## Agenda – MTU Investor and Analyst Day 2017

<table>
<thead>
<tr>
<th>Time</th>
<th>Agenda</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:00 – 11:10</td>
<td>Welcome</td>
<td>Michael Röger, VP Investor Relations</td>
</tr>
<tr>
<td>11:10 – 11:30</td>
<td>MTU's Market Environment: No Clouds in Sight</td>
<td>Reiner Winkler, Chief Executive Officer</td>
</tr>
<tr>
<td>11:30 – 12:30</td>
<td>Leading Technology &amp; Cost Leadership</td>
<td>Dr. Rainer Martens, Chief Operating Officer, Lars Wagner, EVP OEM Operations</td>
</tr>
<tr>
<td>12:30 – 13:30</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>13:30 – 15:00</td>
<td>Shoptour: Blisk Facility, GTF Assembly Line, GTF Testcell</td>
<td></td>
</tr>
<tr>
<td>15:00 – 16:00</td>
<td>MTU goes Digital</td>
<td>Michael Schreyögg, Chief Program Officer</td>
</tr>
<tr>
<td></td>
<td>Military: Defense Budget - Driver for Future growth?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MRO Strategy: Mastering Future Growth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Introduction of the GTF: Keeping a Long Term Perspective</td>
<td></td>
</tr>
<tr>
<td>16:00 – 17:00</td>
<td>Financials: Ramping up cash conversion</td>
<td>Peter Kameritsch, SVP Finance</td>
</tr>
<tr>
<td></td>
<td>MTU's route 2030</td>
<td>Reiner Winkler, Chief Executive Officer</td>
</tr>
</tbody>
</table>
MTU’s Market Environment: No Clouds in Sight
Reiner Winkler, Chief Executive Officer

Munich, 12th December 2017
Not much has changed since last year – key indicators remain in excellent shape

<table>
<thead>
<tr>
<th>Demand indicators</th>
<th>Early '00s</th>
<th>Mid-late '00s</th>
<th>Today</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Backlog</td>
<td>4 yrs 😞</td>
<td>8 yrs 😊</td>
<td>9 yrs 😊</td>
</tr>
<tr>
<td>2. Technology status</td>
<td>'90s 😞</td>
<td>'90s 😞</td>
<td>'10s 😊</td>
</tr>
<tr>
<td>3. Cost of debt</td>
<td>high 😞</td>
<td>mid 😞</td>
<td>low 😊</td>
</tr>
<tr>
<td>4. Oil</td>
<td>30 😊</td>
<td>80 😞</td>
<td>50 😊</td>
</tr>
</tbody>
</table>

Influence on demand

- ✓ Higher rates needed to meet orders
- ✓ Step change in efficiency achieved
- ✓ Easier access to financing options for airlines
- ✓ Below $80, continued traffic stimulation
Overall backlog represents 9 years of production

- Higher production (currently 1,450 p.a.) required is naturally turning the backlog into deliveries
- Recent cancellation and deferral data as a share of backlog shows no reason for concern (not higher than average of last 10 years)

Source: Fleet Analyzer, western-built narrowbody and widebody airframes only (no RJ and TP), excludes Lols, gross orders shown
Production plans are justified by backlog

Backlog distribution vs. production plans

- Narrowbody backlog equates to 10 years of production alone
- By 2020, Airbus and Boeing plan a production rate of 60 and 57 aircraft per month respectively
- Production rates currently justified by orders

- Widebody backlog equates to 6 years of production and has declined since 2014
- 777X to begin in 2019, expected to become largest twin-engine widebody
- 787 is the current bestseller, the production rate 14 per month in 2019-20 is backed up by orders

Source: Ascend firm orders and LoIs, OEM announced production rates, Airbus and Boeing aircraft only
Technology status – MTU applications bring required step change in cost, performance and comfort

Gulfstream G550 (RR BR710)
- Larger cabin
- New generation flight deck
- Speed up to Mach 0.925 vs 0.885

Gulfstream G600 (PW800)
- Larger cabin
- New generation flight deck
- Speed up to Mach 0.925 vs 0.885

A319ceo (V2500)
- C Series: first single-aisle clean sheet design since 1980s
- 15% fuel burn advantage/trip

C Series (PW1500)
- C Series: first single-aisle clean sheet design since 1980s
- 15% fuel burn advantage/trip

Embraer 190 E1 (GE CF34)
- Double-digit-% reduction in fuel burn and maintenance costs
- Increased range by 500 miles
- More seats (108 vs. 98)

Embraer 190 E2 (PW1900)
- Double-digit-% reduction in fuel burn and maintenance costs
- Increased range by 500 miles
- More seats (108 vs. 98)
Technology status – MTU applications bring required step change in cost, performance and comfort

**A320ceo (V2500)**
- 15-17% fuel burn improvement
- 75% lower noise footprint
- New routes: 3.700nm vs. 3.300nm

**A320neo (PW1100G-JM)**

**767 (CF6-80C)**
- 130 new non-stop routes since EIS
- 20% lower fuel consumption
- 60% of 787s powered by GEnx

**787 (GEnx)**

**777-300ER (GE90)**
- Brings twin-engine economics to large capacity twin-aisle
- 777X will be the largest and most efficient twin-engine jet

**777X (GE9X)**
Cost of debt still historically low

6M LIBOR USD

Financial Crisis

09/11/2001
Airlines continue to enjoy ample funding options and cheap access to money

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Leasing Companies</td>
<td>Red</td>
<td>Yellow</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Capital Markets</td>
<td>Yellow</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Commercial Banks</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Export Credit Agencies</td>
<td>Yellow</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Private Equity and Hedge Funds</td>
<td>Red</td>
<td>Yellow</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Tax Equity</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>New Sources of Funding</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Aircraft and Engine Manufacturers</td>
<td>Red</td>
<td>Yellow</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
</tbody>
</table>

Source: Boeing  Current Aircraft Finance Market Outlook
Oil - strong traffic demand in a low fuel price environment supports the high utilization of MTU engines

Crude oil price
US Dollars per Barrel (Brent)

