

# **Meggitt Investor Day**

Stephen Young, Chief Executive



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# **Agenda**

9.15am	Opening remarks	Stephen Young	
9.20am	Customer Services & Support	Lorraine Rienecker	
10.20am	Applied Research & Technology	Chris Allen & Keith Jackson	
11.00am	Coffee break		
11.20am	Meggitt Aircraft Braking Systems	Luke Durudogan	
12.10pm	Meggitt Polymers & Composites	Mel Hilderbrand	
1.00pm	Closing remarks	Stephen Young	
1.10pm	Lunch and technology demo		
2.00pm	Site tour brief	Chris Hopper	
2.15pm	Bus departs for site tour		
3.45pm	Bus departs from site tour		



## Meggitt business model

# Capturing medium-term growth

### » Smart engineering for extreme environments

- Invest in industries with high certification requirements/long life assets
- Where equipment works in harsh environments
- Aerospace defence and energy focus

### » Secure enduring/profitable income streams

- Create proprietary product and manufacturing technology
- Win life of programme OE contracts, preferably on a sole source basis
- Up-front investment delivers strong long term returns
- Participation in multi-decade spares and repairs cycle

### » Long cycle business



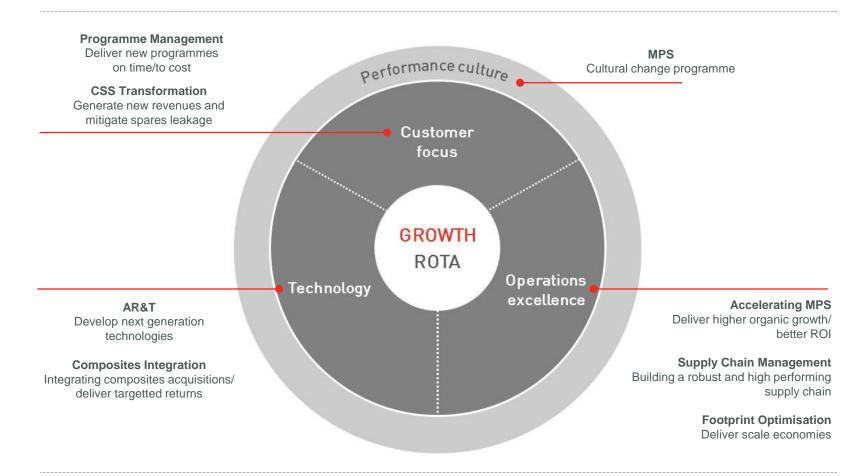
### **Achievements**

- » Growing fleet / growing content
- » MPS record quality and delivery performance
- » CSS response to changing market
- » R&D record level of investment
  - more co-ordinated approach
- Strategic M&A; dispose non-core assets



## Strategic priorities

### Breakthrough objectives link to our strategic priorities







## **Customer Services & Support**

Lorraine Rienecker, President

19 April 2016



# **Agenda**

- Customer Services & Support
- **2** Market Trends
- 3 Strategic Priorities
- 4. Summary



# A centralised service offering for Meggitt's civil and military aerospace aftermarket

A full-service offering from sales through order fulfilment and customer/product support

Over £310m<sup>1</sup> in sales and close to 500 people across 24 sites

#### **Polymers & Composites Control Systems Aircraft Braking Systems Sensing Systems** » Dual-source civil » Condition monitoring » Seals » Thermal management wheel & brake systems systems » Composites » Fluid & pneumatic » Sensors control » Fuel bladders (civil only) » Avionics » Electromagnetic control » Power systems » Safety systems and components » Ground fuelling

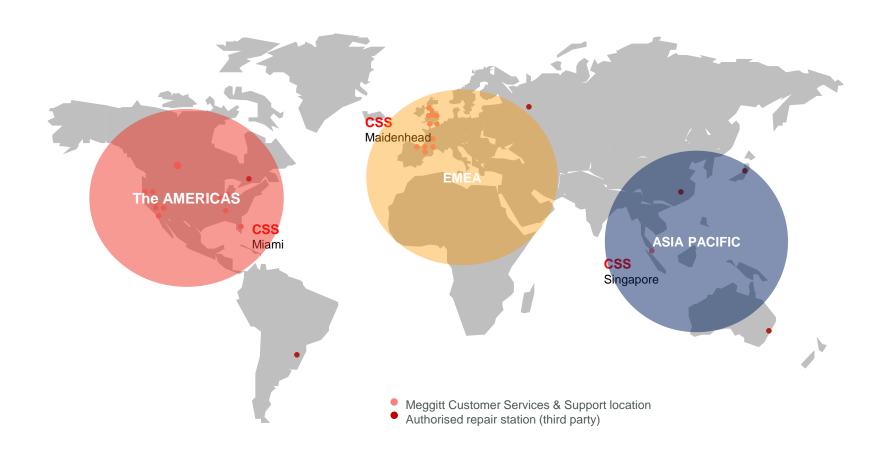
Notes: 1. Close to 45% of total Meggitt aerospace aftermarket

2. Excludes MABS sole-source W&Bs, MPC Military fuel bladders and all MEG



### **CSS** aftermarket facilities

# A global footprint with three core regional hubs





### **CSS** vision

# Building a service organisation and culture

To be a proactive aftermarket organisation providing world-class customer service and support for Meggitt products

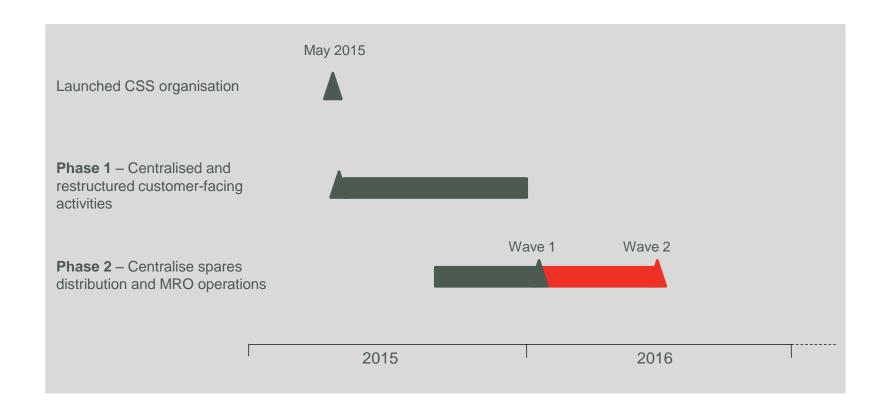
To support Meggitt's integrated lifecycle model

Underpinned by a strong service culture



# **High-level transition plan**

# A two-phased approach





# Agenda

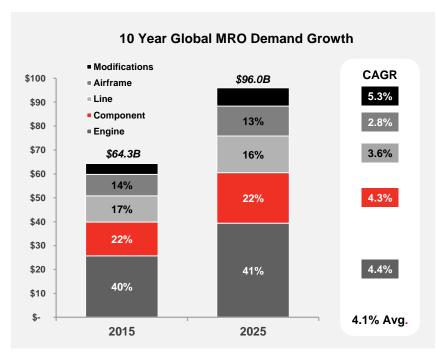
- Meggitt Aftermarket
- **2** Market Forecast and Trends
- 3 Strategic Priorities
- 4. Summary



# Macro trends in the commercial aftermarket remain strong

### **Key trends**

- Solution Services Services
  - Achieved 5.6%<sup>1</sup> growth in 2015
  - IATA forecasting 7% growth in 2016
- The Commercial Transport fleet is projected to grow at 3.4% over the next decade
- Slobal MRO expected to grow by 4.1% per annum over next decade, with components growing at 4.3%



Source: ICF International, forecast in \$US constant dollars

Source: 1. IATA



# In the short term however, key structural and cyclical trends continue to impact aftermarket performance

# MRO Demand Growth vs. Global Capacity (ASK) Growth



Source: Canaccord Genuity estimates

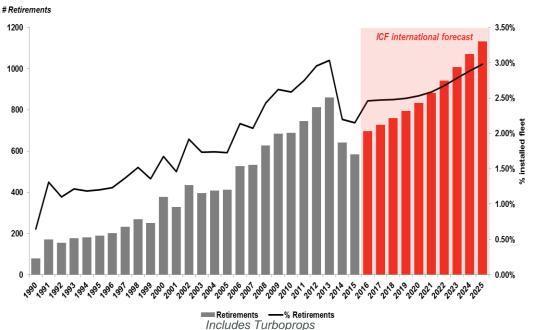
### **Key trends**

- Retirements and falling average age of an aircraft in the fleet
- Availability and use of alternatives to new parts
- Industry restructuring and evolving business models
- 4 Pooling of inventories
- Deferred maintenance due to improving reliability and better data



# Retirements, as a percentage of the active fleet, are expected to grow for the next decade

#### **Air Transport Annual Aircraft Retirements**



### Source: Flight Global ACAS June 2015, Airline Monitor, ICF International Analysis

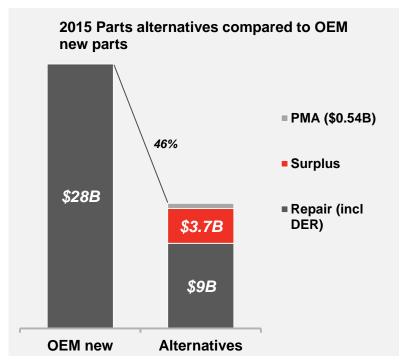
#### Key trends and highlights

- » Sustained low oil prices have reduced premature retirements and are expected to provide some benefit
- » High replacement of aircraft from the previous cycles
- » Retirement of very old aircraft is further reducing the average age of the fleet
- y 45-50% of new aircraft deliveries will be for replacement, vs. the historical norm of ~20%

