FACC // CAPITAL MARKETS DAY
DAY 1 – November 22, 2018
Presentations
GLOBAL MARKET FORECAST
GLOBAL MARKET FORECAST

Airbus and Boeing released their Global Market Forecast 2018

- 2017 Aerospace Industry results have been another “Record Year”
- Market consensus re-confirms long term growth to continue
- World annual traffic will double every 15 years
- 2018 – 2037 demand for 37,400 new commercial airplanes
- Market trends continue to develop
  - Growth shifts to Asia Pacific
  - Efficiency, Cost & Performance remain top line requirements
  - Single Aisle market dominating market rates and market value
GLOBAL MARKET FORECAST

2017 vs. 2018 comparison of market development KPI’s

<table>
<thead>
<tr>
<th>KPI</th>
<th>GMF17</th>
<th>GMF18</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP 20-year avg. growth</td>
<td>2.8%</td>
<td>2.8%</td>
</tr>
<tr>
<td>RPK 20-year avg. growth  start FLEET</td>
<td>4.4%</td>
<td>4.4%</td>
</tr>
<tr>
<td>end FLEET</td>
<td>42,530</td>
<td>47,990</td>
</tr>
<tr>
<td>20-year NEW DELIVERIES</td>
<td>34,900</td>
<td>37,400</td>
</tr>
</tbody>
</table>

Source: Airbus GMF 2018
GLOBAL MARKET FORECAST

Airplane demand increased from 34,900 to 37,400

Source: Airbus GMF 2018
GLOBAL MARKET FORECAST

Is a Airplane demand of 37,400 real and how accurate are forecasts?
GLOBAL MARKET FORECAST

The growth market shifts from “West to East”

- The center of global GDP and RPM shifts south and east.
- Asia Pacific region will grow the most.
- In 2017, 30% of emerging country population took a flight.
- In 2037, 85% of emerging country population will take a flight.
- US and Europe will grow too, but less intense.
GLOBAL MARKET FORECAST

In the past 20 years, there was a shift in airplane size demand

- The travel desire of people is changing
- Point to Point travel is in favor of using hub systems
- Between 1997 and 2017, the demand in Single Aisle airplane increases by 4%
- This trend is expected to continue in the next 20 years
- Further, single aisle seat capacity is growing
GLOBAL MARKET FORECAST
Production & delivery rates with solid growth

- **Commercial Aircraft**: Dynamic increase until 2020 (mostly driven by several ramp ups) and a more moderate growth afterwards
  → *Overall growth driven from growing GDP particularly in emerging markets.*

- **Business Jets**: benefiting from increasing GDP until 2020 with stable rates afterwards

- **Regional Jets**: Constant over time

Source: CLIENT, TEAL, Roland Berger
GLOBAL MARKET SUMMARY

- Long Term Forecast confirmed by OEM’s
- Air traffic will double every 15 years
- Airplane model ramp ups support higher growth rates up to 2020
- Approx. 40,000 airplanes forecasted between 2018 and 2037
  - Narrow Bodys drive rate and value
- Geopolitical Dynamics to be considered
  - Global Footprint is enabler for growth
CUSTOMER TRENDS & EXPECTATIONS
FOUR OEM MEGA TRENDS

The Aerospace Industry will reshape ...

- Changing OEM landscape
- Next Generation Airplane Requirements
- New Supply Chain Model
- Strategic Partnership Approach and Life Cycle Service
TREND 1: CHANGING OEM LANDSCAPE

The industry will further consolidate

- **AIRBUS / Bombardier vs. BOEING / Embraer**
  - OEM Customer base further reduced
  - Cross Company alignment will increase pressure on supply chains
  - Market dominance from both will further grow

- **COMAC market entry with airplane family**
  - 3rd player in the industry
  - Airplane family concept under set up (ARJ 21, C919, CR929)
TREND 2: NEXT GENERATION REQUIREMENTS

Cost, performance and efficiency are key KPI’s

- Efficiency improvements and electrical systems
  - Laminar Flow, Bionic Surfaces, Electrical Engines

- Rate capability and Automation
  - Design for automation and digitalization
  - Life cycle monitoring

- Cost Reduction through new technologies
  - Material → Thermoplastics, SMC, ....
  - Process → Oven, Presses, 3D printing, ...
TREND 3: NEW SUPPLY CHAIN MODEL