- EIA forecasts another year of low fuel prices with $56 for Brent in 2018 (in line with EIU and Oxford Economics forecasts)

Traffic growth
Passenger traffic (RPK) growth in %

- Demand continues to be supported by strong economic activity and lower airfares

Source: US Energy Information Administration (EIA)
Park rate at a record low and substantially less retirements

**Industry**

Stored/parked engine fleet

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Park Rate</td>
<td>12%</td>
<td>13%</td>
<td>14%</td>
<td>15%</td>
<td>16%</td>
<td>17%</td>
<td>18%</td>
<td>19%</td>
<td>20%</td>
<td>21%</td>
<td>22%</td>
<td>23%</td>
</tr>
</tbody>
</table>

Source: Fleet Analyzer 1) % of total fleet (active+stored/parked)

MTU outperforms overall industry with a park rate of 6.6%

Fewer aircraft have been retired since 2013 benefiting aftermarket

**Industry**

Retired engines 1)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LTM</td>
<td>300</td>
<td>600</td>
<td>900</td>
<td>1.200</td>
<td>1.500</td>
<td>1.800</td>
<td>2.000</td>
<td>2.300</td>
<td>2.600</td>
<td>2.900</td>
<td>3.200</td>
<td>3.500</td>
</tr>
</tbody>
</table>

Source: Fleet Analyzer 1) based on aircraft retirements (installed engines), does not cover spare engine retirements
## Key indicators status November 2017

<table>
<thead>
<tr>
<th>Status</th>
<th>Indicator</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>😊</td>
<td>Traffic</td>
<td>+7.3%</td>
<td>+7.4%</td>
<td>+7.5%</td>
<td>↑</td>
</tr>
<tr>
<td>😊</td>
<td>Airline Profits</td>
<td>$36 bn</td>
<td>$35 bn</td>
<td>$35 bn</td>
<td>↑</td>
</tr>
<tr>
<td>😊</td>
<td>Oil (Brent)</td>
<td>$52</td>
<td>$44</td>
<td>$53</td>
<td>↑</td>
</tr>
<tr>
<td>😊</td>
<td>Airliner Deliveries</td>
<td>1,397</td>
<td>1,443</td>
<td>~1,500</td>
<td>↑</td>
</tr>
<tr>
<td>😊</td>
<td>Airliner Backlog</td>
<td>13,400</td>
<td>13,400</td>
<td>13,200</td>
<td>↓</td>
</tr>
</tbody>
</table>

Source: IATA, Ascend, EIA

12th December 2017

© MTU Aero Engines AG. The information contained herein is proprietary to the MTU Aero Engines group companies.
Corporate Strategy

Balanced Portfolio

Benchmark Competitiveness

Leading Technology

Innovative Culture

Profitable Growth

Customer Satisfaction
Leading Technology:
Status Development Programs and Operations
Dr. Rainer Martens, Chief Operating Officer

Munich, 12th December 2017
## Update: Development milestones of new engine programs

<table>
<thead>
<tr>
<th>Engine Model</th>
<th>PW1500G C-Series</th>
<th>PW1100G A320neo</th>
<th>PW1200G MRJ</th>
<th>PW1400G MS-21</th>
<th>PW1900G E-Jets 2nd Gen</th>
<th>PW800 G500 / G600</th>
<th>GE9X B 777X</th>
<th>T408 CH-53K</th>
</tr>
</thead>
<tbody>
<tr>
<td>First engine to test</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tested in flying testbed</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>N/A</td>
<td>✓</td>
<td>✓</td>
<td>2017</td>
<td>N/A</td>
</tr>
<tr>
<td>Engine certification</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>2019</td>
<td>2018*</td>
</tr>
<tr>
<td>First flight</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>2019</td>
<td>✓</td>
</tr>
<tr>
<td>Entry into service</td>
<td>✓</td>
<td>✓</td>
<td>2021</td>
<td>2019</td>
<td>2018</td>
<td>2018</td>
<td>2020</td>
<td>2019</td>
</tr>
</tbody>
</table>

With PW1200G and PW1900G two more Geared Turbofan engines were certified in 2017

* T408: Certification of whole aircraft system after flight testing
MTU’s contribution to the Geared Turbofan (GTF) family

Key components of GTF technology

- Low fuel consumption and less noise plus advanced maintainability based on latest MTU technology

Advanced aero-structural HPC design
- High efficiency
- Robust dynamic behavior
- Minimum weight

High speed LPT design
- Minimum stage and airfoil count
- Low aero loading and high efficiency
- High blade interaction frequency and natural low noise design

3 stage LPT

4 stage HPC front block

30% of PW1100G-JM engine assembly at MTU
MTU’s contribution to the Geared Turbofan (GTF) family
A very successful product family

Medium bypass
direct drive turbofan

High bypass
geared turbofan

**Large core**

- PW814: Gulfstream G500
- PW815: Gulfstream G600
- PW1100G-JM: Airbus A319neo, A320neo and A321neo
- PW1400G-JM: Irkut MS-21
- ~81” Fan

**Medium core**

- PW814: Gulfstream G500
- PW815: Gulfstream G600
- PW1900G: Embraer E190-E2
- PW1500G: Bombardier C-Series CS100 and CS300
- ~73” Fan

**Small core**

- PW1200G: Mitsubishi Regional Jet
- PW1700G: Embraer E175-E2
- ~56” Fan

The GTF product family powers eleven different aircraft and provides a wide range of thrust
GTF in-service and flying
Deliveries and in-service experience

- 18 airlines are now operating 111 aircraft powered by GTF engines
- The engines have already accomplished more than 400,000 flights
- Dispatch reliability is still high at 99.9%
- Flight test program for other GTF applications (MRJ, MC21 and E2) is on track
- Focus is on
  - Ramp-up of the supply chain and delivery performance
  - Progress re early technical removal engines: integration of new bearing no. 3 seal and advanced combustion chamber
  - Lease engines for airlines
### OEM production status and ramp-up

