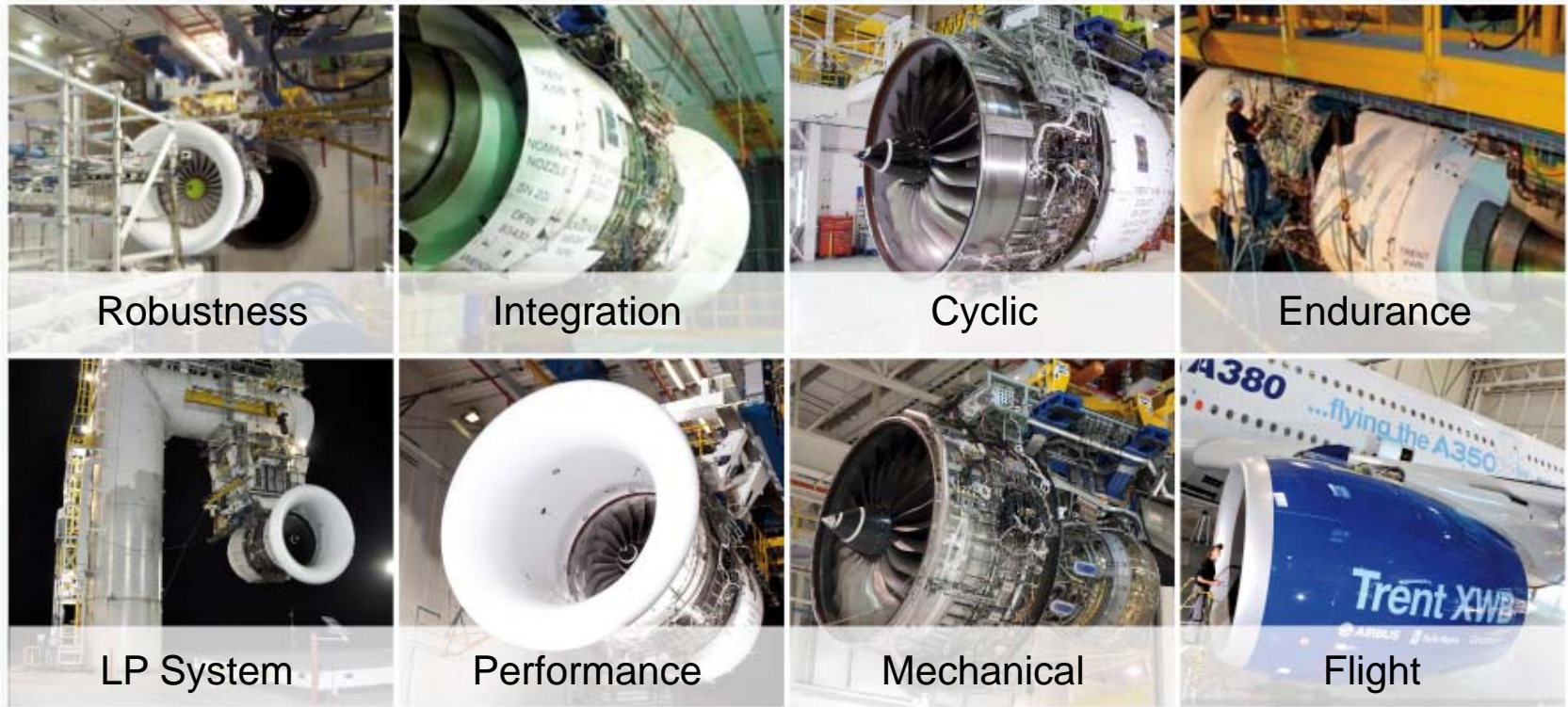


Trent XWB programme

Chris Cholerton

Director – Trent XWB Programme

8 engines and 1200 test hours



Performance, functionality and robustness demonstrated

Trent XWB

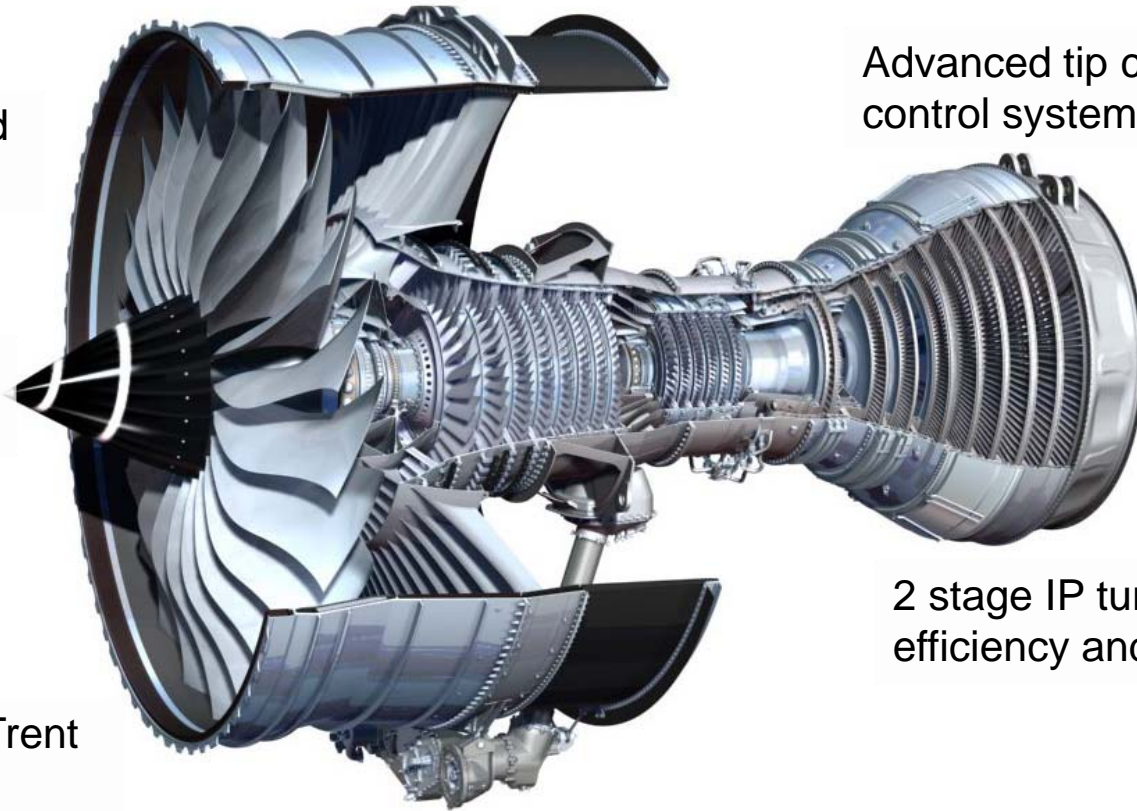
- the most advanced civil turbofan

Latest compressor and turbine aerodynamics

High bypass ratio – low hub/tip ratio fan

Optimised bearing load management

Builds on 50m hours Trent family experience



Advanced tip clearance control system

2 stage IP turbine for efficiency and growth

Optimised for the A350

Engine function confirmed



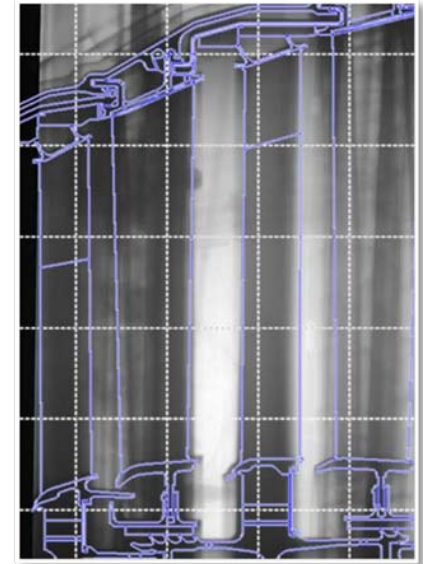
Operational envelope
expanded to 100,000lb