Insight: Retirement of very old aircraft and a younger fleet are impacting demand for maintenance



# In 2015 operators spend almost 50% on alternatives, as they spent on new OEM parts



Source: ICF International

#### **Surplus**

- » Majority of surplus parts now coming from aircraft part-outs (Used Surplus Material) not airline inventories
- » Component surplus accounts for 30% of total surplus and is projected to grow at 4.1% CAGR over the next decade
- » ~80% of airlines now have an active surplus strategy
- Surplus demand is greatest in mature and sunset phases of lifecycle

#### Repairs

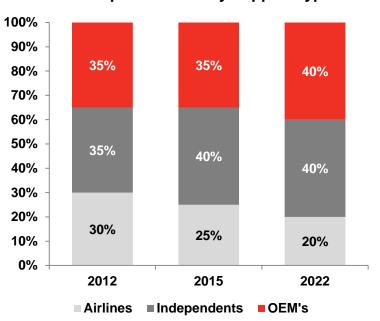
» Repairs are projected to grow at 5.2% CAGR over the next decade

Insight: Growing participation in USM and MRO to mitigate leakage, access growth and product demand, value and performance



# Restructuring and changing business models are increasing competition, as the aftermarket matures

#### Component MRO by supplier type



Source: ICF International, forecast in \$US constant dollars

### Key trends and highlights

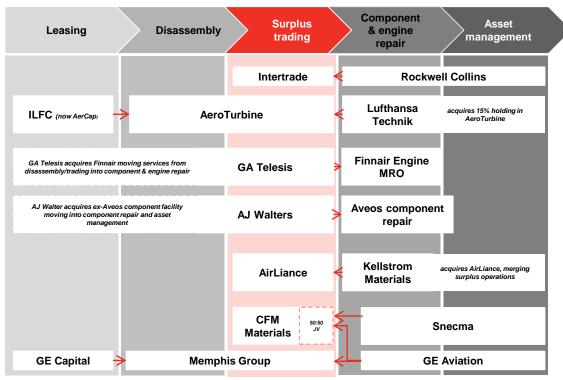
- » Airlines are continuing to outsource
- » Airline in-house MROs are increasingly focused on RONA, driving asset utilisation and cost reductions
- » Independents/Integrators are actively investing to secure nose-to-tail and integrated component service contracts
- » Airframe and engine OEMs are aggressively targeting aftermarket with comprehensive 'care' programmes and PBH contracts
- » Resulting in an increased proportion of component MRO flowing through either the airframe/engine OEMs or integrators

Insight: Strong partnerships and performance are required for Tier 2s to access market and remain competitive



# Consolidation is resulting in a new set of players focused on asset utilisation and management

#### **Surplus Parts Supply Chain Evolution**



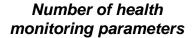
### Key trends and highlights

- » Strong financial backing
- » Able to offer integrated component support packages
- » PBH contracts
- » Pooling inventories across operators to reduce costs and support packages

Source: ICF International and Meggitt analysis

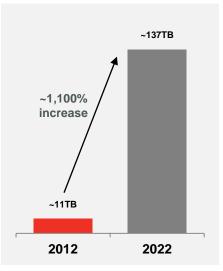


# The increasing availability of performance data is enabling operational improvements and cost reductions





Aircraft data generation (TB/Year)



#### **Key highlights**

- Years of performance data and better than planned reliability, are resulting in deferred maintenance intervals
- Engine OEMs are reducing the number of engine overhauls to manage costs under PBH contracts
- Delta Airlines have reduced maintenance costs per flying hour by 20% since 2008

Source: ICF International

Insight: Access to performance data is increasingly important to delivering product improvements



## **Commercial market summary**

### **Key trends**

Availability and use of alternative parts (USM and repairs)

Industry restructuring continues to drive competition and efficiency improvements

- Pooling of inventories
- Deferred maintenance

Increasing availability of performance data is enabling operational improvements

### **Key insights**

Participation in USM and MRO required to mitigate leakage and access growth

Strong partnerships with OEMs and Integrators required to access market

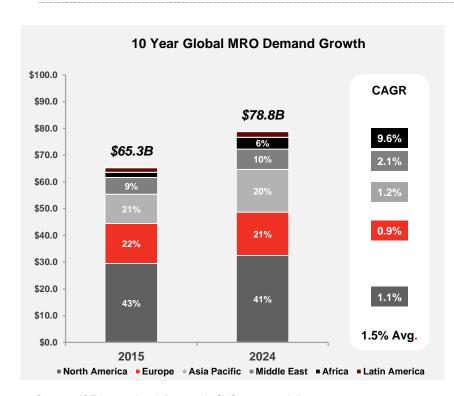
Strong quality, cost & delivery performance capability required to remain competitive

Ability to access and analyse performance data is increasingly critical to delivering product improvements





# Global Military MRO is forecast to grow at 1.5% over the next decade



Source: ICF International, forecast in \$US constant dollars

#### Key highlights and trends

- Strong growth in Asia and parts of the Middle East on the back of recent conflicts
  - Increasing global MRO capability for F35
- » US DOD FY17 O&M budget request 2.7% above FY16 budget, with increases across all Forces
- Overall fleet growth of 1% projected across the period
- » Consolidation into fewer larger platforms
  - A significant shift in key platforms, with growth in new platforms offsetting retirements
- Military continues to slowly emulate the civil model of outsourcing and drive for cost reduction

Insight: Opportunity to target outsourcing and capture incremental growth



# Agenda

- Meggitt Aftermarket
- **2** Market Trends
- 3 Strategic Priorities
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## Strategic Priorities – the Vital Few

### » Deliver our transformation

**KPI: Milestone targets** 

- Complete operations transition to CSS by end Q2
- Develop and implement critical enablers Financial model, communications, resources and data systems

### » Mitigate leakage and drive top-line growth

**KPI: Revenue targets** 

- Build a surplus trading capability
- Strengthen our partnerships to secure access to market
- Pro-actively target retrofit, modifications and upgrades

### » Improve our performance

**KPIs: Performance** metrics & profit targets

- Optimise our distribution and operations footprint
- Continue to drive operational performance improvements using the Meggitt Production System
- Strengthen our commercial capability and protect our Intellectual Property



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## **Summary**

### Addressing the key aftermarket value drivers

- » Building a pro-active aftermarket organisation to mitigate leakage and drive growth
  - Transfer of operations will be completed by end of Q2 2016
  - Development of tools and processes well underway and KPIs established
- » Addressing the key aftermarket value drivers
  - Participating in the surplus market
  - Strengthening our partnerships
  - Growing our MRO capability
  - Pro-actively targeting RMUs and repair schemes
  - Optimising our distribution and MRO footprints

We are on track to mitigate short-term weakness and exceed market growth in the medium term



# **Questions?**





Meggitt Applied Research & Technology

### **AR&T Showcase**

Chris Allen
Group Director, Engineering Programmes and Strategy

MEGGITT

# **AR&T Strategy**

smart engineering for extreme environments





# Gas turbine technology roadmap

		2016-2018	2020	2025	2030	2035
		Rolls-Royce mid	dle of market	GE Next Gen	Rolls-Royce Open Rotor	P&W Reverse flow
				AETP engine		
⇒ GE 9x		Rolls-Royce Advance	⇒ ITEP	Rolls-Royce Ultra	SNECMA Open Rotor	Electric Fan
			GE3000 HPW3000			
STRATEGIC THEME	s —		<b>→</b>	TRL 6 - Achieved —————		<del></del>
Thermal management systems	<b>=</b>		Next Gen S&T, P&F	ALM Coolers [ATI] ALM Structural Coolers [NIPSE] Active control replacement for thermal and pressure relief valves (Smart Valves)	Engine mounted 2 phase cooling system [NIPSE]	Smart sub-systems Prognostics
Air systems	<b>-</b>		Next Gen High Temp Smart Valves (servo) High Temp Solenoid	Low-noise bleed (ALM) Multiple valve parts as one ALM assembly High Temp body material (CMC) High Temp electromagnetic(servo)	High Temp Smart Valves (distributed computing sub- system)	First Meggitt full engine fluid sub-system (air, fuel or oil)
Smart composite systems	<b>&gt;</b>		Reduced touch build Lower power ice protect New part offerings e.g. liners, stator vanes, spinners, panels etc.	Electronics enclosures Out of autoclave Next Gen ice management Acoustic liners with integral ice protection Embedded sensors Structural monitoring Zero touch build CMCs for Sub-assemblies	Multi-functional morphing Composites	Smart sub-systems
Sensing and actuation	<b>-</b>	Health-ready pressure sensor and accelerometer Mass fuel flow Tip clearance with microwave technology	Fluid level with TDR Lead-free high temp piezoceramics	Sensor multiplexing High-temp combined static/dynamic pressure sensor Next-gen temp and speed sensors	Optical sensors (fire, temp, pressure, strain etc)	Harvesting sensors Wireless sensors
Health monitoring	$\supset$	Tip timing (time of arrival) with microwave/eddy current technology	Oil quality with time domain reflectometry	High-temp small, light Vibration Node Unit Gearbox monitoring Embedded sensors	Wireless sensors Virtual machine EMU Active surge management	Smart sub-systems