#### Ramp-up figures

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2017</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Turbines</strong></td>
<td>800</td>
<td>1,300</td>
<td>1,750</td>
</tr>
<tr>
<td><strong>Compressors</strong></td>
<td>200</td>
<td>750</td>
<td>1,650</td>
</tr>
<tr>
<td><strong>Turbine Center Frames</strong></td>
<td>50</td>
<td>250</td>
<td>300</td>
</tr>
<tr>
<td><strong>Engine Assembly</strong></td>
<td>50</td>
<td>150</td>
<td>300</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,100</td>
<td>2,450</td>
<td>4,000</td>
</tr>
</tbody>
</table>

Volume increases by a factor of 4 in one decade
OEM production status and ramp-up
Achievements and lessons learnt

- Quality is at a high level, internal production challenges have been fixed
- Capacities and workload are continuously rising according to the OEM production strategy
- Internal capacity requirements will grow 20% in 2018
- Actions such as advancing and increasing in-house capacity and buffer material were initiated

OEM production growth rate will be at its maximum in 2018 and 2019
MRO status and ramp-up

Major MRO sites

MTU Maintenance Hannover
- NB + WB engines

MTU Maintenance Berlin-Brandenburg
- RJ + BJ engines
- IGT

MTU Maintenance Canada
- NB + WB engines
- NB + WB accessories

MTU Maintenance Lease Services
- RJ + NB + WB engine lease
- Asset management

EME Aero – Engine Maintenance Europe
- NB engines

MTU Maintenance Zhuhai
- NB engines

Airfoil Services (ASSB)
- NB + WB parts repair

Four active facilities for engine MRO with one more in the near future – EME Aero
MRO status and ramp-up
Achievements and lessons learnt

- High workload and utilization at all MRO sites due to high customer demand
- MRO production strategy was updated to implement the best allocation of engines
- PW1100G-JM warranty program established at MTU Hannover
- Actions to secure a high production output such as infrastructure and workforce expansion were initiated

MRO sites will have a high workload in 2018
MRO expansion strategy
Expansion of MRO capacity with focus on best-cost

- Total capacity increase ~50%
- High-cost countries: short-term increase of workforce
- Best-cost countries: doubling of capacities
- Best-cost share will raise from 30% to 50%

Long-term growth will be at best-cost sites within the MRO network
MRO expansion strategy
MTU Zhuhai: Growing portfolio and customer base requires increase of capacity

- 50:50 JV with China Southern since 2001
- Current capacity ~300 shop visits after extension in 2012 (+50%)
- Workforce ~800
- ~50% of visits are from 3rd party airlines
- Growing customer base
- Current portfolio: V2500 and CFM56
- Target to expand to new engine platforms
- Increase capacity by another 50%

Today: no.1 MRO Shop in China and most efficient NB MRO shop world-wide
MRO expansion strategy
EME Aero: New GTF MRO facility

- Company founded December 2017
- 50:50 joint venture with LHT
- Total investment of €150m
- One product shop: GTF only
- Start of operations in 2020
- Work force max. ~ 800 employees
- Full utilization of capacity in 2028

The new shop will have a key role in the GTF MRO network
Cost Leadership:
Higher Automation and Flexibility at MTU Munich
Dr. Rainer Martens, Chief Operating Officer

Munich, 12th December 2017
OEM production strategy
Strategic set-up

MTU Aero Engines Munich: High-tech
- Sophisticated parts and production processes
- Automation
- Development of new production technologies
- Know-how to support all MTU sites and suppliers

MTU Aero Engines Polska: Mid-tech
- Adopting established parts and production lines
- Improvement of parts and production processes
- Module assembly improved with know-how transferred from automotive industry

Suppliers: Raw material, mid and low-tech
- Raw parts
- Finished parts as second source
- Low-tech parts from best-cost countries
High level of automation
Increase in capacity demands higher operator and machine/process hours

Level of automation was continuously increased in recent years
High level of automation

Key elements of the new blisk machining shop

- Blisk = Blade Integrated Disk
- One-piece-flow
- High level of process control
- More-machine-operation for every employee
- Machine running time more than 6,000 hours p.a.
- Centralized logistics and automated system
- Centralized cooling fluid supply and chip removal
- Well water used for climate control and energy retrieval

Blisk production capabilities are state of the art
High level of flexibility with newest production technologies
Flexible manufacturing system for blades and vanes

**Traditional set-up**
- Fixed tact
- One machine for one operation
- No data collection from processes
- Usual machine running times > 5,000 hours p.a.

**Advanced set-up**
- Variable tact
- One machine for several operations: finish cutting
- Data collection from processes implemented

**Flexible manufacturing system**
- Same as advanced set-up
- Automated retooling processes
- Unmanned production
- Extended machine running times ~ 7,000 hours p.a.

The flexible manufacturing system will be unique for this kind of engine parts
Technology Roadmap and Key Enabler
Lars Wagner, Executive Vice President OEM-Operations

Munich, 12th December 2017
Key technology drivers and enablers
Continuous demand for innovation

- Ensure competitiveness based on reliable, attractive products
- Achieve aggressive production and maintenance target costs
- Strong IP management ensuring effective patent portfolio

- Meet challenging environmental goals for:
  - Fuel burn
  - Emissions CO$_2$ and NO$_x$
  - Noise

- Establish virtual engine capabilities and simulation methods
- Facilitate earlier prototype testing
- Leverage digitization, e.g. smart and shared data
- Encourage and stimulate creativity of our employees

Innovation is key for our success
Environmental challenges

CO₂ development as an example

Air traffic
Growth +5% per year

CO₂ emission with business as usual
Efficiency +2% per year

ICAO & IATA targets:
• CO₂ neutral growth beginning 2020
• Until 2050 50% absolute reduction of CO₂ emissions relative to 2005

Highly demanding targets are only achievable with revolutionary progress
MTU’s approach CLAIRE – Clean Air Engine
Vision 2020 and Flightpath 2050 targets

