almost twice the growth rate as GDP growth. This development is expected to continue as the middle-class and urban dwellers go on growing in emerging markets
- MTU revenues (organic) outperformed traffic due to continued investment in new high-growth programs and simultaneous expansion of MTU's program share
- Experience from previous crises has shown that traffic demand and in turn MTU's revenues (organic) have always rebounded and, after short periods, returned to above average growth
Growing production capacity is turning backlog into deliveries (now 8.1 years of production compared to 8.6 last year)

High OE visibility remains, despite lower order intake in 2019

Fundamentals remain strong for OE:
- Interest rates are easing, in turn supporting financing and helping emerging markets dependent on USD-denominated debt
- Oil price volatility is a reminder that new equipment is the best fuel-hedging instrument
- Longer term, current environmental pressures put a premium on fuel efficiency

MTU will benefit from narrowbodies’ 85% backlog share reflecting airlines’ shift to smaller aircraft on medium haul routes

Backlog at historically high level, 8 years of production

Aircraft on order

Source: Cirium Fleets Analyzer

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Aftermarket growth remains robust in 2019

Flight hours of MTU programs

A number of factors continue to support aftermarket demand for MTU programs

- Parked fleet and retirements in relation to the fleet remain at an all time low (park rate at 6.3%, retirement rate at 2.7%)
- Passenger traffic growth is robust (the main driver)
- North American freight growth is not immune to but apparently less affected by the current trade conflicts
- Oil price is subject to supply disruptions but remains well under 90$ with economics acting as a downward pressure at present
- Some of MTU’s aftermarket programs are benefiting from continued robust traffic demand as well as a number of temporary technical issues on competing programs

Source: Flightradar 24
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MTU’s activity is diversified geographically and structurally across fleet

In service fleet and orders relevant to MTU by region and market segment (22,900 engines)

MTU’s portfolio is geographically well balanced with a strong footprint in fast-growing Asian market as well as currently resilient North American market.

Structurally, MTU’s portfolio is also well balanced:
- Very strong presence in the fast-growing single-aisle market
- Participation in leading engine programs in the other 3 segments

Source: Cirium Fleets Analyzer, spare engines are excluded

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A diversified fleet will support MTU in facing current market risks

Mitigation through fleet and backlog in programs relevant to MTU

**Trade conflicts**
Escalation in 2019 (US-China, Japan-Korea, US-EU, Brexit)
- US freight traffic less affected
- Brexit mitigation in place at MTU
- Limited impact of US tariffs

**Economic slowdown**
US, Eurozone and China are affected
- Traffic outlook remains positive
- Positive impact on interest rates and oil price
- MTU fleet geographically diversified with strong presence in resilient US and China

**Oil price uncertainty**
Key MTU programs (V2500, GTF, GP7000, GEnx) are fuel efficiency leaders
- Higher fuel prices support MTU backlog, lower fuel prices MTU’s mature fleet

**Climate impact**
Rising awareness for climate impact, mainly concerning CO₂ emissions
- MTU is committed to climate targets
We are committed to ambitious goals to reduce CO₂ emissions

Reduction of emission and noise levels
Our objective is to cut aircraft engine CO₂ emissions by up to 40% and noise emissions by as much as 65%.

Ambitious technology agenda CLAIRE
MTU is compliant with strategic industry goals such as SRIA (Strategic Research and Innovation Agenda) and IATA (International Air Transport Association) Flightpath 2050.

Sustainable aviation fuel
MTU is strongly advocating the introduction of sustainable kerosene, for example, through its work in the Bauhaus Luftfahrt think tank and in the Aviation Initiative for Renewable Energy in Germany (aireg) association.
MTU’s technology roadmap

Lars Wagner | Chief Operating Officer (COO)
Our motivation

IATA Flightpath 2050

Reduction by…

- Evolutionary technology
- Operational measures
- Optimized air space
- Alternate fuels and revolutionary technologies