# **Manufacturing Technology**

# Closed Loop Adaptable Automated Workbench





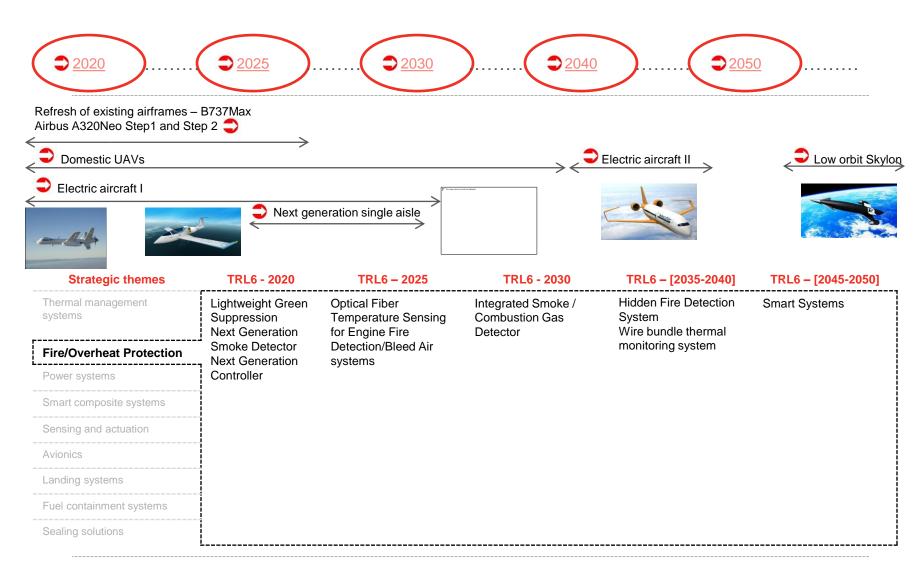
Meggitt Applied Research & Technology

### **AR&T Showcase**

Keith Jackson, Chief Technology Officer



# **Aircraft Technology Roadmap**

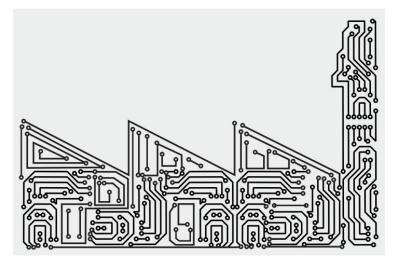




# **Manufacturing Technology**









## **CLAAW**

# Meggitt and AMRC





### **M4**

# Meggitt, AMRC, IBM and MTC





#### **AR&T Office**

# Coventry







#### GAINS - Green Anti-Ice Novel Systems

## MPC – Loughborough

Critical to safety: 100% reliable in all conditions



Electro-thermal Leading edge Wind Tunnel Test



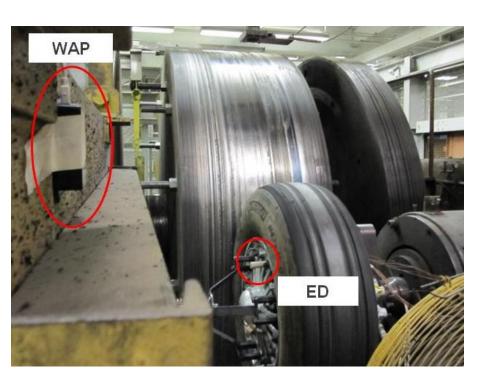
Bombardier Global 5000 Flight Test



# WAITIPS - Wireless Aircraft Tire Pressure Sensing

# MSS – Fribourg

Harsh environment: -55C to 160C - flight after flight





Dynamometer Test

WAITIPS being fitted



# **High Temperature Solenoid**

# MCS – Coventry





1100 °C Fireproof Test



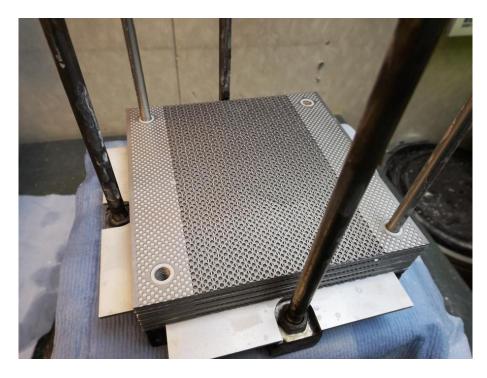
-54 °C Icing Test



# **EPALM** – Etched Plate Additive Layer Manufacture

# MCS – Birmingham

Critical to safety: 100% reliable in all conditions



Stack Being Assembled



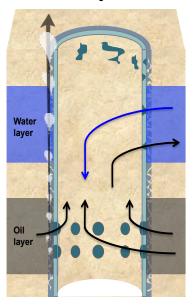
Complete Test Unit



#### GAIA - Deep well ultra sound scanning

High temperature and pressure, operating miles down must be both sensitive and accurate

Uncontrolled oil & gas propagation outside casing



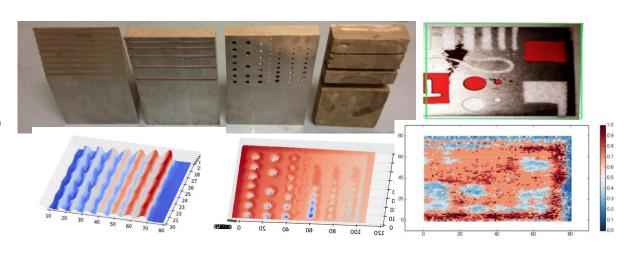
Casing corrosion Failed

cement bond

Water Ingress

Oil contamination of water table

Normal oil Production



Well Casing Systems

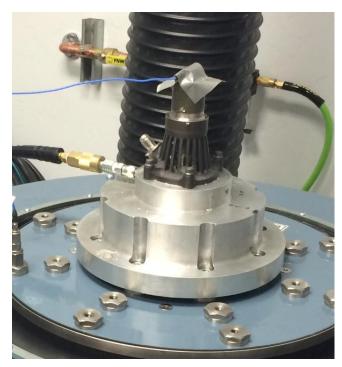
**Ultrasonic Testing** 



# **ALM** – Additive Layer Manufacturing

#### MCS North Hollywood, MCS Coventry and MTC

New materials, new designs, new manufacturing process



Vibration Testing of an Additive Manufactured Bleed valve



Noise Attenuating Bleed Valve



#### To conclude.....

- We are seeing the returns from record levels of investment
- » AR&T is a small but critical element of our future supported by
  - Roadmaps developed with our partners and customers
  - People particularly our Engineering Fellowship and graduate programme
  - Research partners Catapults and Universities
  - Funding agencies
- » Develop once and use many times capability
  - High temperature composite and ALM, valve with embedded sensing, actuation and electrical components
- » Customer success stories
  - Tyre pressure monitoring aircraft OEM
  - High temperature actuators engine OEMs
  - ALM valves engine OEMs
  - Ice management systems aircraft OEM



## Wrap Up





# Meggitt Aircraft Braking Systems Luke Durudogan, President



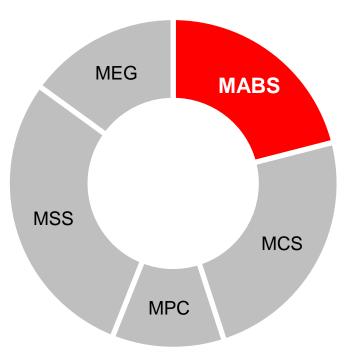
## **Overview of Meggitt Aircraft Braking Systems**

- » Our business
- » Organic growth drivers
- » Manufacturing and operations excellence
- » Summary



# **Meggitt Aircraft Braking Systems**

# 21% of 2015 Group revenue



	£'m	%
Meggitt Aircraft Braking Systems	353.1	21
Meggitt Control Systems	379.9	24
Meggitt Polymers & Composites	177.4	11
Meggitt Sensing Systems	474.8	29
Meggitt Equipment Group	244.0	15

### MABS business summary

- » High up-front investment generates predictably strong financial returns
- » Competitive advantages
  - #1 in our target markets (regional aircraft, business aviation, military)
  - Performance leading technology
  - Highly regulated and stringent qualification and industry certifications required for safety critical systems
  - MABS is primarily a sole source product and service life cycle supplier of wheels, brakes and related systems hardware and software
  - Dependable and responsive customer relations drive repeat business
- » Increasing content on a wide range of newer platforms, won in the last ten years
- » Diverse customer base, represented in all major aerospace markets
- » Frequent and predictable aftermarket events

Well-earned, sole source market share and strong backlog



#### What we do

### Total braking systems capability

#### Brake control **BC/IBC** valves Wheels and brakes Control servovalves system units **Brake** Tire pressure temperature monitoring Landing gear » Wheels monitoring units computers - Main and nose » Brakes - Carbon and steel - Hydraulic and electrically actuated 00000 0 0000000 **Control systems** » Hydro-mechanical braking and antiskid » Brake-by-wire braking Brake temperature » Auto braking sensors » Ebrake® power conversion, management and control » Nose wheel steering Nose wheels Tire pressure » Landing gear Main wheels sensor » Hydraulic systems **Monitoring systems** transducers **Electric brakes** » Brake temperature » Tyre pressure

Steel brakes

Tier 1 system supplier to the OEMs and operators

Carbon brakes

#### **Investor Day**

» Landing gear

» Hydraulic systems

#### **Technology firsts**

## Over 90 years of technical leadership

#### 1930s

- » First multiple disk brakes
- » Light alloy cast wheels and bi-metal drum brakes introduced

#### 1940s

» First automatic adjusters for single disk brakes

#### 1950s

- » First tri-metallic brake and electronic antiskid system
- » Maxaret anti-skid system introduced
- » Fan-cooled brakes introduced

#### 1960s

- » First carbon brake lab test
- » Tubeless tyres adopted for all high performance aircraft

#### 1970s

- » First carbon brake production contract
- » First brake-by-wire system
- » Carbon brake introduced on Concorde, the first carbon brake in airline service