Vertical integration, innovation and global sourcing

- Increased size of scope of the work packages triggered consolidation within the Tier 1 industry
- OEMs have experienced
  - negotiation power from consolidated Tier 1 suppliers
  - delivery issues which resulted in resourcing as well as insourcing of work packages
- OEMs counter-reaction
  - Set-up alternative sources
  - Insourcing & Vertical integration
TREND 4: SERVICE & PARTNERSHIP

Global Footprint, IP Sharing and Life Cycle Support

- Strategic Partnerships
  - Joined R&T and Product Development
  - IP sharing and participation
  - Global sourcing to support growing market demands
  - Strategy alignment for program life time support
OEM CUSTOMER TRENDS AND EXPECTATIONS

- OEM Customer Base will further consolidate
- Supply Chain model is in a transition phase
- Innovation, Globalization and Cost Competitiveness are key to increase market share
  - Provide technology for future airplane applications
  - Global production network to support OEM’s in growing markets
  - Partnership and OEM alignment on defined work packages
FACC VISION
2020 AND BEYOND
FACC STRATEGY

From 2020 into the next decade ...

- Vision 2020 Execution
- Mission critical factors
- Preparation for the next decade
OUR MISSION

WE DESIGN FUTURE MOBILITY WITH TOMORROW’S MATERIALS
VISION 2020 EXECUTION

... we are on track to fulfill our commitment

- **1 Billion** Euro Sales in FY 2020/21
- **Preferred Tier 1 Partner** to all OEMs
- **Technology-, Cost & Quality Leadership**
- **Sustainability** throughout increasing Profitability
- **Increasing Shareholder Value** from a constantly growing market share and innovation
<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerospace composite lightweight</td>
<td>100%</td>
</tr>
<tr>
<td>Engineering centers in Austria</td>
<td>2</td>
</tr>
<tr>
<td>Plants</td>
<td>5</td>
</tr>
<tr>
<td>Network of engineering- &amp; production locations in 13 countries</td>
<td>Global</td>
</tr>
<tr>
<td>Tier 1</td>
<td>Partner for all aerospace OEMs</td>
</tr>
<tr>
<td>YoY average growth</td>
<td>20%</td>
</tr>
<tr>
<td>Employees worldwide</td>
<td>3,500</td>
</tr>
<tr>
<td>Largest aerospace company in Austria</td>
<td>Nr. 1</td>
</tr>
<tr>
<td>Export</td>
<td>100%</td>
</tr>
<tr>
<td>Represented of every modern aircraft</td>
<td>All</td>
</tr>
</tbody>
</table>
FACC - WELL POSITIONED IN THE INDUSTRY

The Best for The Best

- FACC provides turn key solutions to all OEM’s
- Our value chain covers
  - R&T
  - Engineering & Certification
  - Global production
  - Worldwide MRO Coverage
UNIQUE IN PRODUCTS & TECHNOLOGY

Every second, FACC technology & innovation takes off with 100% dispatch reliability

AEROSTRUCTURES

ENGINES & NACELLES

CABIN INTERIORS

AFTERMARKET SERVICES
FACC STRATEGY - FACTORS

... that are supporting our execution of profitability and growth

1. Automation and Execution of cost reduction initiatives
2. Organic- and non-organic growth to increase market share beyond aerospace growth
FACC STRATEGY / FACTORS
Automation and further execution of cost reduction initiatives

- Internal efficiency targets are set for EBIT step changes
- 8% YoY increase of production efficiency
- 1.5% YoY constant material cost decrease
- Inventory reduction measures to reduce Working Capital
- Continued introduction of automation & digitalization
  - Achievement: 150 million USD sales output increase between 2016 and 2018 with same staff
  - Significant automation projects are in pipeline
- Low cost sourcing to reduce labor cost ratio
- Fixed cost control to benefit from growing volume effects
FACC STRATEGY FACTORS
... for organic and non-organic growth

- Innovations that provide technology for next generation airplanes
  - R&T Projects with customer in the pipeline
  - Increasing network with partner and universities

- Organic Growth
  - Benefit from 1 billion new contract boarded in 2017 and 2018
  - Increase market share from getting new contracts

- Non-organic Growth
  - Pursue M&A to increase FACC core business
  - Look after bolt on technology or vertical integration

- New market entry
  - Increase FACC MRO business to meet 100 Million target in 2022
  - Front runner in new mobility systems
FACC ROADMAP 2030

... a more sizeable and global technology & service company providing mobility solutions

- Further system integration capability
  - Aerostructures Primary Structure
  - Cabin System and market leadership in Business Jet Interior
  - Nacelle Systems & Engine Composite Casings

- Grow twice as fast as the overall market

- Increase footprint in all important markets

- Non-organic growth to increase market share and competence
URBAN AIR MOBILITY

FACC as a front-runner in advanced mobility solutions
URBAN AIR MOBILITY (UAM)

Three key topics

A huge opportunity
UAM business models are poised to take off and disrupt mobility markets and value chains

A multidisciplinary challenge
Setting up UAM operations requires technology and infrastructure development involving a wide range of industries

Things are getting real
First movers have already launched projects
DEVELOPMENT PROGRAMS

...the pace of program development is increasing

Known developments by date of announcement (cumulative, 2009-May 2018)\(^1\)

\[^{1}\) Excluding UAVs and purely recreational developments

+34\% p.a.