CO₂ neutral growth

-50%

CO₂ emissions normalized to 2005 levels

Without actions

economic measures
MTU’s approach CLAIRE | Clean Air Engine

Vision 2020 and Flightpath 2050 targets

V2500

Geared Turbo Fan

Fan with low pressure ratio

Integrated high-efficiency propulsion

△ Noise reduction in %  △ CO₂-reduction in %  Increase in alternate fuels

100% 100% 2000

-40% -15% 2015

-50% -25% 2030

-65% -40% 2050

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Our approach

Maturity

Gas turbine
- Evolutionary Gen2 GTF development
- Revolutionary concepts
- Drop-in power-/sun-to-liquid: SAF
- Turbo-electric, hybrid concepts
- Batteries
- Direct H₂-burn/fuels cells with liquid-H₂

Electric propulsion

Application

Urban mobility
- Short-range
- Short-range
- Short-range

Short-range
- Mid-range
- Mid-range
- Mid-range

Mid-range
- Long-range
- Long-range
- Long-range

Long-range

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GTF Gen2 concept for 2030+

Increase in electrical components

Targets

- 10% fuel
- 10% dB noise

Further CO₂ reduction by:

- Drop-in fuels
- Sustainable aviation fuels SAF
- Hydrogen
New European Fighter Engine – NEFE

Military technology development

**Targets**
- Long range
- High mission flexibility
- Low observability
- High availability
- Low operation costs
- First prototype 2031+
- EIS 2040+

**Key enabler**
- Variable cycle engine technology
- “World class” components
- High-temp, low-weight materials
- Integrated aircraft/engine heat management
- Fully digitalized design and aftermarket processes

Safran and MTU are committed to jointly developing a new fighter engine
Key synergies: technical, competences and technology funding

Commercial and military technology development

**Commercial**

- High pressure compressor
- Low pressure turbine
- Additive manufacturing
- Materials & manufacturing engineering
- Virtual engine
- Life cycle management

**Military**

- NEFE prototype technology ready 2023+
- NEFE prototype entry into service 2031+

Significant synergies between commercial and military technology development achievable
Revolutionary concepts

Composite cycle (turbine and piston)

STIG cycle (steam ingestion)

-12% fuel burn

-20% fuel burn
Revolutionary concepts

(Hybrid-) electric propulsion

PMAD: power management and distribution

100% batteries

Hybrid:
Gas turbine with generator
eFuels

Fuel cell
with liquid hydrogen
Propulsion concepts for emission free flying

Participation e.SAT
(Schematic)

Characteristics

Project plan
- Development of a 5-seat box wing flight taxi
- Electric architecture with ROTAX piston engine
- Low-noise fan

Partners
- e.SAT and e.SAT Powertrain GmbH
- RWTH Aachen, MTU, …

Schedule
- Final design freeze Q1/2021
- Permit to flight Q4/2021
- EIS Q1/2023
**Propulsion concepts for emission free flying**

**Participation DO228hep**

(Schematic)

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<td><strong>Project plan</strong></td>
</tr>
<tr>
<td>• Proof of concept for electric propulsion</td>
</tr>
<tr>
<td>• Potential integration of fuel cell</td>
</tr>
<tr>
<td><strong>Partners</strong></td>
</tr>
<tr>
<td>• DLR</td>
</tr>
<tr>
<td><strong>Schedule</strong></td>
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<tr>
<td>• Flight test 2021</td>
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Our potential contribution

1. Next generation GTF
   - Low FPR\(^1\), high BPR\(^2\) and OPR\(^3\) as well as lean burn combustor
   - Higher efficiency, reduced NO\(_X\) and GHG\(^4\) (STIG)

2. Revolutionary engine concepts
   - Fuel cell with LH\(_2\)\(^5\) (commercial aircrafts) and battery-electric propulsion (small aircraft only)

3. Emission free flying
   - Renewable and to a large extend CO\(_2\) free (PtL\(^7\) and StL\(^8\))

- CO\(_2\) and NO\(_X\) free
- Liquid hydrogen

Footnotes:
1 Fan pressure ratio, 2 Bypass ratio, 3 Overall pressure ratio, 4 Greenhouse gas, 5 Liquid hydrogen, 6 Sustainable aviation fuels, 7 Power to liquid, 8 Sun to liquid
Expansion of production facilities
Geared turbofan engines are setting new economical standards – and are a key driver of our production ramp-up

First geared turbofan (GTF) engine generation

-16% reduction in fuel burn

75% reduction of the noise footprint

Fewer emissions

CO₂ / NOₓ

MRO cost savings

25% fewer stages, 45% fewer blades, lower operating temperature

Production ramp-up within one decade

Modules and engines p.a.