#### 1980s

- » First electric brake lab demonstration
- » First digital brake-by-wire system
- » First nose/main gear carbon brake management system

#### 1990s

- » First taxi brake select system
- » First phase change/carbon brake
- » Integrated metering/antiskid valve
- » Deceleration feedback control
- » High RTO coefficient long life Series 6000 carbon
- » Thermal management and ceramic insulation technology
- First successful integration of a brake control system into a Modular Avionics Unit (MAU) system
- » Large investments in design and manufacturing facilities

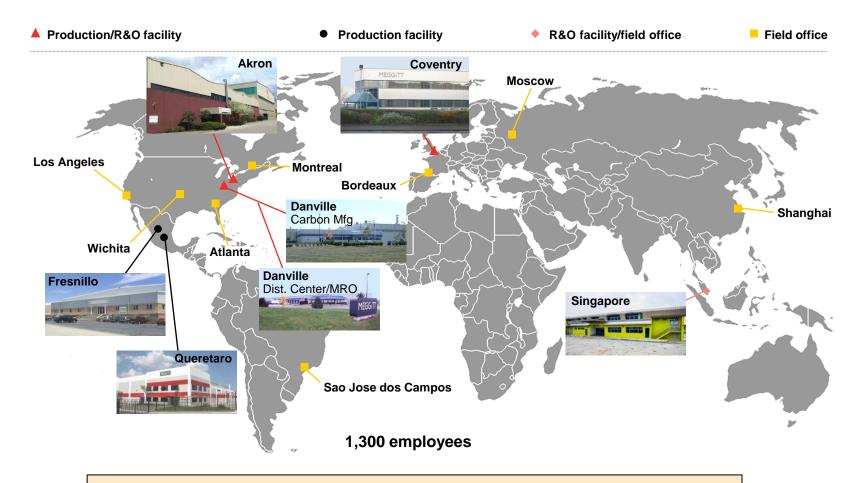
#### 2000 - today

- » Breakthrough 7000 Series NuCarb® carbon technology for first production program
- First qualification and flight test of complete electric braking system for a commercial jet
- » World's first flight of commercial aircraft fully equipped with electric brakes
- » First in-house fabrication of pressure sensors for Meggitt tyre pressure monitoring systems

A long history of innovation with more to come



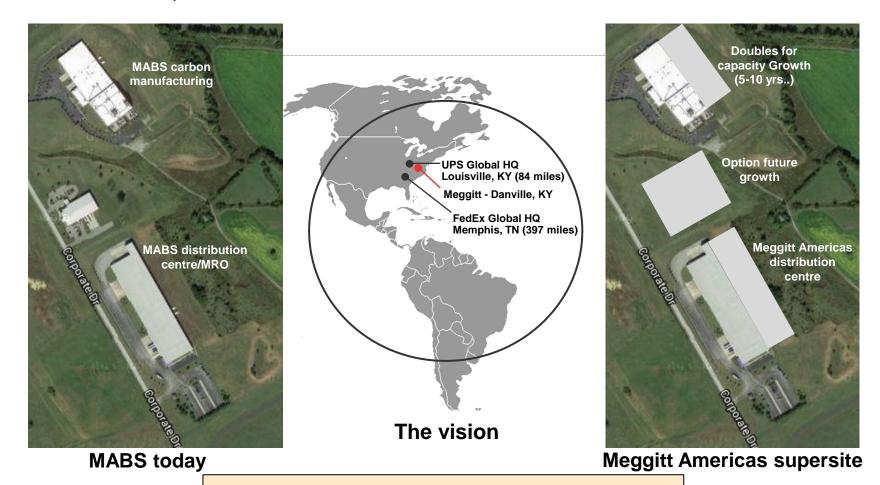
## MABS worldwide operation excellence



Low cost, high quality global manufacturing base and supply chain



#### Danville, KY



Any spare, anywhere in 24 hours, 7 days a week



# **MPS Operational Excellence maturity**

CY 2015 YTD 2016

KPI Metric	Measure	Target	Actual
EHS - Safety	Lost time incident rate	< 648 IR	489 IR
Quality	PPM	< 500 PPM	416 PPM (YTD)
Dolivery	Dalliana OTD %		93.7% (Q4 3 month avg.)
Delivery OTD %	> 92%	<b>92.7%</b> (Year End)	

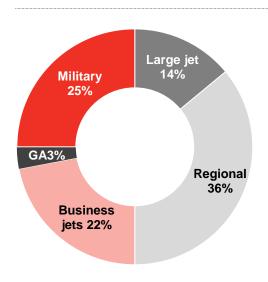
	Akron	Coventry
Current MPS stage	Yellow	Green
Site On time delivery %	94%	93%
YTD DPPM	405	478
Safety	Platinum	Gold

Site	MPS Stage	Exit Plan
MABS Coventry	Green	2017
MABS Queretaro	Yellow	Dec 2016
MABS Danville	Yellow	Dec 2016
MABS Akron	Green	2017
MABS Fresnillo	Red	Nov 2016

On time delivery and quality improvements through MPS

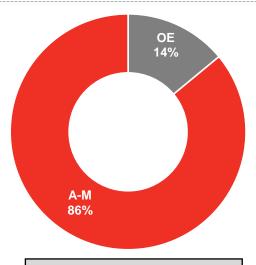


#### Revenue breakdown – 2015



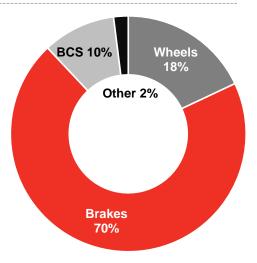


- » Balanced global portfolio
- » High cycle commercial transports
- » Leader in target markets



# Original Equipment vs. Aftermarket

- » Annuity business model
- » Reliable, profitable revenue stream



#### **Products**

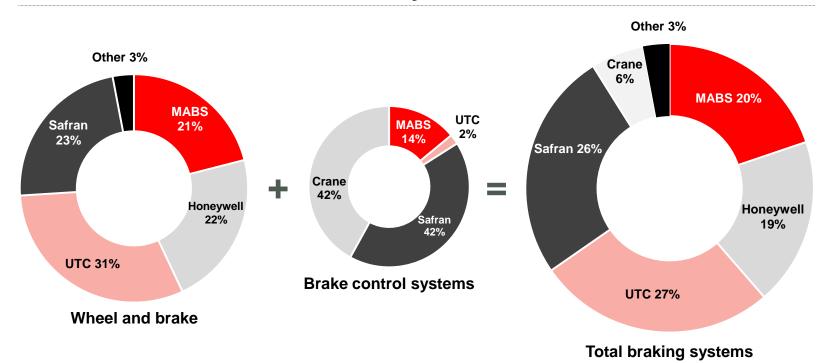
- » Primarily sole source
- » Clever technology
- » Significant installed base

Balanced sole source markets, large in service aftermarket, driven by consumable braking products



## Key braking system competitors

## Estimated market share by revenue



Meggitt is a market leader in military, business aviation and regional.

Competitors market share driven by Boeing and Airbus



### MABS execution strategy

» Launch into service 12 new programs in the next 3 years

- CS100 - ARJ21 - Falcon 8X - Global 7000/8000

- CS300 - G500 - Falcon 5X - HondaJet

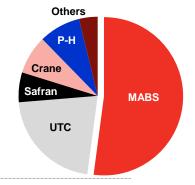
- MC21 - G600 - Legacy 500/450 - JAS39 NG

- » Pursue new programs on the basis of sound financial returns
- » Meet expanding aircraft systems requirements in new programmes
- » Continue Meggitt Production System driven performance improvements in global supply chain - low cost high quality manufacturing, footprint reduction, equipment and systems modernisation, e.g. Danville, Queretaro, and Fresnillo
- » Lead the market in cost efficient new technology applications

Launch new programs, use MPS to drive up productivity, continue to grow backlog







- » High revenue per landing with total braking system content
- » US light and medium size bizjet deliveries continue steady recovery with recent or new MABS equipped aircraft
  - HondaJet
  - Cessna CJ4
  - Embraer Phenom 100/300 and Legacy 450/500
- Introduction of new large and long range models strengthen demand in the intermediate term with recent or new MABS equipped aircraft
  - Bombardier Challenger 650 and Global 7000/8000
  - Dassault Falcon 8X and Falcon 5X
  - Gulfstream G500 and G600

MABS higher content on platforms drives CAGR

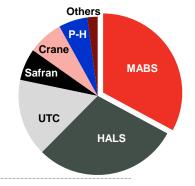


**Business jets life cycle** 

Growth  » Gulfstream G650/ER  » Gulfstream G550	Established  » Gulfstream GIV-SP/GV	Mature  » Gulfstream GIIB/GIII/GIV
» Gulfstream G550		» Gulfstream GIIB/GIII/GIV
0.16.1	» Gulfstream G300/G408	» Gulfstream GI/GII
» Gulfstream G450	» Gulfstream G200	» Falcon 10/20*
» Gulfstream G280	19 yrs. » Gu/fstream G100	Challenger 600
» Gulfstream G150	» Falcon 900EX/DX	» Learjet 20/30/50*
» Falcon 7X	y Falcon 50/EX	» Hawker 600/700/800XP*
» Falcon 900LX	» Challenger 601/604/605	» MU300/Beechjet 400
<ul> <li>Challenger 650</li> <li>Legacy 450/500</li> <li>Embraer Phenom 300</li> <li>Embraer Phenom 100</li> <li>Hawker 4000</li> <li>Cessna CJ4</li> <li>Learjet 60/60XR</li> <li>Learjet 20/3</li> <li>Citation 500</li> <li>Sabreliners</li> <li>Hawker 750/850/900XP*</li> <li>Jet Command</li> </ul>		<ul> <li>» Learjet 20/30/50*</li> <li>» Citation 500/550*</li> <li>» Sabreliners*</li> <li>» Jet Commanders</li> <li>40</li> <li>» IAI Astra/1125</li> <li>yrs.</li> </ul>
,		<b>⋖</b> 5 – 15 years ──•
	» Gulfstream G150  » Falcon 7X  » Falcon 900LX  » Challenger 650  » Legacy 450/500  » Embraer Phenom 300  » Embraer Phenom 100  » Cessna CJ4  » Emivest SJ30  » HondaJa1  ——————————————————————————————————	<ul> <li>Gulfstream G150</li> <li>Falcon 7X</li> <li>Falcon 900LX</li> <li>Falcon 50/EX</li> <li>Falcon 50/EX</li> <li>Challenger 650</li> <li>Legacy 450/500</li> <li>Embraer Phenom 300</li> <li>Cessna CJ4</li> <li>Emivest SJ30</li> <li>Hawker 4000</li> <li>Hawker 400A/XP*</li> </ul>