Source: Roland Berger Study "Aircraft Electrical Propulsion – Onwards and Upwards", 2018
UAM IS EXPECTED TO BECOME A SIGNIFICANT MARKET

... consisting of hardware, transportation of PAX and related services

Regional split of intra city market [%]

- **Asia Pacific**: 45.00%
- **Americas**: 30.00%
- **Europe and rest of the world**: 25.00%

**Passenger**

- **USD 21bn**
- **USD 11bn**
URBAN AIR MOBILITY

FACC’s and eHang Strategic Partnership

Joint Development
FACC engineering, certification and technology leadership in lightweight composite systems supports industrialization of product

Step by Step penetration of market
Cargo vehicle delivery for oil platform support and other mission considered first. Certification for further use to follow with market readiness in 3-5 years

Market penetration
Step by step increase of units built from 300 in 2021 up to > 1,000 p.a. before 2025
Innovation as a key factor for a strong partnership

VISION 2020

Safeguarding the increase in shareholder value, higher profitability and long-term growth with a revenue target of EUR 1 billion by financial year 2020/21

Technology, cost and quality leadership

Creation of a global customer, development and production network

Positioning as leading Tier 1 supplier

INNOVATION IS OUR DESTINATION
...BEYOND HORIZON
FACC // CAPITAL MARKETS DAY
Operational Excellence
Andreas Ockel – COO
Kurt Pieringer – VP Cabin Systems
CONTENTS

- Introduction
- Composite Materials
- Production process (video)
- Global operations footprint
- Operational excellence
- Operational challenges
- Takted production
- Automation / industry 4.0
USE OF COMPOSITE MATERIALS

Increasing utilisation thanks to superior characteristics
COMPOSITE OVERVIEW

Superior characteristics

Composites are defined by:

- Material of fibre / roving (glass fibre, aramid fibre, carbon fibre, ceramic fibre)
- Weave (plain / twill / satin)
- Fibre orientation
- Matrix (epoxy / phenol)
- Stack-up
- Usage of cores
- Process parameters
MATERIALS

Fibre technology
- Material
  - Glas fibre
  - Carbon fibre
  - Aramid fibre
  - Glass ceramics
- Geometry
  - UD Tape
  - Fabric
- Resin / matrix
  - Epoxy
  - Phenol
  - PMI

Honeycomb technology
- Material
  - Nomex core
  - Aluminium core
  - Glas-fibre core
- Geometry
  - Hexagonal
  - Over-expanded
  - Flexcore
COMPOSITE OVERVIEW

Numerous advantages

▪ Lighter than comparable metals

▪ Mechanical characteristics better than those of comparable light metals

▪ Low / no thermal expansion

▪ High fatigue strength at dynamic loads

▪ Structure can be adapted to mechanical requirements (acting forces / direction of forces)

▪ Complex geometrical shapes to be manufactured with less effort (compared to metal)
## COMPOSITE OVERVIEW

<table>
<thead>
<tr>
<th>Superior characteristics ...</th>
<th>... lead to tangible advantages</th>
<th>Real-life examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ 20%+ lower weight</td>
<td>✓ Fuel savings</td>
<td>✓ 787 Dreamliner</td>
</tr>
<tr>
<td></td>
<td>✓ Lower emissions</td>
<td>✓ 787 Dreamliner</td>
</tr>
<tr>
<td>✓ No corrosion</td>
<td>✓ Lower cost of airframe</td>
<td>✓ A350XWB</td>
</tr>
<tr>
<td></td>
<td>maintenance</td>
<td>✓ Service intervals from 6 to 12 years</td>
</tr>
<tr>
<td>✓ Better vibration</td>
<td>✓ Noise reduction</td>
<td>✓ Lower need for fatigue-related inspections / corrosion-related checks</td>
</tr>
<tr>
<td>absorption</td>
<td></td>
<td>✓ 787 Dreamliner noise footprint 60% smaller than old generation</td>
</tr>
<tr>
<td>✓ Design flexibility</td>
<td>✓ Absence of scrap materials</td>
<td>✓ 90% of raw aluminium used to create airplane parts is turned into scrap during manufacturing process</td>
</tr>
<tr>
<td></td>
<td>reduces manufacturing costs</td>
<td></td>
</tr>
</tbody>
</table>