Increase by factor of 4

Source: P&W
## Automation in engine manufacturing

### Why we constantly increase our level of automation

<table>
<thead>
<tr>
<th>Reduction of costs</th>
<th>Better process stability and quality</th>
<th>Reduction of turnaround time and working capital</th>
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</thead>
</table>
| • Increased operating times  
  • Higher automation level  
  • Separation of man and machine  
  • Optimized space utilization |
| • Less manual interference  
  • Process data management |
| • Fewer workplace rotations  
  • Fewer interruptions  
  • Higher transparency and controlling possibilities  
  • Increased reliability |

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Utilization of ramp-up

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MTU as role model for automation in aero engine manufacturing

- **Semiautomated hub strut case manufacturing** in 2011
- **Semiautomated flow path hardware manufacturing** in 2012
- **Closed door automated blisk manufacturing** in 2015
- **Closed door automated turbine blade manufacturing** in 2019
Closed door automated manufacturing of blisks

Manufacturing 4.0

Main features

• Fully automated system
• IT-controlled eco-system for autonomous parts and tool flow management
• Production of 4,000 blisks per year

-25%
+40%
-30%
Closed door blade manufacturing

Main features

- Fully-automated system
- IT-controlled eco-system for autonomous parts and tools flow management
- Offset correction for individual geometry and adjustment of NC-programs → continual high quality
- Production capacity 7,000 hours per year and machine
- Lot size one
Our next steps in automation

- Simulation
- Process data management
- Manufacturing execution system

Automated manufacturing
- 2020: Automated manufacturing w. autonomous mobile robots
- 2020: Flow path hardware
- 2021: Automated manufacturing
- 2022: Automated ECM manufacturing
- Bearing chambers
- Rotors
Autonomous mobile robots

Manufacturing 4.0

Main features

- Fully-automated system
- Eco-system of freely moving robots for autonomous storage, parts and tool management
- Offset correction for individual geometry and adjustment of NC-programs → continual high quality
- No dedicated storage necessary
- Overall production capacity of 160,000h per year
- Lot size one
Electro chemical machining

Main features

- Dissolving material from workpiece by electrochemical process (electrolysis)
- Replacement of two processes (broaching and edge rounding)
- Improved surface quality at lower cost

Manufacturing 4.0

-50%
+30%
-20%
Working capital management
Working capital management

MTU established a center of competence for working capital management

<table>
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<tr>
<th>Enabler</th>
<th>Flexibility</th>
<th>Response time</th>
<th>Forecast accuracy</th>
<th>Digitalization</th>
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**Short term:** Big data analysis
- Daily visualization on digital dashboards
- Big data analysis of all parameters

**Mid-term:** Exception management
- Material management by exception
- Automatically proposed adjustments

**Long-term:** AI-disposition
- Pattern recognition and deviation forecast
- Adjustments carried out automatically
Outlook
Outlook

Technology roadmap

- We have promising commercial and military technology in the pipeline
- Revolutionary concepts including fuel cells with (hybrid-)electric drive train enable emission reduced/free flying in the long run

Production extension + automation

- Automation and Industry 4.0 are key to utilizing possibilities in production ramp-up
- We will double our automation level by 2030 to further improve cost efficiency, turnaround time and stability

Working capital management

- The newly created center of excellence focusses on significant working capital improvement
- New digital tools support a 50% reduction in lead-time mid-term
Lunch Break

Presentation continues at 13:30 CET
Market success in OEM and MRO businesses

Michael Schreyögg | Chief Program Officer (CPO)
Positive market trends in all business segments
Solid growth in new civil aircraft deliveries over the next 20 years

Positive market environment for the aviation industry

- 20-year annual GDP growth: 2.7%
- 20-year annual RPK* traffic growth: 4.5%
- 20-year annual global fleet growth: 3.7%**
- 20-year new aircraft deliveries: 46,000**

Solid new aircraft delivery over the next 20 years

- 14,500 Business jets
- 6,100 Regional aircraft
- 30,900 Narrowbodies
- 9,000 Widebodies