# **Military**

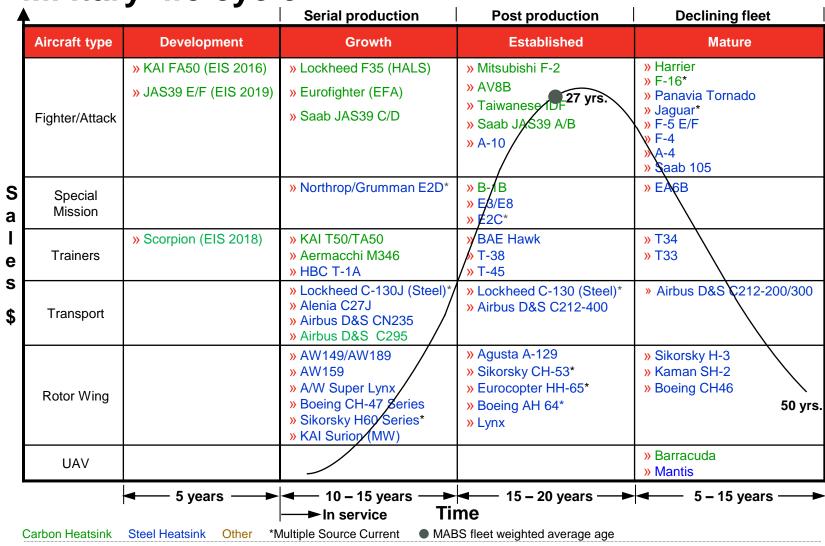


- » MABS has a significant portfolio of front line aircraft and helicopters
- » 2016 2021
  - Eurofighter and Helicopter production coupled with a strong build-up of
     F-35 partnered with Honeywell
  - Continuing Aermacchi M346, KAI T50 family and Hawker trainer production
  - Reduction in established and mature programs partially offset by price increases
- » 2021 2026
  - On going **F35** growth
  - Continuing JAS39 and Helicopter family production
  - Well positioned on T-X with braking equipment on all demonstrator aircraft

Installed base, plus EFA and F-35, drive growth throughout the period

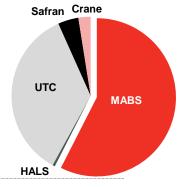


Military life cycle





# Regional aircraft



- » High cycle, predominantly sole source, regional jets and turboprops
- » 2016 2021
  - Greater than 50 seat fleet continuing to grow CRJ700/900 steel and E170/175 and E190/195 carbon families
  - Growing high content CRJ1000 and ARJ-21 total carbon braking systems
  - Greater than 50 seat regional turboprops continue to grow
  - Fleet with less than 50 seats declines over the period

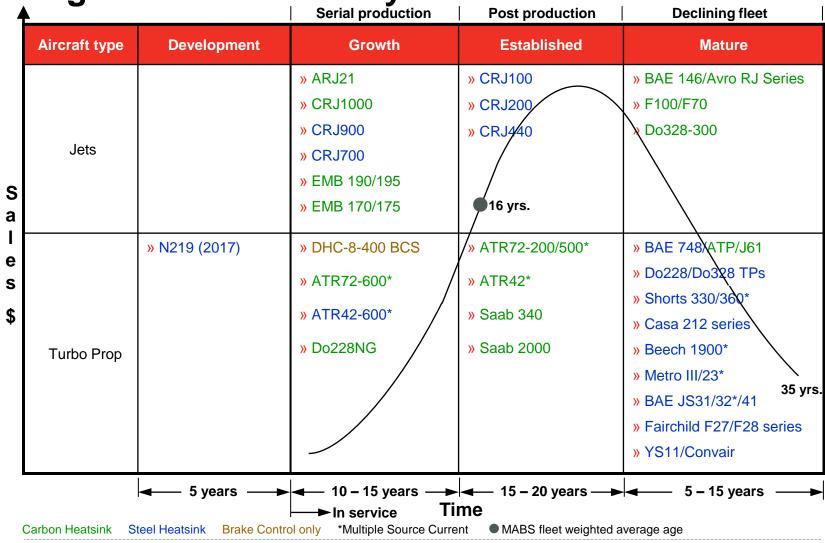
#### » 2021 – 2026

- Net fleets of 50 seats or less stabilise at lower values
- Net fleets of greater than 50 seats continue to grow

50 seat fleet decline migrates into our larger RJ position

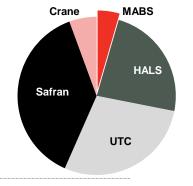


Regional aircraft life cycle





# Large jets

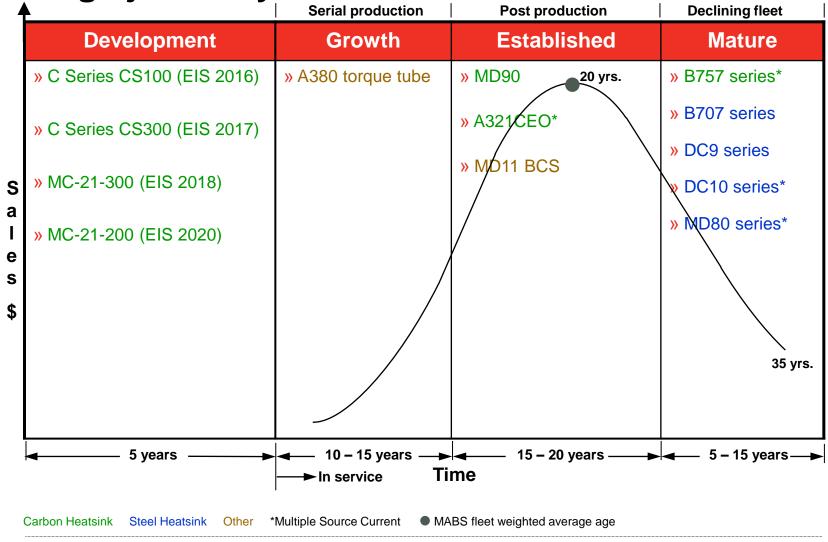


- » Wheel and brake predominantly dual/triple source (Boeing and Airbus)
- » BCS single source to Crane (Boeing) and Safran (Airbus)
- 2016 2021
  - Sole source Bombardier CS100 deliveries start in 2016
  - Sole source Bombardier CS300 and Irkut MC-21
- » 2021 2026
  - Growth in service of the C Series and MC-21 large jet families during this time period

Selective penetration of sole source opportunities



Large jet life cycle





# Clever technology drives expanding aircraft systems responsibilities

#### » Wheels and brakes

- NuCarb heatsinks
- Electrically actuated brakes

#### » Brake control

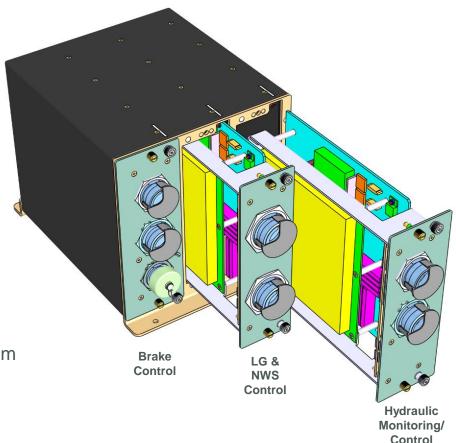
- Digital brake-by-wire
- Analogue brake-by-wire
- Autobrake

#### » Expanded control

- Auto spoiler deployment
- Nose wheel steering control
- Landing gear/doors extension and retraction
- Hydraulic system control

#### » Expanded monitoring

- Brake temperature monitoring system
- Tyre pressure monitoring system
- Hydraulic system monitoring
- Landing gear/doors indication





## MABS strategic innovation initiatives



**Carbon wheels** 



Composite-based additive manufacturing



Health and Logistics Optimisation HALO

New materials, manufacturing technologies and industrial internet drive success



#### Value drivers

#### Conclusion

Market leader in regional, bizjet and military



Existing fleet will drive annuity-like revenues for many years to come, with a further 12 new platforms over next 5 years

Growing content on newer platforms



Significant growth in shipset value per aircraft driven by shift from steel to carbon and greater systems content

Innovation will drive further growth



New products include Ebrake and NuCarb. Intensified focus on services including HALO and CSS activities

Driving operational excellence



Greater operational efficiency through MPS will drive growth and future profitability

