PART II.
AIRCRAFT EQUIPMENT
AIRCRAFT EQUIPMENT
LANDING AND BRAKING SYSTEMS

Vincent MASCÉ
CEO, Messier-Bugatti-Dowty
LEADING POSITIONS ON BRAKING & LANDING MARKETS

**N°1 worldwide** for Carbon Brakes for > 100 pax civil aircraft

**N°1 worldwide** for Landing Gear Systems for civil aircraft

**7,250** people in 8 countries

**€2.3 billion** revenue

Airbus + Boeing programs: **75%**

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**WHEELS AND BRAKES**

- **SALES**
  - 99% aftermarket
  - 1% Others

- Generally dual source
- Revenue based on fee per landing
- Carbon brakes replace steel brakes

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**LANDING GEAR & SYSTEMS**

- **SALES**
  - 57% OE
  - 43% aftermarket

- Generally single source
- OE sales to Airframers
- Aftermarket sales to Operators & MROs

(2015 figures)
DIVERSIFIED CUSTOMER BASE & MARKETS

Sales per Customer type

AIRFRAMERS
Original Equipment (OE)

AIRCRAFT MANUFACTURERS

AIRLINES & MROs
Aftermarket

Sales per Market

90%

Commercial

~ 300 Airlines

~ 40 MROs, civil & military shops

10%

Military

Sales

50%

50%
WELL POSITIONED IN A GROWING COMMERCIAL AIRCRAFT MARKET

Wheels & Carbon Brakes

<table>
<thead>
<tr>
<th>2014</th>
<th>2025e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base 100</td>
<td>200</td>
</tr>
</tbody>
</table>

>100pax commercial aircraft fleet in service equipped with carbon brakes

Landing Gear & Systems

<table>
<thead>
<tr>
<th>2014</th>
<th>2025e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base 100</td>
<td>149</td>
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</table>

Commercial Market (OE + aftermarket)

Maintaining a market share above 50% thanks to innovative offer and product development
PRESENT ON BEST SELLING PROGRAMS

**NEW:**
A350-1000, 787-10, 737 MAX, Airbus Helicopters H160, KC390, Global 7000, Falcon 8X

**RECENT:**
A350-900, 787-8/9, A380, A320/A321neo, A400M, Falcon 7X, SSJ100

**MATURE:**
A320/A321ceo, 737, 777, 747, ATR 42 & 72, other Bombardier & Falcon programs
Eurofighter / RAFALE / F18 / V22

**LEGACY:**
A300/310, BAE146, Mirage, Tornado…

60 active programs including 7 in development
(787-10, 737 MAX, A350-1000, H160, KC390, Global 7000, Falcon 8X)

Revenue driven by Aftermarket sales

Revenue from OE & Aftermarket

Revenue from OE

+20%
DOUBLING CARBON CAPACITY IN THE NEXT 10 YEARS

Carbon tonnage growth 1997-2025

- 1987: ~1,400 AC >100 pax equipped
- 1997: ~2,500 AC >100 pax equipped
- 2000: ~4,500 AC >100 pax equipped
- 2005: ~7,500 AC >100 pax equipped
- 2015: 13,000+ AC >100 pax equipped

SA 3D carbon    SepCarb III    SepCarb III OR    SepCarb IV    Next Gen Carb
WORLDWIDE FOOTPRINT STRATEGICALLY LOCATED TO SERVE CUSTOMERS

- **8 Legacy facilities**
  Europe | USA | Canada

- **3 facilities in Low cost countries**
  Mexico | Malaysia | China

- **8 MRO shops**
  Mexico | USA | Europe | Singapore

**IMPROVE CUSTOMER PROXIMITY FOR SUPPORT & SERVICES**

**GROW LOW COST EXTERNAL SUPPLY CHAIN**

From 2010 to 2020: 4% → 20%

Total purchase: \(x2\)

**AUTOMATION IN WESTERN FACILITIES**

- 2015 vs 2010
  20% recurring costs reduction

- 2015 vs 2010
  Manufacturing lead-times divided by 2

- 2020
  Further reduction by 20%

- 2018
  Further reduction by 2

**ADD CAPACITY ON RECENT LOW COST SITES**

- Mexico & China plants
INVESTING IN OUR FUTURE

Demonstration Platform for game changer aircraft

Advanced Landing Gear Concept

ATA32 integration Platform for Long Range

*New standard Low weight*

ATA32 integration Platform for Short/Medium Range

*Low cost electrical*

ATA32 integration Platform for all aircraft segments

*Electrical Nose Landing Gear & Systems*

Electric Green taxiing System

**State of the art**

- Composite structural Landing Gear parts
- Electrical Brakes
- New Carbon SepCarbIV
- REACH Compliant solutions
- Dispatch reliability services

**Improvements**

*Incremental innovation*

- Carbon SepCarbIV+
- New advanced materials
- Electrical Ext / Retraction braking & steering
- Health monitoring
- Fully integrated low maintenance landing systems

**Breakthrough technologies**

- Carbon next generation
- Electric actuation Gen2
- Smart actuator on e-brakes
- E-taxi Gen 2
- New Structural Composite

**A unique position on Landing Systems**
STRATEGIC ROADMAP IN 3 STEPS

YESTERDAY
- Secure & consolidate our positions and Customer satisfaction

TODAY
- Improve operating margin by 3 - 4 points in 4 years
- Improve our overall competitiveness
  - Technical – Operational – Commercial
- Innovate