*Revenue passenger kilometres  **Total commercial a/c (widebody, narrowbody, regional aircraft)
Total commercial engine MRO revenues will double over the next 10 years

Worldwide MRO market

- Total MRO revenues will grow from ~US$ 34 bn today to US$ 66 bn by 2029
- MTU's MRO market coverage maintains at ~80%
- OEM MRO is growing the strongest driven by new engine platforms

Source: MTU strategic planning 2019 (dynamic), SV for commercial engines (w/o bizjet or military)
Military outlook – German defense budget expected to increase by 6.2% in 2020, reaching 1.42% of GDP

MTU’s key growth drivers
The number of GTF powered aircraft is steadily rising

- **A320neo**
  - EIS Jan 25, 2016
  - Source: MTU

- **A220-100**
  - EIS Jul 15, 2016
  - Source: Swiss International Airlines

- **A220-300**
  - EIS Dec 14, 2016
  - Source: MTU

- **A321neo**
  - EIS Sep 7, 2017
  - Source: Airbus

- **E190-E2**
  - EIS Apr 24, 2018
  - Source: MTU

- **E195-E2**
  - EIS Sep 12, 2019
  - Source: MTU

Source: MTU
GTF – 10,000 orders and commitments, 80+ customers worldwide, 5 aircraft platforms

- 600+ aircraft in service
- 40+ operators
- 4 million + flight hours
- 200 million + passengers
- 280 million + gallons of fuel saved
- 2.7 million + metric tonnes of CO₂ avoided
- Up to 75% smaller noise footprint

Source: Pratt&Whitney
MTU participates in the large business jet scene – the segment with the strongest growth and the highest revenues in the business jet market

- Gulfstream G500/G600 >10,000 flying hours accumulated
- Mach 0.9 – fastest jets in their category
- Dassault's Falcon 6X EIS expected in 2022
- PW800 engines use common core GTF concept for A220 and Mitsubishi SpaceJet aircraft
- Long and ultra-long range business jet will make up ~ 40% of total business jet deliveries in the next 10 years
- MTU's business jet revenues to triple over the next 10 years
The regional jet market will be dominated by the GTF – market share to increase to 90%

- GTF exclusive powerplant for all 3 new RJ platforms
- A220 gained order momentum since Airbus stepped in
- Boeing’s 80% stake into Embraer expected for 2020
- Mitsubishi SpaceJet expected to enter into service in 2020

GTF

A220 | PW1500G
EIS 2016

E-Jet E2 | PW1900/1700G
EIS 2018

Mitsubishi SpaceJet | PW1200G
EIS expected 2020

*incl. firm orders, options, LoIs, purchase rights

Total order book of ~ 4,500 engines*
PW1100G-JM powering the A320neo will be the key revenue driver in coming years

• PW1100G-JM (A320) covers roughly 55% of total GTF order book
• >500 A320neo and A321neo equipped with GTF delivered
• Benefits in fuel, noise and emission proven since 1st flight hour
• Increased thrust level especially beneficial for increased take-off weight A321XLR, available in 2022
• A321LR, XLR have potential to stimulate market demand further
• Strongest driver is A320neo GTF engine
• Annual production rate at >1,300 GTF engines by the middle of the next decade
• Upside potential from NGSA 2030+

GTF installed base growing – GTF engine fleet to increase to ~ 15,000 in 2030

No. of installed engines

Thousands

2019

2030

GTF engine fleet increase >10x
The GTF will lead the industry’s engine architecture for the next decades

- GTF concept used on regional and narrowbody platforms
- Flexibility to be extended to higher thrust levels
- Technology roadmap is in place
- Further innovations and flight experiences make the GTF a preferred choice for potential new aircraft platforms
- NMA would be a welcome opportunity for scaling up to GTF higher thrust levels
- NGSA requires further efficiencies

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GTF industrialization – cost structure optimized and reliable output achieved

**Blisk manufacturing, Munich**
- High degree of automation
- Production cost optimized
- Annual capa. of 4,000 blisks

**GTF assembly line, Munich**
- 30% of all A320neo GTFs
- Output one GTF engine per day

**MTU Maintenance, Hannover**
PW1100G-JM MRO readiness achieved in 2016

**EME Aero, Poland**
- Most efficient GTF MRO shop worldwide
- Operation start Dec 2019

**MTU Aero Engines Polska, Poland**
- Lower labour cost
- Mid-tech work
Managing GTF challenges requires additional shop visits