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2015</th>
<th>2030</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPR</td>
<td>5</td>
<td>12</td>
<td>&gt; 14</td>
<td>&gt; 20</td>
</tr>
<tr>
<td>OPR</td>
<td>36</td>
<td>46</td>
<td>60</td>
<td>70</td>
</tr>
</tbody>
</table>

Today’s air traffic between Europe and the US

Evolutionary development of engines until 2030, revolutionary ideas needed for 2050

- **BASE**: V2500
- **CLAIRE 1**: Geared turbofan engine
- **CLAIRE 2**: Next generation engine
- **CLAIRE 3**: Future propulsion concepts

**BPR**: Bypass ratio
**OPR**: Overall pressure ratio

<table>
<thead>
<tr>
<th><strong>Δ CO₂ %</strong></th>
<th><strong>Δ Noise %</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>15%</td>
<td>40%</td>
</tr>
<tr>
<td>25%</td>
<td>50%</td>
</tr>
<tr>
<td>40%</td>
<td>65%</td>
</tr>
</tbody>
</table>

© MTU Aero Engines AG. The information contained herein is proprietary to the MTU Aero Engines group companies.
Future propulsion system development

The Geared Turbofan engine concept offers a substantial improvement potential
MTU’s leading technology roadmap supporting engines for entry into service in 2030+
Additional 10% CO₂ and noise reduction relative to GTF engines

Technology roadmap established to achieve demanding next generation engine targets
Additive manufacturing
Increase of complexity and share of AM parts in aero engines

Additive manufacturing will be a key enabler for the new engine generation

Source: CIAM*

© MTU Aero Engines AG. The information contained herein is proprietary to the MTU Aero Engines group companies.
Intensive use and development of simulation tools
Integrated computational manufacturing and materials engineering (ICM2E)

Manufacturing processes:
• Reduction of machining trials
• Optimization of tools and CNC processes
• Multi-scale approach

Material development:
• Numerical design of new materials
• Predict texture and microstructures
• Generate material characteristics

Simulation to optimize & develop manufacturing processes and materials much faster at less cost

Simulation of additive manufacturing

Simulation of electro-chemical machining
Conclusion

- Development milestones for all new engine programs are secured
- GTF engines have proven their game changing performance
- Corrective actions have been implemented to increase GTF reliability and durability
- 2018 and 2019 will see highest OEM growth rates triggered by GTF
- MRO workload will continuously increase leading to further expansion strategy
- MTU’s automation and best-cost initiatives secure high profitability
- MTU’s high-sophisticated technology roadmap paves the way to the next gen engine

...looking forward to answering your questions!
Site plan of MTU in Munich
MTU goes Digital
Michael Schreyögg, Chief Program Officer

Munich, 12th December 2017
Impact of digitization on MTU’s business model

In B2C industries, digitization partly leads to a serious change in the business model.

For companies in B2B industries, process improvements are often the focus of attention.

Digitization will not fundamentally alter the business model of MTU in the medium term.
Digitization@ MTU focus on 4 areas of activity

- Work 4.0
- MRO 4.0
- Technology 4.0
- Production 4.0
Work 4.0

Robotic process automation
Automation of repetitive administrative tasks as well as ordering and procurement processes → increase in workflow efficiency and valuable tasks

IT security
Strengthening security precautions and digital collaboration

Unified collaboration & communication (UCC)
Continuous improvement of digital communication and collaboration, regardless of medium, place and device

E-learning
Developing innovative e-learning contents for employees

Investor & Analyst Day 2017 - Munich
12th December 2017
Technology 4.0

**Digital twin**
Pooling together value adding data from development activities to MRO

**Virtual engine**
Design, development, manufacturing, assembly, certification and maintenance of engine components by virtual engine simulations

**Material & manufacturing simulation**
Achievement of considerable savings in development and testing of new materials and manufacturing techniques by simulation
Digital twin – Enabler for efficient and adaptive production processes

Product lifecycle management as basis for the digital twin
Production 4.0

Intelligent machine control
Digital control of largely automated processes including consideration of all necessary resources

Additive manufacturing
Ensures process capability and industrialization of additive manufacturing

Optimized material flow/Logistics 4.0
Optimization of turn around times and inventories with increasing productivity and competitive production costs
MRO and aftermarket 4.0

Predictive maintenance (ETM)
Engine Trend Monitoring monitors the condition of engines during flight and after

Predictive analytics
Analyze comprehensive and complex data volumes for patterns and correlations
Predictive analytics improves engine lifecycle management

Data creation and usage within MTU

Data Sources

- Development & production
- MRO inspections
- Engine usage

MTU data pool & advanced analytics

Data applications

- Simulation
- Lifecycle management
- Technology & Product Improvements
- Planning & Evaluation
- Contract & Risk Management
- Services & Customer Support

MTU leverages its big data pool and modern advanced analytics technologies to improve efficiency and quality in engineering, OEM contracts and MRO processes
The ‘big five’ digitization projects are already in implementation

Timeline overview

2017 2018 2019 2020 2021 2022

- Digitization Strategy
- Integrated Digitization Competence Teams (Business + IT)

‘Big Five’ Projects

- Robotic process automation
  - Group-wide Roll-Out
- Digital twin
- Intelligent machine control
  - Roll-Out to Maintenance
- Optimized material flow / Logistics 4.0
- Predictive analytics & services
  - Increased use of artificial intelligence
Military Business –
Defense budget - driver for future growth?
Michael Schreyögg, Chief Program Officer

Munich, 12th December 2017
German defense budget 2018-2025 will increase in average by €1.3 bn or 3.4 % (nominal) annually.
German defense budget equals 1.2% of the GDP on average
Annual growth rate of ~3.4% confirmed by German government

To reach the target of 2% GDP, the defense budget would have to grow by 17% or €9 bn annually
Military aircraft equipment equals 5-6% of total German defense budget

Investment in military aircraft equipment expected to increase by ~5% annually
# Military business outlook