Innovative features
Internal sealing
Mid-height offtake
Bearing loads



Ease and quality
of assembly



Mechanical behaviour
Performance improvement defined

Performance on track



The most efficient
civil turbofan



Compressors exceeding
expectation
Higher efficiency
Excellent operability



Detail measurements
match prediction

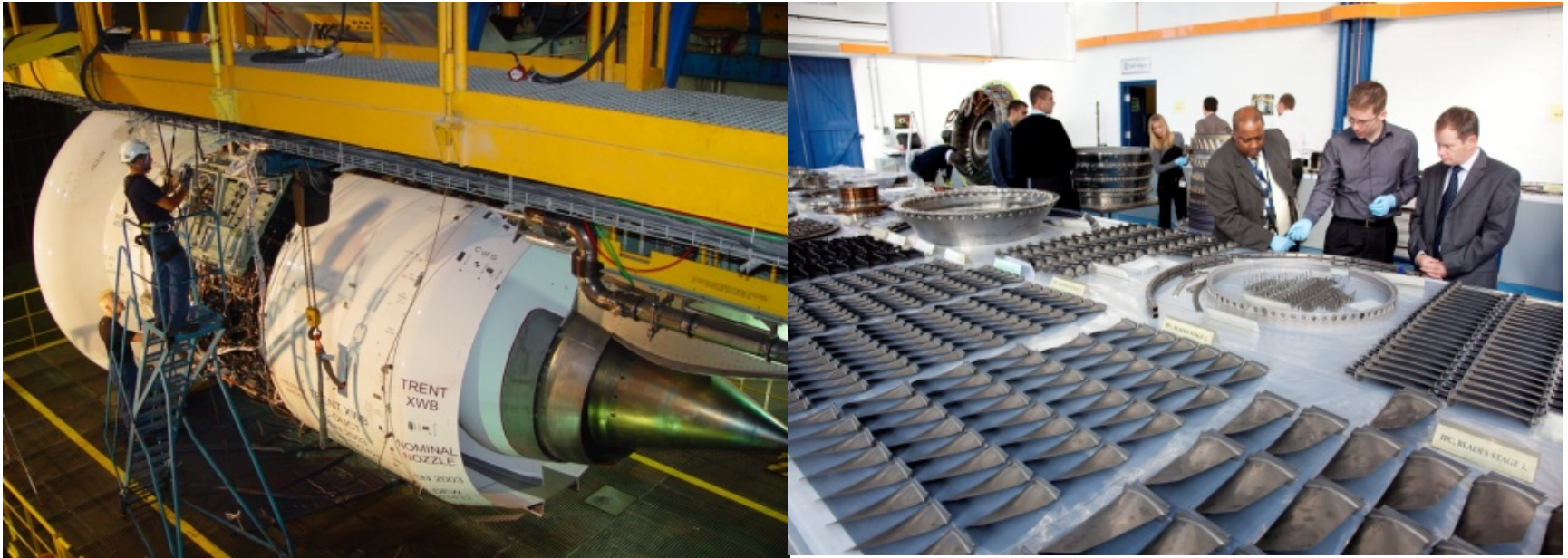


Temperature margin as
predicted

Confidence in specific fuel consumption and capability



Key robustness demonstrations completed



Endurance Test and layout event

Early confirmation of design capability



Key robustness demonstrations completed



Confidence from rig testing



Unit Reliability
Surface cooler



Combustion
Emissions & altitude relight



System
Fuel system



Mechanical
Fan blade release



Aerodynamic
IP compressor

Over 200 tests – material, component, sub-system and system

Ground running on flying test bed

TRENT XWB



Unprecedented levels of measurement and maturity

Looking forward 12 months

Mechanical Tests