Limited durability (on-wing time) and technical issues especially under severe environmental conditions (e.g. India)

Nov. 2019: Indian regulator action for GTF engines

- Technical issues have been addressed
- New design available and has been implemented for new engines since Q1 2019
- Retrofit program of the in-service PW1100G-JM engines started mid-2019
- Speed up of retrofit schedule by additional shop visits and spare parts needs

PW1100G-JM engine

Reliability of GTF continues to improve
EJ200 with attractive national and international growth potential

Program highlights:

• Over 1,300 EJ200 sold
• >1,000,000 engine flight hours accumulated
• Replacement of tranche 1 → decision expected in 2020
• Replacement of Tornado fleet – competition F/A-18 → decision expected in 2020
• Long-term evolution study started to investigate growth potential of EJ200 engine to fit the requirements of future EF-missions (e.g. as replacement for Tornado)
• Eurofighter (with EJ200 engine) will be a major component in any future European combat air system
MTU’s profitable spare parts business is secured by mature and new engine programs

Unabated flight hour demand secures spare parts revenue growth

- V2500 key spare parts revenue driver with high visibility
- CF6-80C/E – high portion of freighter application will result in solid spare parts contribution
- High visibility of PW2000 aftermarket due to its military and civil application
- GP7000 spare parts secured for next years
- GEnx young engine program with a high installed fleet and still growing
- GTF first spare parts expected beginning of 2020; future key revenue driver next to V2500

Long-term growth of spare parts revenue assured
MRO revenues significantly outperformed the market

MTU Maintenance Zhuhai 100%
MRO revenues reported

~ 4.5 bn US$
CAGR + high teens %

Highlights

• Market approach via independent MRO and OEM-MRO partnerships
• Largest engine maintenance portfolio worldwide
• Broad, diversified customer base
• Strong position in growth platforms
• Current narrowbody engines have not yet reached their shop visit peak
• Future growth mainly driven by new engine platforms

MTU very well positioned to benefit from future growth in the MRO market
Independent MRO and OEM-MRO cooperation are the basis for future growth


<table>
<thead>
<tr>
<th>Year</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>Est. 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>2.1</td>
<td>2.2</td>
<td>3.0</td>
<td>4.5</td>
<td>6.7</td>
</tr>
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</table>

OEM-MRO cooperation order book as of 30th September 2019

- **Narrowbody**
- **Widebody**

~ € 11bn

Independent MRO business very successful in winning new campaigns
OEM-MRO cooperation secures access to new engine platforms
Increasing demand requires capacity expansion primarily in best cost countries

Capacity demand vs. available capacity

- Rising demand for mature and new engine programs
- Short-term: full capacity utilization at existing locations
- Mid to long term: increase capacity and repair capabilities at best cost locations
- Strengthen partnerships with China Southern, Lufthansa Technik

Capacity share in best cost countries will increase from ~30% to ~50%
Key expansion projects support future profitable growth

**EME Aero**
- Most efficient GTF MRO shop worldwide
- JV with Lufthansa Technik
- Operational begin in Dec 2019

**MTU Maintenance Zhuhai**
- Prolongation of JV until 2051
- LEAP repair licenses
- 2nd expansion → ~ 450 SV
- Long-term expansion concept under development

**MTU Maintenance Serbia**
- New parts repairs shop
- Capacity 400,000 repair hours
- Operational begin 2022

**Other MRO expansions**
- MTU Maintenance Hannover
- MTU Maintenance Berlin
- ASSB Malaysia
- MTU Maintenance Canada
MTU achieves an advantageous position compared to its competitors by covering all market segments

Competitive MRO landscape

MTU's strengths

- Well positioned in all market segments as a unique selling point
- Technological know-how from the OEM segment creates high level of trust among independent airline customers
- Customized MRO solutions and asset management
- Continuous innovative product and service development
- High quality standards
- Financial strength and willingness to invest in long-term contracts and partnerships
MTU Maintenance offers intelligent solutions over the entire engine lifecycle