Source: Airbus, Boeing
GLOBAL OPERATIONS FOOTPRINT

- Headquarters
- On-site offices
- Production plants and partnerships
- Engineering center
- MRO
OPERATIONAL EXCELLENCE

Ensuring efficiency and application of standards

Steady increase of production efficiency

Providing relevant information on time

Ensuring bottom-up communication within operations covering all operational aspects
OPERATIONAL EXCELLENCE

Ensuring efficiency and application of standards

- **5S methods**
  - Implementing and improving standards

- **One-piece flow**
  - Decreasing production lead times / inventory

- **Total productive maintenance**
  - Actions to prevent breakdown of machinery

- **Kanban**
  - Reduction of inventory by applying pull principles
OPERATIONAL EXCELLENCE

Providing relevant information on time

- **Visual management**
  - Providing information
  - Communication of standards and procedures
  - Visualisation of target-performance comparison

- **Key performance indicators (KPI)**
  - KPIs to be used as basis for
    - evaluation
    - analyses
    - tracking of production processes
OPERATIONAL EXCELLENCE

Steady increase of production efficiency

- **Kaizen / continuous improvement**
  - Steady working on perfection of production

- **Value stream mapping / design**
  - Visualisation of value stream
  - Identification of improvement potentials

- **SMED**
  - Reduce non-productive time of machinery and equipment

- **CAQ (Computer-Aided Quality assurance)**
  - Reduction of costs for quality check
  - Automated reporting and analyses
OPERATIONAL EXCELLENCE

Ensuring bottom-up communication within operations covering all operational aspects

SQCDP

S  ...  Safety
Q  ...  Quality
C  ...  Cost
D  ...  Delivery
P  ...  People
OPERATIONAL EXCELLENCE

Applied on the Airbus A350 Winglet

- **Work without mistakes**
  - Increased efficiency by using a semiautomated drilling unit

- **Work in Progress**
  - Reduction of “Work in Progress” by 20%

- **Pay attention to the right amount**
  - Less tools necessary by adjusting the assembly strategy

- **Stick to standards**
  - Continuous CM improvements
OPERATIONAL CHALLENGES

Current challenges and solutions

- **Increasing rates**
  - High customer demand (net increase in order book)
  - Ramp-up of major programmes (Airbus & Boeing)
  - Involvement in new business programmes (Comac)

- **Actions**
  - Facility expansion
  - Takted production lines (efficiency gains)
  - Automation / I4.0
TAKTED PRODUCTION

Continuous improvements (Airbus A321 outboard flap)

- Assembly shop floor reduction by 55%
- Enabled rate capability increase by 50%+
- Production cycle time reduction from 21 to 9 days
- Ergonomic assembly using trunnions, robotic drilling & CSK
TAKTED PRODUCTION

Continuous improvements (Boeing 787 blocker doors)

- Shift reduction from 3 to 2 shift model, capacity savings by 33%
- Shop floor reduction by 27%
- Enabled rate capability increase from 530 to 600+ blocker doors / month
- Four separate product configurations in one mixed model line
AUTOMATION / I4.0

- Implemented automated processes
  - Automated tape laying
  - Advanced high-speed NDI
  - Robot drilling
  - Hot drape forming
  - Phonometry

- Results
  - Lower amount of manual labour
  - Decreased production lead times
AUTOMATION / I4.0

- Ongoing / future automation campaigns
  - Automated transport systems
  - Automated drilling, riveting, grinding and painting applications
  - Seamless link of data in entire value stream

- Results
  - Lower amount of manual labour
  - Increased efficiency in labour-intensive work steps by semi-automation
  - Real-time monitoring of production steps
  - Paced decision making
AUTOMATION / I4.0

- Industry 4.0 campaigns
  - Real-time visualization
  - Proof of concept MES
- Way forward
  - I4.0 – main streams defined and team established to drive initiatives
  - Strong focus on E2E (end to end) process introduction
  - Road map for new technology introduction established and I4.0 goals defined
  - Further cycle time reduction
  - Utilization and flexibility
  - Fixed cost reduction
  - Partnerships established
BEYOND HORIZONS