Operational excellence, cost efficient technology and customer focus





just got smarter

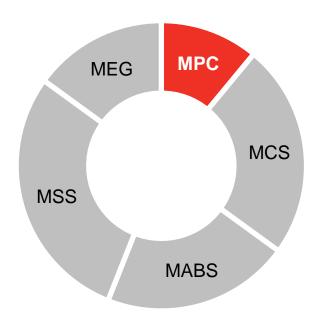
**Meggitt Polymers & Composites** 

Mel Hilderbrand, SVP Fuel Systems



## **Meggitt Polymers & Composites**

# 11% of 2015 Group revenue



	£'m	%	%
Meggitt Aircraft Braking Systems	353.1	21	20
Meggitt Control Systems	397.9	24	22
Meggitt Polymers & Composites	177.4	11	17
Meggitt Sensing Systems	474.8	29	27
Meggitt Equipment Group	244.0	15	14

Proforma numbers including the acquired businesses



#### **MPC** business model

#### High levels of product and process IP

#### » Smart engineering for extreme environments

- Invest in industries with high certification requirements/long-life assets
- Where equipment works in harsh environments
- Aerospace and defence focus

#### » Creation and retention of intellectual property

- 50+ years' aerospace pedigree
- Product IP
- Manufacturing process IP

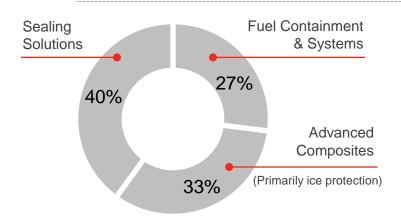
#### » Focus on operations excellence

- Market fragmentation presents near-term opportunities
- Sustainable performance cements long-term relationships

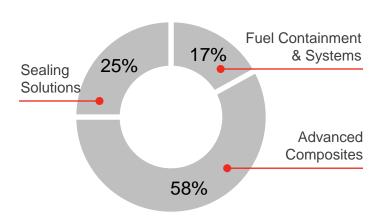


# **Meggitt Polymers & Composites**

# Business mix pre- and post-acquisition



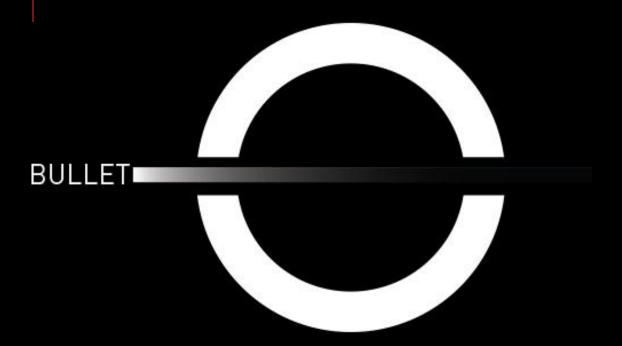
	Pre-acquisition
Employees	1,800
Facilities	4
Square feet	1m



	Post-acquisition
Employees	2,900
Facilities	12
Square feet	1.5m



# Fuel containment

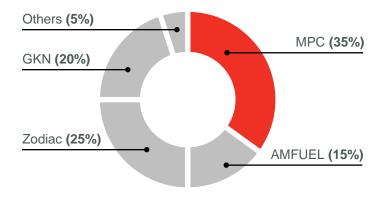


### **Fuel containment**

## Military and commercial markets around the world

- » Leading manufacturer of flexible fuel cells for military aircraft
  - self-sealing/ballistically-resistant and crashworthy
- » Presence on virtually every US military helicopter platform
  - additional opportunities in Europe
- » Meggitt preferred for
  - Trusted as the technology pioneer
  - Product performance safety
  - On-time delivery and quality
- Wet wing sealants opportunity





£269m annually



## **Expanding solutions for containment**

## Cells to systems

- » Moving up value chain to provide comprehensive fuel systems
- » Integrating structural composite housings, fuel cells and fuel delivery systems
- » Providing primary and auxiliary fuel systems
- » Delivering multi-piece composite structures
  - Reduced manufacturing risk
  - Reduced cost of field repairs
- » Opportunity to deploy Meggitt sensing and fluid control products

#### **Recent platform wins**



V-280



AW-159

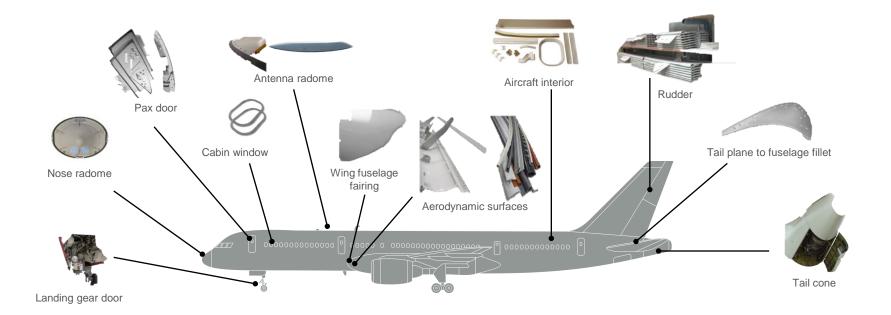


# Sealing solutions



# **Aerodynamic seals**

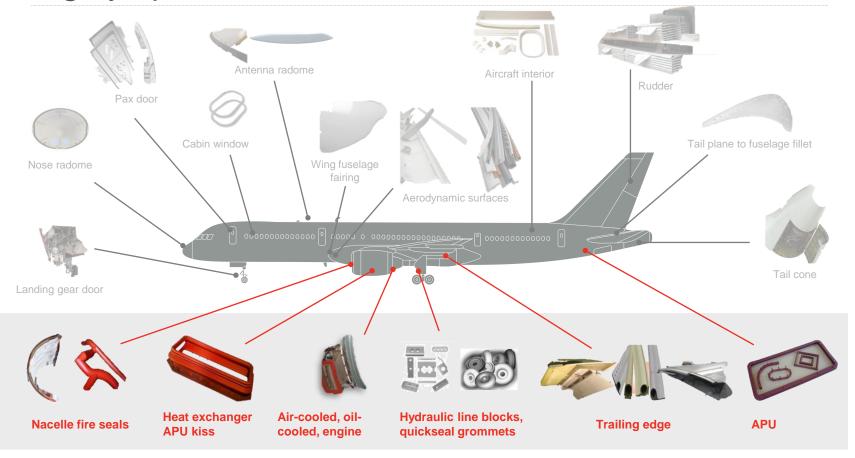
# Engineering rich





## **Engine seals**

# Highly specified

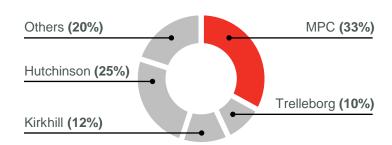




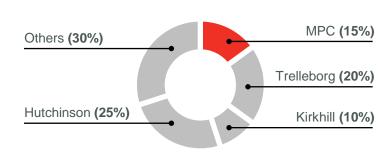
## Engine and aerodynamic seals market

- » Highly competitive market
- » MPC factories market-leaders in highly complex logistics, shipping 1000s of different part numbers per day, many different materials
- » Well-established, low-cost production in China
- » Growing market share through
  - Highly-engineered, high performance products created by in-house, industry experts
  - Build-to-print underpinned by Meggitt Production System – 240% growth on A350XWB

### Aerodynamic seal market: £150m



#### Engine seal market: £190m





# Ice protection

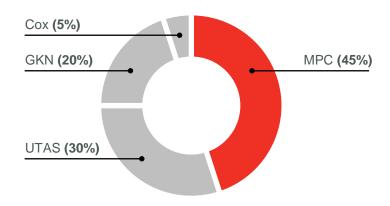


## Ice protection

## A complex composites capability

- » Historical core capability
- » >50 years protecting geometrically-challenging apertures
- » Leading supplier of electro-thermal ice protection for rotorcraft
  - Military
  - Commercial
  - Heavy lift
- » Glass fibre

### Rotorcraft ice protection market



£33.5m annually



## **Growth strategies**

### for established MPC businesses

### Fuel containment and systems

 Remain No 1 in military fuel cells, grow share of fuel systems, expand into commercial rotorcraft, commercialise wet wing sealants

### Sealing solutions

 remain supplier of choice for aircraft sealing solutions – grow through deployment of lighter-weight polymers, engineering and integration expertise. Quality performance will increase market share

## Ice protection

 Remain No 1 provider of electro-thermal ice protection for rotorcraft, collaborating with group AR&T to deliver energy-efficient fixed wing technology with EU Clean Skies GAINS funding

### Advanced composites is biggest growth area



# Advanced composites



## **Advanced composites**

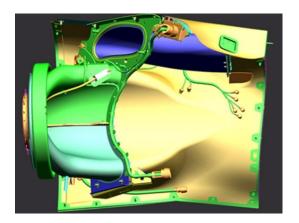
## Where we play

- » Not primary structures (fuselages, wings)
  - Simple, consistent shapes
  - Automatic fibre placement production
  - Capital-intensive

### » Meggitt prefers

- Less capital intense/higher margin
- Complex secondary structures
- Hand lay-up
- Difficult shapes and geometries
- Diverse and highly-specified manufacturing processes
- Significant process IP





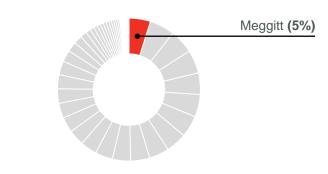


## **Complex composite market**

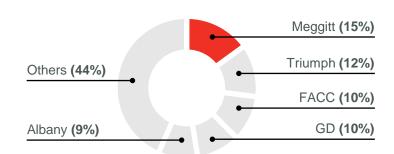
## Strong position through acquired businesses