**PERFORM**<sup>Plus</sup>

**New engines**
More flight hours at lower cost with customized MRO

**Mature engines**
Reduced cost with smart strategies

**SAVE**<sup>Plus</sup>

**SUNSET**<sup>Plus</sup>

**MOVE**<sup>Plus</sup>

**Solutions for lessors**
Cost-efficient risk mitigation with portable MRO

Further development of customized solutions strengthens MTU position in the MRO market with strong competitive advantages
MRO technology roadmap focusses on more efficient processes, automation and digitalization in the OEM-MRO and independent MRO businesses

**Repair & automation technologies**
- Provide essential repair technologies for future products
- Increase degree of shop automation by 20%
- Reduce repair development costs by means of process simulations

**Life-cycle management**
- Introduce comprehensive on-/near-wing services incl. repairs
- Establish capabilities for target-based workscoping thanks to engine condition monitoring and shop visit data
- Implement process for life-cycle cost management

**Intelligent MRO processes**
- Develop and leverage technologies to foster innovative MRO processes, driven by their impact on value chain
- Collect, produce and treasure smart MRO data as a basis for future developments and improvements
Future profitable growth requires balanced management of operational and strategic aspects

Operational and strategic aspects

- **Customer retention**
- **Maintain and expand partnerships**
- **Expansion of service and product portfolio**
- **Expansion of MRO network structure**
- **Strengthening of core competencies and operational performance**
Outlook for the next decade
MTU’s growth story will continue in the future

**Commercial OEM**
- 25% program share targeted for the next generation of GTF engines
- Upside potential driven by new aircraft platforms

**Military OEM**
- Next European Fighter Engine (NEFE) key for future growth
- EJ200 production secured over the next decade

**Commercial MRO**
- Development of product portfolio
- Active fleet management
- Increase of best cost operations to 50%
- Well positioned in Asia to capture future market growth
- MRO revenues expected to double within the next 10 years
Financials

Peter Kameritsch | Chief Financial Officer (CFO) | Chief Information Officer (CIO)
MTU included in German large cap index DAX

MTU share price development [Jan.-Sept. 2019; +53.5%]

MTU trading volume [Jan.-Sept. 2019; in million shares]

AUG 2019

- DAX composition was tested end of August
  - Rank by Market Capitalization #24 with ~13bn €
  - Rank by 12 Month Trading volume was #35

SEPT 2019

- On 23 September, MTU replaced ThyssenKrupp in the DAX index

Source: OECD, The Economist Intelligence Unit
MTU included in German large cap index DAX

Better reputation
DAX is the German blue chip index

More visibility
• Broader press coverage
• Higher public recognition
• Reputation on labour market

Higher trading volume
• Money in DAX ETFs 10x MDAX
• Money in DAX Futures/Derivatives 40x MDAX
• More active funds with DAX as benchmark
IFRS16 implementation

New IFRS standard for lease contracts

• All lease contracts to be recognized in the balance sheet as right-of-use assets/lease liabilities
• Operating expenses decrease while finance costs increase
• Lease payments to be shown in financing cash flow compared to operating cashflow in IAS17

MTU is impacted by IFRS16 mainly in the following aspects

<table>
<thead>
<tr>
<th>Engine Leasing</th>
<th>Real Estate</th>
<th>others</th>
</tr>
</thead>
<tbody>
<tr>
<td>117 M €</td>
<td>17 M €</td>
<td>3 M €</td>
</tr>
</tbody>
</table>
Changes through applying IFRS 16 (leases)

Balance sheet as of 01.01.2019

<table>
<thead>
<tr>
<th>Right-of-use assets/ net-investment</th>
<th>Equity</th>
<th>Lease liability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+128M €</td>
<td>+127M €</td>
</tr>
</tbody>
</table>

Balance sheet as of 30.09.2019

<table>
<thead>
<tr>
<th>Right-of-use assets/ net-investment</th>
<th>Equity</th>
<th>Lease liability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-8M €</td>
<td>+145M €</td>
</tr>
</tbody>
</table>