<table>
<thead>
<tr>
<th>Year</th>
<th>Fighter, trainer</th>
<th>Transport</th>
<th>Helicopter</th>
<th>Export</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>Eurofighter EJ200</td>
<td>A400M TP400</td>
<td>CH-53K T408</td>
<td>Eurofighter, Kuwait, Qatar, Saudi Arabia</td>
</tr>
<tr>
<td>2020</td>
<td>Eurofighter Upgrade, Tranche 1 replacement</td>
<td>KC390 V2500</td>
<td></td>
<td>A400M</td>
</tr>
<tr>
<td>2025</td>
<td></td>
<td></td>
<td></td>
<td>CH-53K</td>
</tr>
<tr>
<td>2030</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2035</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Export potential:
- A400M
- CH-53K
NGWS market landscape – potential partner countries

- Rafale add on
- Gripen supplement
- F18 replacement
- Tornado replacement

JSF partner countries
NGWS “initiator”
Potential NGWS Partner Nations (D, F, SP and SW)
MTU Military revenue outlook 2017 to 2027 (in €m)

- **Series**
- **Aftermarket/services**
- **Upside mainly through export**

- **2017**
  - TP400 ramped up

- **2022**
  - T408 strong revenue contribution

- **2027**
  - Strong export potential

- CAGR up low single digit
- ~ €400 m
- ~ €450 m
- ~ €500 m

© MTU Aero Engines AG. The information contained herein is proprietary to the MTU Aero Engines group companies.
MRO Strategy – Mastering future growth
Michael Schreyögg, Chief Program Officer

Munich, 12th December 2017
MRO revenues increased over proportional over the last 2 years

MRO revenues 2015 – 2017 (in € m)

<table>
<thead>
<tr>
<th></th>
<th>CAGR 2015 – 2017 (organic (US$))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Market</td>
<td>High single digit</td>
</tr>
<tr>
<td>MTU-MRO</td>
<td>Up high teens</td>
</tr>
</tbody>
</table>

- MRO revenues grew stronger than the market
- Main revenue driver: V2500, CF34, GTF
- Strong growth of engine lease and asset management business

Actual 2015: 1,580
Actual 2016: 1,914
Estimate 2017: ~2,200

Organic (US$) +21%
Organic (US$) up mid to high teens
~2,200
MTU Maintenance centers of excellence

MTU Maintenance Hannover
- Revenue growth 2017 ~20%
- NB + WB engines

MTU Maintenance Berlin-Brandenburg
- Revenue growth 2017 ~20%
- BJ + RJ + IGT

MTU Maintenance Canada
- NB + WB engines
- NB + WB accessories

MTU Maintenance Hannover
- Revenue growth 2017 ~20%
- NB + WB engines

MTU Maintenance Berlin-Brandenburg
- Revenue growth 2017 ~20%
- BJ + RJ + IGT

Airfoil Services (ASSB)
- Revenue growth in 2017 ~25%
- JV with LH Technik
- NB + WB parts repair

MTU Maintenance Lease Services
- Revenue growth 2017 ~100%
- RJ + NB + WB engine lease and asset management

MTU Maintenance Zhuhai
- Revenue growth 2017 ~20%
- No.1 MRO shop in China
- NB engines
Future MRO volume growth mainly driven by new engine platforms

No. of shop visits

<table>
<thead>
<tr>
<th>CAGR</th>
<th>Market</th>
<th>MTU served market</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016-2027</td>
<td>Low single digit</td>
<td>Mid to high single digit</td>
</tr>
</tbody>
</table>

MTU is very well positioned in the MRO market:

- 2 different points of access: independent, OEM co-operation
- Largest engine maintenance portfolio worldwide with ~30 different engine types
- Strong position on growth platforms such as V2500, CFM56, CF34 and GE90G
- Stable development of mature engine platforms supported by environment of low oil prices
- Future growth mainly driven by new engine platforms

*) incl. 100% MTU Zhuhai Shop Visits

Expansion of MTU MRO network to cope with future growth volume
As the majority of new engine platforms are sold with OEM flight hour agreements more shop visits will be subcontracted by the OEM.

MTU expects to grow in both market segments with stronger growth in OEM cooperation business, leading to increasing pressure on profitability.

incl. companies consolidated at equity
Expansion of MRO capacity with clear focus on best cost initiated

Capacity needs vs. availability

- Total capacity increase ~50%
- High cost countries: short-term increase of workstaff
- Low-cost countries: doubling of capacity
- Low-cost portion to total capacity increases from 30% to 50%
Measures to increase profitability
Labor cost is not the only way to improve profitability

<table>
<thead>
<tr>
<th>Cost structure MRO (i.e. V2500 Indep.)</th>
<th>Measures of cost reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Added Value (Labor etc.)</td>
<td>Expand low-cost footprint</td>
</tr>
<tr>
<td>New Material</td>
<td>Repair development, repair licences, low cost shops</td>
</tr>
<tr>
<td>Limited impact</td>
<td>Gain access to used material through teardown engines</td>
</tr>
<tr>
<td></td>
<td>LLP-Management, material deals, efficient workscoping</td>
</tr>
</tbody>
</table>
MTU MRO “Three X“ strategy addresses key elements to secure profitable growth

Sales strategy
Alignment of sales structure and focus on cooperations with airlines, lessors and OEMs.

Service portfolio
Offering TEC® and integrated solutions such as leasing, alternatives to MRO, engine life extension and end-of-life solutions.

Proposals
Customized proposals offering, ‘one stop shop‘ solutions, financially-optimized workscoping.

Purchasing
Cost reduction through LLP Management and material deals, teardown co-operations.

Operations
Expansion of low cost footprint and flexibility in operations. Use of digitization initiatives.

Repairs
Expansion of repair portfolio. Development of alternative part repair practices to avoid new material cost.