TOMORROW
- Be on-board of the next generation aircraft of all major airframers

Revenues

2010 2015 2020+
## The More Electrical Aircraft

<table>
<thead>
<tr>
<th>Systems</th>
<th>A320ceo</th>
<th>A330ceo</th>
<th>A380 &amp; A350</th>
<th>Boeing 787</th>
<th>Next gen aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deicing</td>
<td>Pneumatic</td>
<td>Pneumatic</td>
<td>Pneumatic</td>
<td>Electricity</td>
<td>Electricity</td>
</tr>
<tr>
<td>Environmental Control System</td>
<td>Pneumatic</td>
<td>Pneumatic</td>
<td>Pneumatic</td>
<td>Electricity</td>
<td>Electricity</td>
</tr>
<tr>
<td>Avionics</td>
<td>Electricity</td>
<td>Electricity</td>
<td>Electricity</td>
<td>Electricity</td>
<td>Electricity</td>
</tr>
<tr>
<td>Interior loads</td>
<td>Electricity</td>
<td>Electricity</td>
<td>Electricity</td>
<td>Electricity</td>
<td>Electricity</td>
</tr>
<tr>
<td>Braking</td>
<td>Hydraulic</td>
<td>Partial electrification</td>
<td>Partial electrification</td>
<td>Partial electrification</td>
<td>Partial electrification</td>
</tr>
<tr>
<td>Flight Control System</td>
<td>Hydraulic</td>
<td>Partial electrification</td>
<td>Partial electrification</td>
<td>Partial electrification</td>
<td>Partial electrification</td>
</tr>
<tr>
<td>Landing Gear, thrust reverser, etc.</td>
<td>Partial electrification</td>
<td>Partial electrification</td>
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</tr>
</tbody>
</table>

**More Electrical Power…**

- **A330ceo**
  - 230kW
- **Boeing 787**
  - 1MW

**…is a gradual evolution**
A WORLD LEADER IN ELECTRICAL SYSTEMS

1. N°1 worldwide for EWIS* and ventilation systems
2. N°2 worldwide for Power Generation & Distribution
3. 14,100 people in 12 countries
4. €1.6 billion revenue

EWIS

- SALES
  - 73% OE
  - 7% Services
  - 20% Engineering

Supply chain excellence
Configuration management

POWER GENERATION & DISTRIBUTION

- SALES
  - 55% OE
  - 45% Aftermarket

Technology
Maturity in service
MRO network

*EWIS: Electrical Wiring Interconnection Systems

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A key building block to Safran portfolio

POWER SOURCES
- Engine
- APU
- Battery

Electrical systems (up to 1.5MW)
- Generator
- Distribution
- EWIS for power
- Power converter

LOADS
- Flight controls
- Nacelle
- Electric fans
- Landing gear
WORLD LEADER IN EWIS

→ High volume of production
  • 3,000 harnesses delivered per day

→ Example: long range programs
  • 100 - 200 km of wires
  • 10,000 – 15,000 connectors
  • 20,000 – 35,000 interfaces (brackets, clamps…)

→ High customization & flexibility
  • Mature program: 5-10 modifications per day
  • Program in development: 50-100 modifications per day
  • Configuration Management
  • End to End Process from Engineering to Installation
HIGH COMPETITIVENESS OF EWIS INDUSTRIAL FOOTPRINT

PROXIMITY

USA: 1,800 employees (2 plants; 1 to close at end 2016)

FRANCE: 1,300 employees (2 plants)

CHINA: 300 employees (1 plant)

LOW COST

MEXICO: 4,300 employees (4 plants)

MOROCCO: 2,100 employees (2 plants)

NEW COUNTRY (1 new plant in 2017)

2/3 of the workforce in LCC
PERFORMANCE AND COMPETITIVENESS

→ Best-in-class in EWIS businesses

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2016 target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery (OTD)</td>
<td>98%</td>
<td>99%</td>
</tr>
<tr>
<td>Quality (ppm)</td>
<td>500</td>
<td>100</td>
</tr>
</tbody>
</table>

→ Continuous Labor cost saving

- Efficiency: -2% per year + learning curve
- LPS² = standardized efficient processes

Excellence in production recognized by customers
Cost Saving on Material

- 260 suppliers
  - 26% single source
  - 34% customer contract flow down
  - 40% open
  - Minimum 3 competitors per commodity
- 26 suppliers make up 80% of spend
- 92% under long term agreement for up to 5 years
  - Price reduction plan
  - Design to cost
INNOVATION & DEVELOPMENT

R&T
- Patents - portfolio of over 1,000
- Major programs focused on More Electric Aircraft

Development
- End of large programs development phase (A350, 787)

Investing in the future
Technical Insertion & Next Generation Aircraft

*PLC: Power Line Communication
WELL POSITIONED TO CAPTURE GROWTH

Civil Market (OE + aftermarket)

**EWIS (sales)**
LPS Market share 50% → 55%
70% long range, 60% single aisle

<table>
<thead>
<tr>
<th>Year</th>
<th>Value Base 100</th>
<th>Value 154</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2025e</td>
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</tbody>
</table>

**Electrical Systems Market**

<table>
<thead>
<tr>
<th>Year</th>
<th>Value Base 100</th>
<th>Value 145</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
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<td></td>
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<tr>
<td>2025e</td>
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<td></td>
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**Power Generation & Distribution (sales)**
LPS Market share 10% → 12%

<table>
<thead>
<tr>
<th>Year</th>
<th>Value Base 100</th>
<th>Value 180</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td></td>
<td></td>
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<tr>
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Benefit from production rates and customer offload

Gain share from market leader
KEY DRIVERS TO IMPROVE FINANCIAL PERFORMANCE

- Innovation & new technologies (VFG, VSCF, Fiber optic, PLC, …)
- Operational excellence & supply chain performance
- Cost savings from footprint consolidation in North America
- Growing aftermarket revenues from maturing installed base of electrical systems
- Market share gains from competition or from customers

Moving along the value chain
Improve operating margin by 3 points over 2016-2018