P/L 9M2019

| Revenues: | -15M € |
| EBIT:     | +1M €  |
| EBITDA:   | +28M € |
| Financial result: | -9M € |
| of which FX | -6M € |
| P/L Sum   | -9M €  |

Cash flow statement 9M2019

| Operating CF: | +29M € |
| Investing CF: | 0M €  |
| FCF:          | +29M € |
| Financing CF: | -29M € |
Capital structure management
Key capital structure considerations

Position at 30.06.2019

- Equity ratio ~30% and 52m shares
- Net debt/EBITDA ~ 0.9
- Investment grade rating from Fitch (BBB) and Moody’s (Baa3)

Targets

- No new equity
- Net debt/EBITDA will be in range between 0.5-1.5
- Keep investment grade rating
- Maintain flexibility for investment in new programs or organic growth opportunities
- Increasing shareholder returns
Convertible bond May 2016

1. **Nominal value** 500M €

2. **Maturity** 7 years, May 2023

3. **50% conversion premium** leads to a conversion price of ~125€ per share

4. Possible execution of **Issuer Call** from June 2020

**Assessment**

- Convert deeply in the money
- Market value at ~ 1bn €
- Nearing date for Issuer Call feature increases risk of early conversions

**Risk for dilution of up to 4M Shares**
First step
Convertible transaction Sept. 2019
Issue of new convertible bond

1. **Nominal value** 500M €
2. **Maturity** 7.5 years
3. **Issue price** 103% and 0.05% coupon implying -0.34% yield to maturity
4. **55% conversion premium** leads to a conversion price of 378€ per share
5. **Conversions** excluded until September 2024

**Market reception**
- Orderbook already closed 3 hours after announcement
- Orderbook oversubscribed by factor 2.5
- High quality investors, 55% long-only and 45% hedge funds

**Placement of 500M € convertible bond in highly favourable market conditions!**
First step
**Convertible transaction Sept. 2019**

Offer for partial repurchase of convertible bond 2016

1. **Nominal value** up to 275M €
2. **Payment** with proceeds of convertible bond 2019
3. **Repurchase** of ~ 2.2M underlying shares
4. **Offered incentive** in the range of 0.25 to 1.00%

**Market reception**

- Repurchase offer was well received with orderbook of ~ 400M €
- Assignment based on the lower end of the incentive range at 0.25%
- After initial spike share price reaction neutral
First step
Convertible transaction Sept. 2019
Dilution risk reduced and postponed

Potential conversion before transaction

<table>
<thead>
<tr>
<th>Shares</th>
<th>Until 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>4M</td>
<td></td>
</tr>
</tbody>
</table>

Potential conversion after transaction

<table>
<thead>
<tr>
<th>Shares</th>
<th>Until 2023</th>
<th>Earliest 2024</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8M</td>
<td>1.3M</td>
<td>0.9M</td>
</tr>
</tbody>
</table>

Market reception

- Convertible refinancing seen as credit positive by Moody’s
- Extension of debt and maturity profile and re-striking seen positively
- Negative yield on new convertibles further strengthens MTUs interest coverage
Conclusion
Capital structure management

1. No need for new equity as **FCF further improves**

2. **Management of dilution** remains a key item on the agenda

3. **Dividend payout ratio** towards 40% of net income adjusted

4. MTU has a well **diversified refinancing profile**

5. **Balanced leverage ratio of net debt/EBITDA** around 0.5-1.5 grants flexibility for business development and shareholder returns

**MTU’s financial strength gives us flexibility for business development opportunities and higher shareholder returns**
Guidance 2020
The year 2020

Sustainable growth path confirmed

- Further ramp of GTF volumes
- Ongoing strong growth of aftermarket (Com. Spares & MRO)
- Military business to stabilize on higher level
- Working capital to grow less than revenues

- Total OE losses to stabilize despite continuous ramp-up

- Investment in efficiency gains and capacity ramp-up in both segments high
- Launch of invest in new parts repair site in Serbia
- Acceleration of GTF Retrofit-SVs
The year 2020: Further growth of EBIT adj. and Free Cashflow