- » Market fragmented, dominated by small, high-risk operators
- » Aerospace customers need high quality, low-risk, scale suppliers
- » Meggitt offers
  - ✓ On time delivery and high quality
  - √ Reliability
  - √ Material science
  - ✓ Broad design capability
  - ✓ System engineering
  - √ Financial stability
  - √ Scale
  - √ Mature manufacturing processes

### Composite secondary structures: £2bn



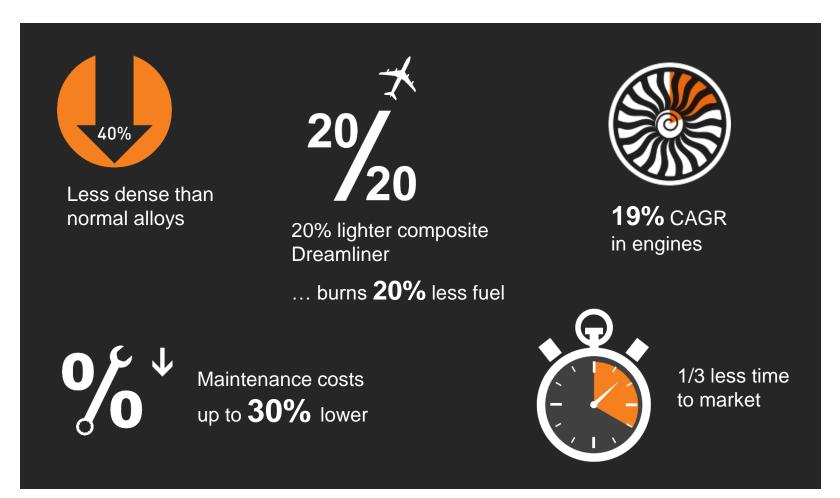
#### Engine composites: £0.6bn



Source: Meggitt estimates; Vision Gain; Roland Berger



## Metal-to-composite conversion is growing ...





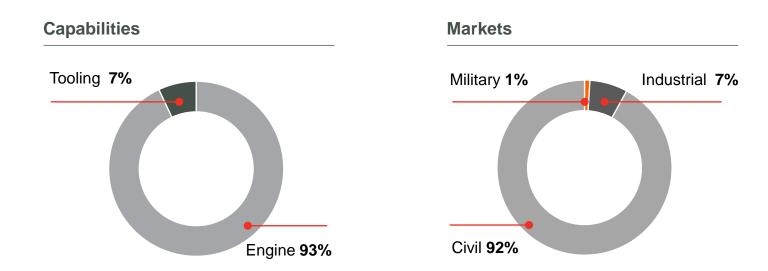
## ... accelerating our composite ambitions

- » First-class customer relationships in Europe and North America on high-growth programmes
  - Gogo, LEAP, F135, PurePower
- » #1 in growing satcom radomes
- » #1 in engine composites
- » Acquisitions augmented glass fibre with new carbon-fibre capabilities
- » Acquisitions delivered an almost unique combination of process capabilities to address virtually any geometric challenge
- » Carbon fibre market growing at c.10% p.a.

Well-positioned in fast-growing niche with significant qualification and certification requirements



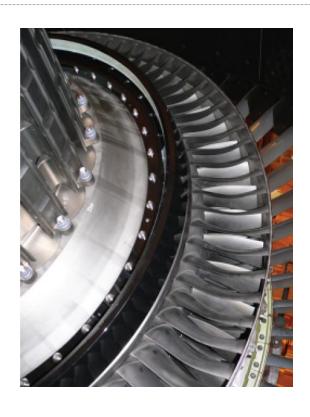
# How the former EDAC business positions us for growth



- » Composite footprint in engine components on every major commercial aerospace platform, including
  - LEAP, PW1000G, GEnx, GE90
- » \$600 million pipeline



## ... and delivers new capabilities



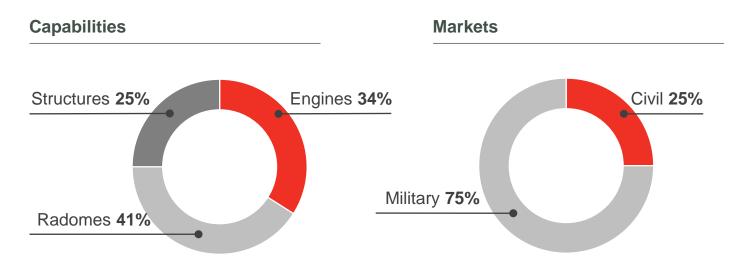
- » World's first load-bearing composite rotating part
- » GE90 115B
- » 50% reduction in weight vs stainless steel equivalent
- » 75% reduction in unit cost
- Win-win for Meggitt and customers
  - More cost-effective for customers
  - Additional revenue streams for Meggitt

Design analysis + engineering + tooling + onerous qualification + testing



## Former Cobham sites – well-positioned in military

## ... with an increasing presence in civil



- » Strong radome capability with broad platform exposure
  - Eurofighter Typhoon, P8 Poseidon, F16, F18, Apache ...
- » High engine content on F35
  - >100 composite parts on F135 engine
- » Good positions on future growth aircraft
  - A320neo, C-Series, Mitsubishi MRJ, 777X, G650 ...



# How the former Cobham businesses position us for growth

- » Top 10 advanced composites business by revenue and platform
- » High-growth platform footprint
- » Strong revenue visibility
  - ~75% of revenues from long-term agreements and single or sole-source contracts
  - Equivalent to 8.5 years' production
- » Technological evolution driven by demanding military specifications
- » Composites used for
  - stealth and low radar observability
  - engine performance
  - extreme aerodynamics
- » High-profile on F-35 aircraft



## Increasing scale in composites

	Meggitt Polymers & Composites	
	Was	Now
Revenue	£170m	c£300m
Facilities	4	12
Square feet	1 million	1.5 million
Employees	1,800	2,900
Output	Glass-fibre based	Carbon-fibre



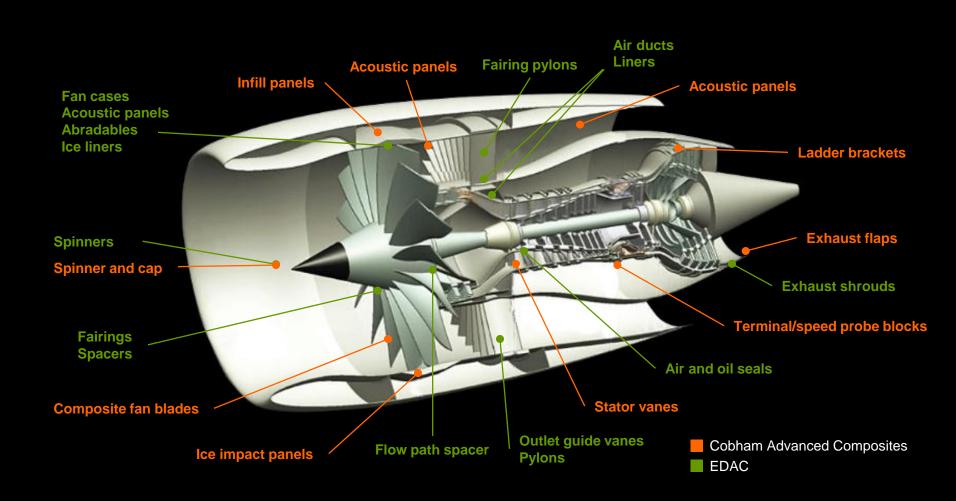
# Now equipped to address any geometric challenge



- Autoclave/out-of-autoclave
- RTM and VARTM
- Multi and single-axis compression moulding
- Injection moulding
- Bladder moulding
- Filament winding
- Assembly/bonding
- Product and process design
- Materials manufacturing
- MRO
- Tooling
- Special processes

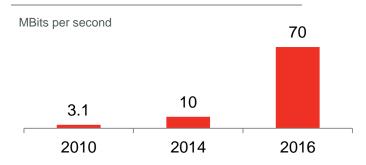


## **Engine of growth**



## In-flight connectivity opportunity

#### Gogo peak transmission speed





2Ku, Gogo's next generation satcom, enabled by Meggitt super-aerodynamic radomes

- » Massive opportunity in aircraft satellite communications and passenger internet
- » IFC market set to grow at CAGR of 35% until 2024
- » Meggitt well-positioned to capture market share
- » Sole-source contract with Gogo
- Significant opportunity to assemble with seals



## Three value streams



## **Operational synergies**

- » Diverse manufacturing capabilities deliver competitive edge
- » Combined engineering resource and shared materials and process best practice improve solutions
- » Low-cost and transatlantic manufacturing delivers new flexibility
- » Lower cost management overheads
- » Consolidation of capabilities into Centres of Excellence
- » In-sourced tooling, division-wide
- » In-sourced seals growth opportunities
- » Integration capability enables seal and composite assembly proposition
- » Group engineering resource to offer industry brand-new multi-functional composites



## **Delivering the business case**

### CAC

- » Continued investment in capacity
- Cost synergy run-rate of \$3.8m pa by end of year 3
- » Up-front cost to achieve synergies of \$4.3m
- » Returns greater than WACC by end of year 3