„Three X“ does not leave any stone unturned for long term success
Future landscape of MRO locations

MTU Maintenance Hannover
- Short-term increase in personnel
- GTF maintenance
- Expansion repair technologies

MTU Maintenance Berlin-Brandenburg
- New logistics center
- Expansion of BJ portfolio

EME AERO
New GTF MRO shop
- 50:50 JV with LHT
- Facility in best cost region
- Start in 2020

MTU Maintenance Zhuhai
- Expand customer base and grow NB engine portfolio
- Increase capacity

MTU Maintenance Canada
- 3rd MRO shop for V2500
- Growth strategy for accessories business

MTU Maintenance Lease Services
- Expansion of engine lease pool and asset management

Airfoil Services (ASSB)
- Dedicated to parts repair – now and in the future
- Program expansion

All locations are getting ready to efficiently master future growth
Introduction of the GTF: Keeping a long term perspective (compared to the V2500)

Michael Schreyögg, Chief Program Officer

Munich, 12th December 2017
# Bold technology required to deliver step changes in fuel burn, range and noise

## JT8D
- Entry into Service (EIS) 1964
- <22 klbf
- Bypass ratio 1.0-2.0
- Program share 12.5% (MD-80)
- Boeing 727, MD-80

## V2500
- EIS 1989
- <33 klbf
- Bypass ratio 5.0
- 18% improved fuel efficiency
- Improvement through A5, Select 1 and 2
- Program share 16% (2012+)
- A320, Boeing MD90, KC-390

## PW1000G
- EIS 2016
- <35 klbf
- Bypass ratio 12.0
- Gear technology
- 16% improved fuel efficiency with further potential
- Program share 18% (A320neo)
- A320neo, CS, ERJ, MRJ, Irkut
Pioneering engine programs have rarely been exempt from introductory issues

<table>
<thead>
<tr>
<th></th>
<th>V2500</th>
<th>PW1000G</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R&amp;D</strong></td>
<td>• 1983-88</td>
<td>• 2011-15</td>
</tr>
<tr>
<td></td>
<td>• Early development shortcomings</td>
<td>• No major issues</td>
</tr>
<tr>
<td><strong>EIS</strong></td>
<td>• 100 engines delivered in first 2 years</td>
<td>• 500 engines delivered in first 2 years</td>
</tr>
<tr>
<td></td>
<td>• Early technical removals and reconfigurations</td>
<td>• Early technical removals and reconfigurations</td>
</tr>
<tr>
<td></td>
<td>• High pressure compressor issues</td>
<td>• Motor to start time &amp; nuisance messages solved</td>
</tr>
<tr>
<td></td>
<td>• Combustor upgrade to prevent premature engine removal</td>
<td>• Combustor upgrades underway</td>
</tr>
<tr>
<td></td>
<td>• Level of durability does not meet customer expectations until “1992</td>
<td>• Alternate design of no. 3 carbon oil seal</td>
</tr>
<tr>
<td></td>
<td>standard”</td>
<td>• AOG situation solved</td>
</tr>
<tr>
<td></td>
<td>• ETOPS 120min in 1994</td>
<td>• ETOPS 120min in 2016</td>
</tr>
<tr>
<td></td>
<td>ETOPS 180min in 2006</td>
<td>• ETOPS 180min in 2017</td>
</tr>
</tbody>
</table>
The GTF history in numbers

Unprecedented ramp-up for MTU and its partners, driven by bestseller A320neo and other aircraft applications

Source: Fleetanalyzer, MTU
MTU expects the fast-growing engine fleet to peak at 15,000

The GTF engine fleet will outnumber its predecessors by a factor >2
Fleet requirement will lead to unprecedented aftermarket demand

The GTF family is forecast to peak at 2 to 3 times what the V2500 is experiencing

Source: MTU
Geared Turbofan @ MTU: The long term perspective

~$90 bn Revenues

~15,000 engines

~1 bn flight hours

~50,000 shopvisits

...looking forward to answering your questions!
MTU’s Financials and Outlook: Ramping up Cash Conversion
Peter Kameritsch, SVP Finance
Munich, 12th December 2017
Contents

1. IFRS15 @ MTU
2. Updated Order Book Definition
3. Review Investment Phase 2014 – 2017
4. Outlook 2018
5. Long Term Outlook
6. Cash Deployment Strategy
## IFRS 15 @ MTU – Implications on MTU accounts

<table>
<thead>
<tr>
<th>Main accounting issues</th>
<th>Current accounting</th>
<th>Future accounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Payments to customer (OEM) to compensate program expenses, e.g. concessions</td>
<td>▪ Cost of goods sold</td>
<td>▪ Reduction in revenue</td>
</tr>
<tr>
<td>2 Capitalized program entry fee and compensation payments for development costs</td>
<td>▪ Amortization of capitalized payments over program term within Cost of goods sold</td>
<td>▪ Amortization of capitalized payments reducing revenues</td>
</tr>
<tr>
<td>3 Presentation of expensed R&amp;D related to program development</td>
<td>▪ R&amp;D expense for payments to customers and in-house efforts</td>
<td>▪ Reduction of Revenue for payments to customers ▪ COGS for in-house efforts</td>
</tr>
<tr>
<td>4 Timing of revenue recognition (and corresponding COGS)</td>
<td>▪ Over-time revenue recognition for military development and production ▪ Revenue recognition on delivery from MTU consignment stock</td>
<td>▪ Over-time revenue recognition for ongoing military development only ▪ Revenue recognition on delivery to MTU consignment stock</td>
</tr>
</tbody>
</table>
### IFRS 15 @ MTU – reconciliation based on results FY 2016 (in € m)

<table>
<thead>
<tr>
<th>Revenues</th>
<th>Pre IFRS15 (as reported)</th>
<th>Post IFRS15 FY2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2016</td>
<td>4.733</td>
<td>3.288</td>
</tr>
<tr>
<td></td>
<td>-1.378</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-1.445</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EBIT adj.</th>
<th>Pre IFRS15 (as reported)</th>
<th>Post IFRS15 FY2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2016</td>
<td>503</td>
<td>485</td>
</tr>
<tr>
<td>10.6% Margin</td>
<td></td>
<td>14.8% Margin</td>
</tr>
</tbody>
</table>
Updated order book definition