2020 main drivers

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Military</td>
<td>stable</td>
</tr>
<tr>
<td>Commercial OE</td>
<td>Up high single digit</td>
</tr>
<tr>
<td>Commercial Spares</td>
<td>Up mid to high single digit</td>
</tr>
</tbody>
</table>
| Commercial MRO   | Core MRO up high single digit  
|                  | Acceleration of GTF-Retrofit program under evaluation |
| EBIT adj.        | High single digit growth |
| CCR*             | ~ 70%          |

*) Cash Conversion Rate = Free Cashflow/Net Income adj.
Q&A
Executive Summary
Reiner Winkler | Chief Executive Officer (CEO)
MTU Aero Engines – lifetime excellence

**Broad know-how and portfolio**
- 150 technology projects, 400 patents and 200 invention disclosure reports per year
- 30% of aircraft have MTU technology on board

**Growing MRO business**
- >1,000 shop visits per year for over 30 different engine types

**Technological expertise**
- Promising commercial and military technology in the pipeline
- Revolutionary concepts including fuel cells enable emission reduced or even emission free flying in the long run

**High barriers to entry**
- High technology expertise and substantial up-front investment required
- Long term contracts

**Long established partnerships**
- With all engine OEMs, airlines and the German Air Force
- MTU is an essential partner in the engine value chain
MTU’s technological excellence and established partnerships build the foundation for long-term success

“MTU’s financial strength makes it a reliable long-term partner”

“MTU has a sound technological basis and provides operational excellence”

“Very high level of quality performance”

“No need to worry about MTU’s delivery performance – allows us to focus on others”

“Trust, competence and reliability are the attributes that make MTU essential for the German Airforce”
MTUs road into the 2020s

<table>
<thead>
<tr>
<th></th>
<th>Continued huge demand drives new engine deliveries</th>
<th>MTU’s expected ongoing engine fleet utilization secures aftermarket</th>
<th>Leading German and European industry partner in defence</th>
<th>Key expansion projects support profitable MRO growth in future</th>
<th>Clear strategy towards a Clean Air Engine</th>
<th>MTU’s financial strength grants flexibility for business development and shareholder returns</th>
</tr>
</thead>
</table>
| 1 | • GTF delivers game-changing economic and environmental performance  
   • GTF engine fleet to increase to 15,000 in 2030 | • V2500s peak still ahead  
   • New programs accelerating into early 2020s | • NEFE secures long-term growth | • Customer focused approach secures strong independent business growth  
   • New engine access secured by OEM-MRO cooperation  
   • MRO revenues to double in 10 years | • GTF Gen2 concept for 2030+  
   • Revolutionary concepts  
   • Concepts for emission free flying | • 30%+ equity ratio  
   • Well-diversified refinancing profile |
Q&A
Thank you!
Cautionary Note Regarding Forward-Looking Statements

Certain of the statements contained herein may be statements of future expectations and other forward-looking statements that are based on management’s current views and assumptions and involve known and unknown risks and uncertainties that could cause actual results, performance or events to differ materially from those expressed or implied in such statements. In addition to statements that are forward-looking by reason of context, the words “may,” “will,” “should,” “expect,” “plan,” “intend,” “anticipate,” “forecast,” “believe,” “estimate,” “predict,” “potential,” or “continue” and similar expressions identify forward-looking statements.

Actual results, performance or events may differ materially from those in such statements due to, without limitation, (i) competition from other companies in MTU’s industry and MTU’s ability to retain or increase its market share, (ii) MTU’s reliance on certain customers for its sales, (iii) risks related to MTU’s participation in consortia and risk and revenue sharing agreements for new aero engine programs, (iv) the impact of non-compete provisions included in certain of MTU’s contracts, (v) the impact of a decline in German or other European defense budgets or changes in funding priorities for military aircraft, (vi) risks associated with government funding, (vii) the impact of significant disruptions in MTU’s supply from key vendors, (viii) the continued success of MTU’s research and development initiatives, (ix) currency exchange rate fluctuations, (x) changes in tax legislation, (xi) the impact of any product liability claims, (xii) MTU’s ability to comply with regulations affecting its business and its ability to respond to changes in the regulatory environment, (xiii) the cyclicality of the airline industry and the current financial difficulties of commercial airlines, (xiv) our substantial leverage and (xv) general local and global economic conditions. Many of these factors may be more likely to occur, or more pronounced, as a result of terrorist activities and their consequences.

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