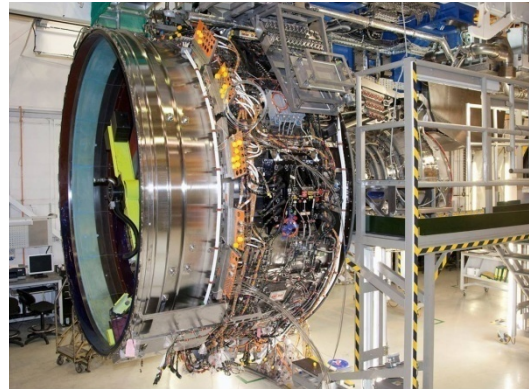
Maturity tests



Altitude and severe weather tests



Flying Test Bed



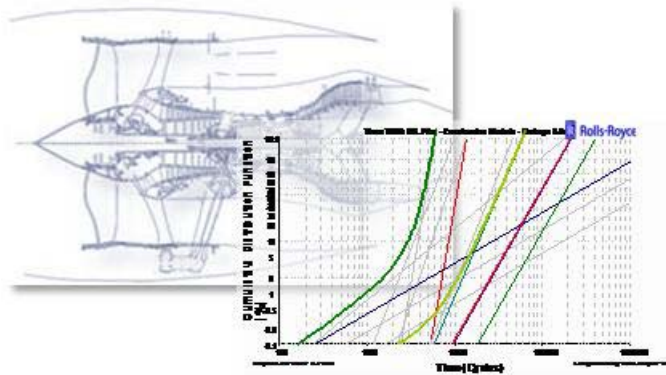
A350 Flight Test Engine Build



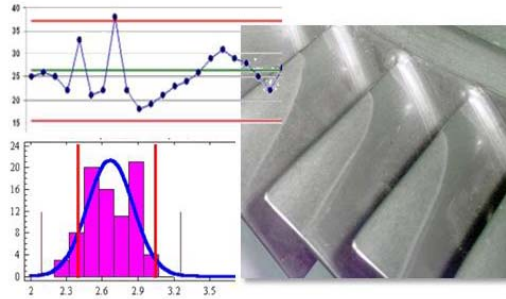
Customer Readiness



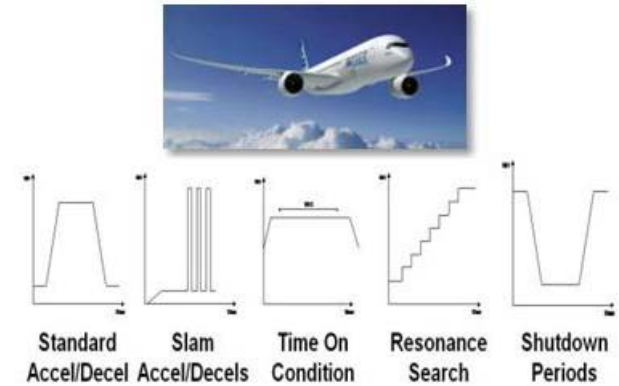
Focus on delivering maturity



Risk & reliability processes
Models based on Trent family experience



Statistical process control
Focus on manufacturing capability



Representative testing
Component and system level replicating service conditions



Timely event capture & resolution



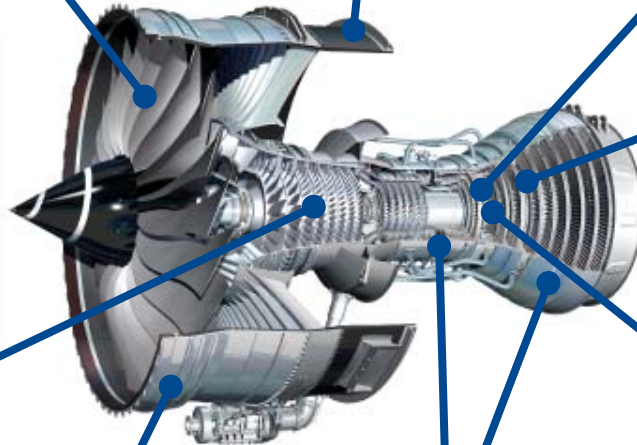
3rd generation health monitoring



Maintainability analysis and validation

005532

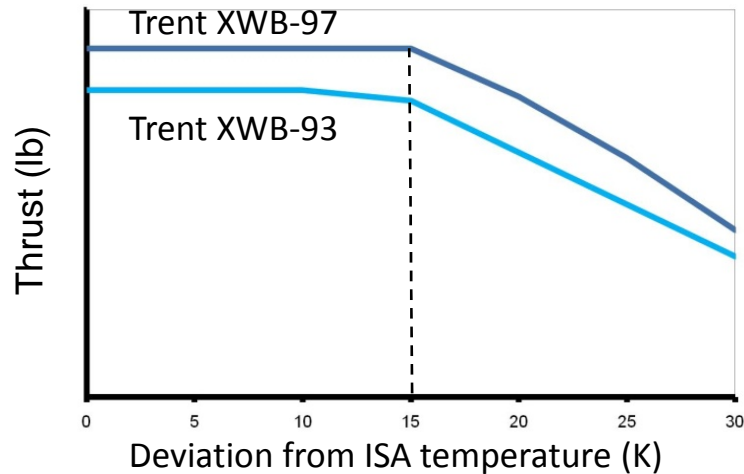
Investment in production capacity



Vcom 16156

Trent XWB for A350-1000

Enhanced engine capability



- 97,000lb thrust to ISA+15 day temperature from EIS
- Increased thrust but with no impact on specific fuel consumption
- Improved combustor to retain 20% NO_x margin to CAEP 6 limits.