<table>
<thead>
<tr>
<th>Main changes</th>
<th>Old definition</th>
<th>New definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFRS15</td>
<td></td>
<td>▪ Order book definition corresponds to IFRS 15 revenue recognition scheme (i.e. net-revenue basis)</td>
</tr>
<tr>
<td>IAE/GE long-term service agreements (FHAs)</td>
<td>▪ Considered only in MRO for max. 10 years</td>
<td>▪ Consideration in both segments with consolidation on group level</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Basis: business case</td>
</tr>
<tr>
<td>Price basis</td>
<td>▪ Consideration of total business case revenues incl. escalation in MRO segment</td>
<td>▪ Price basis is the current year in all businesses</td>
</tr>
</tbody>
</table>

**General assumptions:**

- Only firm and exclusive contracts considered
- Order book included until expiry of contract
Updated order book definition

Reconciliation based on order book Dec. 31st 2016 (in € bn):

Order Book 2016 as reported
  IFRS 15 OEM segment
  Inclusion OEM FHAs OEM segment
  Inclusion OEM FHAs MRO segment
  Consolidation Group
  Price Basis 2016 MRO segment

Order Book 2016 NEW

-6.5 +6.1 +4.1 -2.3 -1.4 +0.1

14.2 14.3
Flashback CMD 2015:
Long-term outlook 2014-2025 - our initial commitments

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenues</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Military:</td>
<td>➡</td>
<td>Military:</td>
</tr>
<tr>
<td>Com. OE:</td>
<td>⬆</td>
<td>Com. OE:</td>
</tr>
<tr>
<td>Com. spares:</td>
<td>⬆</td>
<td>Com. spares:</td>
</tr>
<tr>
<td>Com. MRO:</td>
<td>⬆⬆</td>
<td>Com. MRO:</td>
</tr>
<tr>
<td><strong>EBIT adjusted</strong></td>
<td>Growth in line with revenue</td>
<td>Growth stronger than revenue</td>
</tr>
<tr>
<td><strong>Net Income adj.</strong></td>
<td>Growth stronger than EBIT adj.</td>
<td>Growth in line with EBIT adj.</td>
</tr>
<tr>
<td>*<em>CCR</em></td>
<td>Low double digit %</td>
<td>High double digit %</td>
</tr>
</tbody>
</table>

* Cash Conversion Rate = Free Cash Flow/Net Income adj.
...our status today: Stronger aftermarket and delay in new programs

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Military:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial OE:</td>
<td>↑</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
<td>↑</td>
<td></td>
</tr>
<tr>
<td>Commercial Spares:</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td>↑</td>
<td></td>
</tr>
<tr>
<td>Commercial MRO:</td>
<td>↑</td>
<td></td>
<td>↑</td>
<td></td>
<td>↑</td>
<td></td>
</tr>
</tbody>
</table>

Compared to our initial planning we faced a stronger than expected demand in aftermarket (Spares & MRO) and a slight delay in Military and Com. OE
The bottom line: Change in business mix lead to an overperformance in investment phase

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIT adjusted Margin</td>
<td>~10%</td>
<td>~10%</td>
<td>~11%</td>
<td>~12%</td>
<td>Growth stronger than revenue</td>
</tr>
<tr>
<td>Net Income adj.</td>
<td>€ 253 m</td>
<td>€ 307 m</td>
<td>€ 345 m</td>
<td>~€ 420 m</td>
<td>Growth stronger than EBIT</td>
</tr>
<tr>
<td>CCR*</td>
<td>17%</td>
<td>22%</td>
<td>24%</td>
<td>~33%</td>
<td>Low double digit %</td>
</tr>
</tbody>
</table>

The better underlying business mix lead to an improvement of EBIT adj. margin in the investment phase already

* Cash Conversion Rate = Free Cash Flow/Net Income adj.
The year 2018: Transition into consolidation phase

Tailwinds will overcompensate headwinds from GTF growth

- Doubling of GTF volumes drives up OE losses
  - Improved margin from OE business due to lower cost per unit
  - Ongoing strong growth of aftermarket (Com. Spares & MRO)
  - Retrofit shopvisits for GTF drive MRO revenue but not profits
  - Will tailwind from mature engine types in aftermarket persist
  - Slight tailwind from FX
  - Less headwind from working capital

12th December 2017
The year 2018: Transition into consolidation phase

<table>
<thead>
<tr>
<th>2018 Main drivers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Military:</td>
<td>Stable</td>
</tr>
<tr>
<td>Commercial OE:</td>
<td>Up ~30%</td>
</tr>
<tr>
<td>Commercial Spares:</td>
<td>Up mid single digit</td>
</tr>
<tr>
<td>Commercial MRO:</td>
<td>Up in the high teens</td>
</tr>
<tr>
<td>EBIT adj.</td>
<td>Moderate progression</td>
</tr>
<tr>
<td>Free Cashflow</td>
<td>Growth stronger than Net Income adj. (CCR* up)</td>
</tr>
</tbody>
</table>

* Cash Conversion Rate = Free Cash Flow/Net Income adj.
2019 onwards...further consolidation of EBIT and Free Cashflow

### Long-term trends at MTU 2019 - 2025

- Further improvement of OE margins due to pricing
- OE growth will stabilize from 2019 onwards
- Ongoing strong growth of spares and MRO business
- Spares sales growth will outperform OE growth
  - MRO margin will remain under pressure
- FX might turn into a headwind
- 2020ff shows opportunities to re-grow military business
## Long term outlook 2019-2025 update: Improved Free Cashflow conversion reconfirmed

<table>
<thead>
<tr>
<th></th>
<th>Consolidation phase 2019-2025</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Net income adj.</strong></td>
<td>Steady growth</td>
</tr>
<tr>
<td><strong>Working capital</strong></td>
<td>Growing less than revenues</td>
</tr>
<tr>
<td></td>
<td>+ No consumption of prepayments</td>
</tr>
<tr>
<td></td>
<td>+ Inventory turns will improve</td>
</tr>
<tr>
<td></td>
<td>+ More FHAs with preferential Cashflow profile</td>
</tr>
<tr>
<td><strong>CF from investing</strong></td>
<td>Will go into decline</td>
</tr>
<tr>
<td></td>
<td>+ Less payments for intangibles</td>
</tr>
<tr>
<td></td>
<td>+ Less spendings for capacity build-up (PPE)</td>
</tr>
<tr>
<td></td>
<td>+ R&amp;D capitalization declines as programs enter into service</td>
</tr>
<tr>
<td>*<em>CCR</em></td>
<td>High double digit %</td>
</tr>
</tbody>
</table>