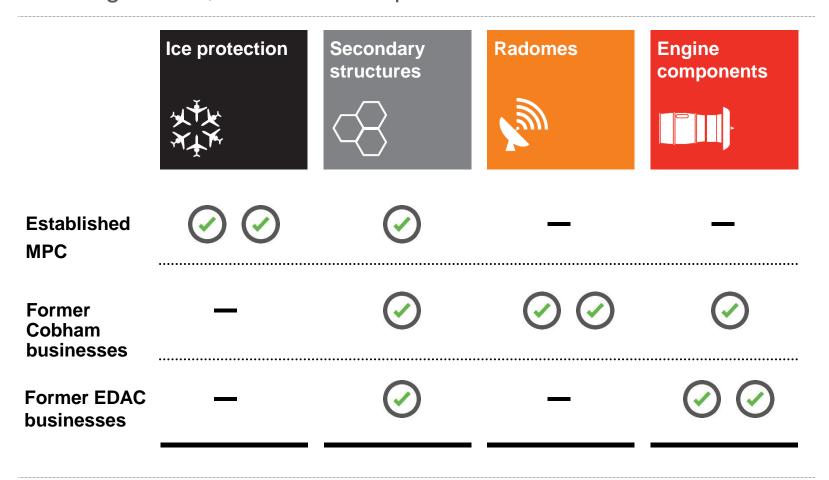
#### **EDAC**

- Continued investment in capacity
- Cost synergy run-rate of \$6m pa by end of year 3
- » Up-front cost to achieve synergies of \$4.8m
- » Returns greater than WACC by end of year 3
- » Numbers assume no revenue synergies
  - Very achievable targets
  - Revenue synergy opportunities will emerge over time
- » Integration progressing well
- » MPC management team compensation directly linked to delivering the numbers
- » Great, high growth, complementary businesses with good synergies



## Ticking all the boxes

for a large-scale, advanced composites business





### Value drivers

Meggitt Production System  Meggitt Production System – quality and delivery recognised as a differentiator by customers

Strong positions on growth platforms

Shipset value growth across total product offering on new generation aircraft

Delivering the acquisition numbers

Excellent strategic fit, merged businesses' capability magnified, scale enables growth and efficiency

Composites as a growth engine

Our market leadership enables us to capitalise on most rapid growth area in aerospace



# **Closing remarks**

# Stephen Young



## **Key value drivers**

Capitalise on the better content we have **Programme** won on the latest generation of aircraft execution Drive a culture of continuous improvement **Meggitt Production** across the business. Better operational **System** performance will enhance shareholder return Increasing agility and responsiveness will **Customer Services** drive aftermarket growth sustainably & Support ahead of the market **Footprint** Elimination of complexity and cost will deliver greater efficiency rationalisation Disciplined capital allocation is key. Capital **Enhanced returns will enable greater** deployment financial flexibility



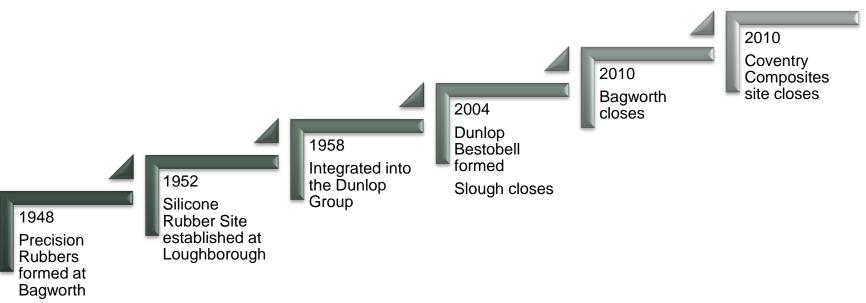
# Polymers & Composites Loughborough Chris Hopper





## Aircraft seals

## Loughborough development



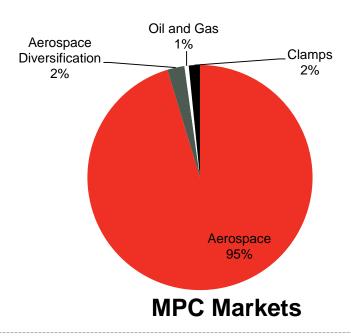
From a headcount of 390 in 2006, to current day headcount of currently 475



### Aircraft seals

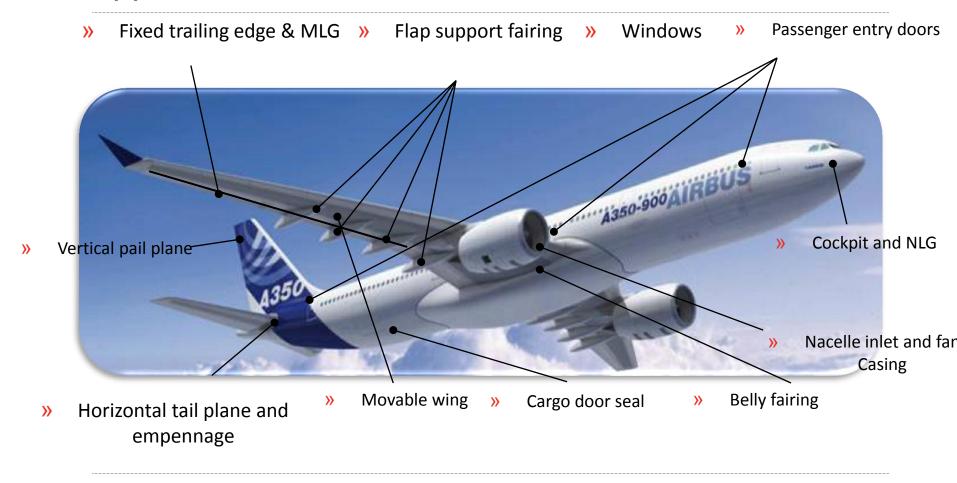
## Loughborough market place

- » MPC Seals predominantly create bespoke aerospace sealing solutions for dynamic and static environments; with 120,000 designs on its books and 11,000 in production a year we find ourselves situated on virtually every aerodynamic surface on an aircraft.
- » These seals are developed to be:
  - Aerodynamic
  - Pressure retaining
  - Fire resistant and fire proof
  - Fluid retaining
  - Conductive
  - Preventative coatings



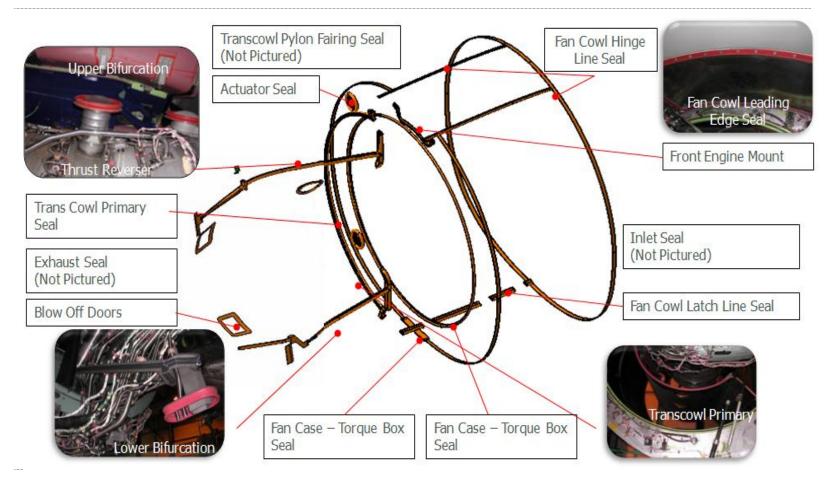


## **Applications**





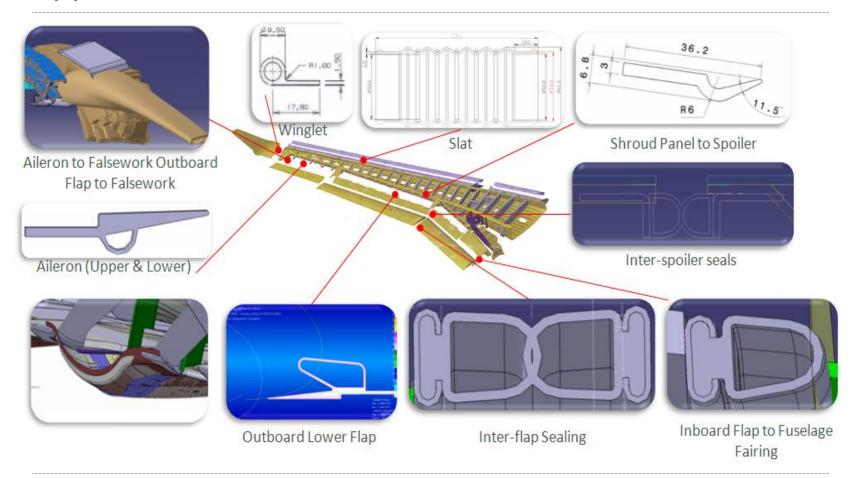
## **Applications - Detail**







## **Applications - Detail**





## MPC Loughborough site tour

### » Tour Stops

- Live module quality clinic/site quality improvements -Pete Lewzey and central quality team
- Workflow/supply cell- Mike Woodward and Steve Evans
- Customer service-Beverley Pratt-Thompson plus 1
- EHS Deal with it campaign-Aimee Harvey and Tracy Woolley

#### » Tour leads

- Group 1-Chris Hopper SVP Sealing Solutions
- Group 2-Paul Hewins Interim Operations Director
- Group 3-Scott Mawby Sales and marketing Director
- Group 4-Karl McIntyre BDM
- » Proposed 15 minute sessions for each demonstration, 5 minutes transfer



## MPCL Safety Induction

- » Ensure you stay with your Meggitt representative at all times when onsite
- » Ensure you use the pedestrian walk ways and zebra crossings when walking between buildings
- » Safety glasses and safety shoes are mandatory across all manufacturing areas
- Ensure you stay within the blue walkways during the manufacturing tour, unless your Meggitt representative guides you to a work station
- » If you have any questions regarding safety please ask your Meggitt representative



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