- Noise - remains QC1 arrival, QC2 departure

Enabled by positive 84k engine test results

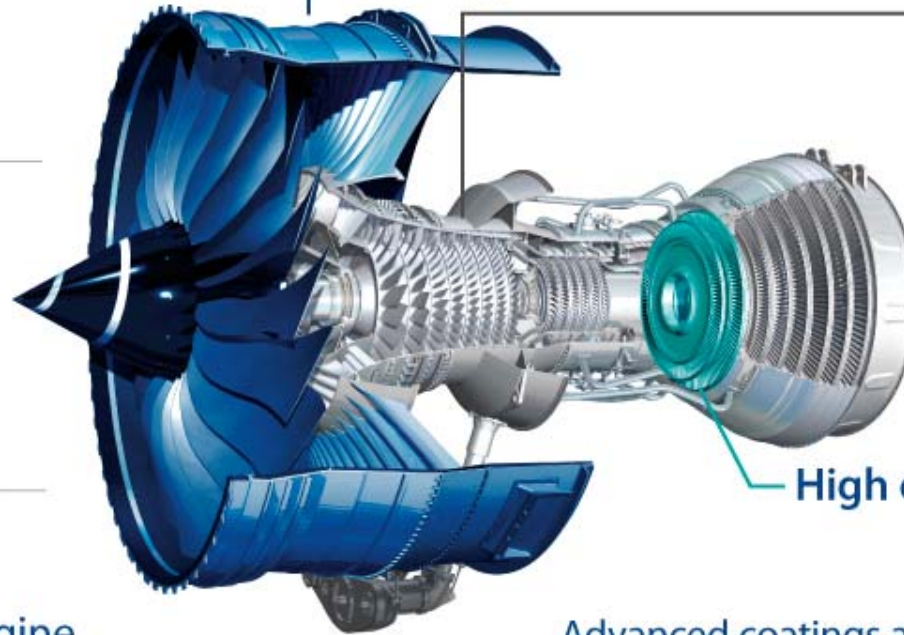
Trent XWB for the A350-1000

High flow fan system
enabled with
inflected annulus

Larger Core to increase flow

Increased
mechanical
capability for
97,000lbs thrust

Maintain nacelle
aerolines as 84k engine



High capability turbines

Tip clearance control

Upgraded materials

Advanced coatings and cooling technology

Improved capability, without impact on specific fuel consumption or on-wing life

97k technology demonstration



Trent XWB-84

Prototype engine



E3E

(Environment, Economy and Efficiency)



EFE

(Environmentally Friendly Engine)

Demonstrating: High temperature materials
Shroudless HP turbine
Tip clearance system
High flow fan

Positive results from 8 engines

Demonstrated performance

Accelerating test experience

Focus on maturity and production

Supporting aircraft programme

97,000lb programme launched

Benefitting from up-front investment

000140