* Cash Conversion Rate = Free Cash Flow/Net Income adj.
Cash deployment 2019 - 25

Main targets in Consolidation Phase

- Keep investment grade rating
- Limit de-leveraging
- Increased participation of shareholders in returns
- Remain prepared for next investment phase after 2025

MTU’s target is a balanced leverage ratio in the range of 1 x net Debt / EBITDA
# Cash deployment 2019 - 25: The instruments

<table>
<thead>
<tr>
<th>Prio</th>
<th>Instrument</th>
<th>Investment phase 2014-17</th>
<th>Consolidation phase 2018 - 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Investment in organic growth</td>
<td>Strong investment in new programs</td>
<td>Limited opportunities</td>
</tr>
<tr>
<td>II</td>
<td>Dividend deployment</td>
<td>Growth in line with net income</td>
<td>Growth stronger than net income</td>
</tr>
<tr>
<td>III</td>
<td>Share buyback programs</td>
<td>No buyback programs as cash conversion low</td>
<td>Instrument to limit deleveraging</td>
</tr>
<tr>
<td>IV</td>
<td>M&amp;A</td>
<td>No suitable targets in aircraft engine market</td>
<td>No new targets expected</td>
</tr>
</tbody>
</table>
...looking forward to answering your questions!
MTU’s route 2030
Reiner Winkler, Chief Executive Officer

Munich, 12th December 2017
Global aircraft engine market is expected to continue its growth path in the next 10 years

Source: MTU/ASM Mai 2017
Corporate Strategy

Balanced Portfolio

Benchmark Competitiveness

Profitable Growth

Customer Satisfaction

Leading Technology

Innovative Culture
Possible new program opportunities in the narrowbody market

<table>
<thead>
<tr>
<th>NB</th>
<th>In production</th>
<th>Future programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIRBUS</td>
<td>A320ceo/neo</td>
<td>A321neo</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A321neo stretch?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NGSA Airbus</td>
</tr>
<tr>
<td>BOEING</td>
<td>737NG</td>
<td>MAX8/9/7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MAX10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NGSA Boeing</td>
</tr>
<tr>
<td>BOMBARDIER</td>
<td>C Series</td>
<td>CS 300 stretch?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Potential Next Generation Single Aisle(s) (NGSA) from new entrant(s)</td>
</tr>
<tr>
<td>COMAC</td>
<td></td>
<td>C919</td>
</tr>
<tr>
<td>IRKUT/HAPIT</td>
<td>MS-21</td>
<td></td>
</tr>
</tbody>
</table>

Source: MTU

Window of opportunity for further market share gains opens up in the ‘30s

2017

2030

Entry into Service
Widebody – landscape seems to be set mid term

**In production**
- **AIRBUS**
  - A380-800
  - A350-900
  - A330-200/300
- **BOEING**
  - 747-8I/F
  - 777-300ER
  - 787-9
  - 787-8

**Future programs**
- **AIRBUS**
  - A350-1000
  - A330neo
  - A330 successor?
- **BOEING**
  - 777-9 stretch?
  - 787-10
  - 787-8
  - NMA (MoM)?
  - 787 successor?

Source: MTU

If new midsize aircraft will be launched it might trigger reaction by Airbus
MTU is targeting growth by extending RSP share in future programs.

MTU has excellent expertise in various components and is well positioned to increase its footprint in next generation of engines.
MTU Strategic roadmap 2030

<table>
<thead>
<tr>
<th>Balanced Portfolio</th>
<th>2017</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEM partnering</td>
<td></td>
<td>With PW and GE + Higher program shares</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent MRO &amp; airline partnering</td>
<td></td>
<td># 1 in indep. MRO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Military business</td>
<td></td>
<td></td>
<td>Export, NGWS</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Leading Technology</th>
<th>2017</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated HPC and high-speed LPT &amp; TCF</td>
<td></td>
<td>Gen2 GTF, adv. TCF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New materials &amp; advanced manufacturing</td>
<td></td>
<td>Gen2 GTF, adv. TCF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life-cycle cost optimization</td>
<td></td>
<td>↓ Low double digit GTF vs V2500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benchmark Competitiveness</th>
<th>2017</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEM-/MRO-network</td>
<td></td>
<td>40% best-cost share</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply chain &amp; logistic</td>
<td></td>
<td>Significant WOC-Reduction (% of sales)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benchmark quality</td>
<td></td>
<td>Reduced Q-cost per unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improvement programs: Efficiency, operational performance &amp; customer satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Innovative Culture</th>
<th>2017</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>People, Digitization &amp; IT, Innovation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
...looking forward to answering your questions!
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.

The company assumes no obligation to update any forward-looking statement.

Any securities referred to herein have not been and will not be registered under the U.S. Securities Act of 1933, as amended (the “Securities Act”), and may not be offered or sold without registration thereunder or pursuant to an available exemption therefrom. Any public offering of securities of MTU Aero Engines to be made in the United States would have to be made by means of a prospectus that would be obtainable from MTU Aero Engines and would contain detailed information about the issuer of the securities and its management, as well as financial statements.

Neither this document nor the information contained herein constitutes an offer to sell or the solicitation of an offer to buy any securities. These materials do not constitute an offer of securities for sale in the United States; the securities may not be offered or sold in the United States absent registration or an exemption from registration.

No money, securities or other consideration is being solicited, and, if sent in response to the information contained herein, will not be accepted.
Proprietary Notice

This document contains proprietary information of the MTU Aero Engines AG group companies. The document and its contents shall not be copied or disclosed to any third party or used for any purpose other than that for which it is provided, without the prior written agreement of MTU Aero Engines AG.