

Flight Test Department
Airbus

A350-1000 Flight Test Programme

Capt. Christophe CAIL
Chief Test Pilot



A350-1000 first flight – The Crew



**Hugues
van der Stichel**
Experimental
Test Pilot



Frank Chapman
Experimental
Test Pilot



**Gérard
Maisonneuve**
Test Flight
Engineer



Patrick du Ché
Flight Test
Engineer
*Head of Flight &
Integration Tests*



**Emanuele
Costanzo**
Flight Test
Engineer



Stéphane Vaux
Flight Test
Engineer

Key A350-1000 features impacting Flight Test Program

Increased MTOW

- Increased payload
- Increased design weights
- Reinforced structure

- Wing Aero improvements
Extended wing trailing edge

5 additional frames
aft fuselage

6 additional frames
forward fuselage

- New 6 wheel bogie MLG

- Increased thrust rating to 97,000 lbs



What was done before First Flight?

- Engine Flying-Test-Bed on A380 MSN001
- Lab test : system tests
 - Ground Vibration Tests
 - Landing gear
 - Electrical system
 - Flight control
- Simulator, “Aircraft zero”
 - Systems integration
 - First Flight rehearsal on Simulator
 - Crew highly involved
- Aircraft and Flight Test Installation Power-On
- Engine runs performed
- Low-speed Rejected Take-Offs
- High-Speed Rejected Take-Off



Trent XWB-97 Flying-Test-Bed: A380 MSN001



1st FTB Campaign: 148 FH achieved between Nov 5th, 2015 and April 26th, 2016

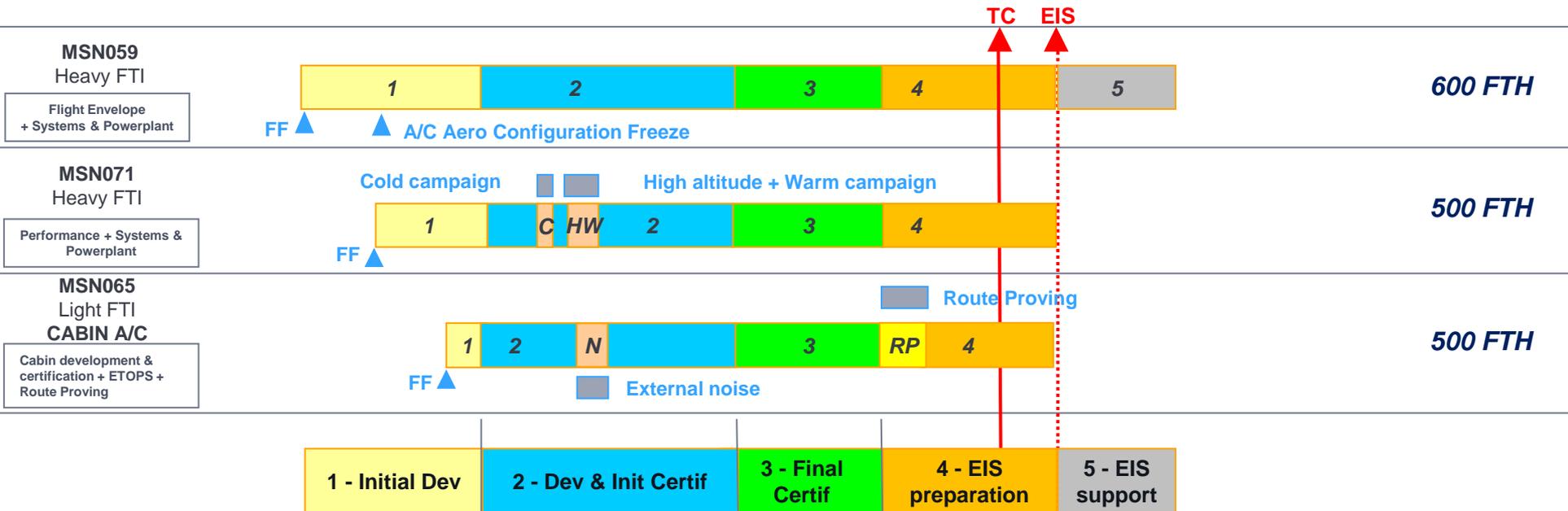
- Engine tests with operability mainly dedicated to engine, including operability tests for RR Certification Specification for Engine (CS-E)

2nd FTB Campaign: target 157 FH from end of July 2016 till End of Year.

- De-risking, maturity and Certification Specification for engine integration (CS-25) items (Hot weather, Natural Icing, Drainage, Fire-extinguishing)

A350-1000 Flight Test Programme overview

Total Flight Test Campaign: 1600 FTH



**Reduced Flight Test campaign,
focusing on A350-1000 new features**

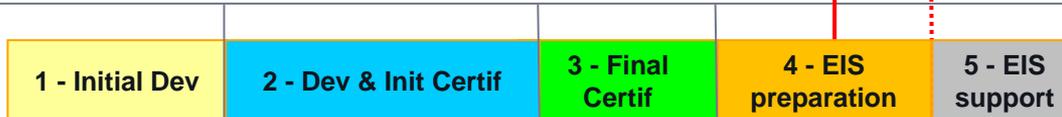
A350-1000 Flight Test Programme – MSN059



MSN059
Heavy FTI



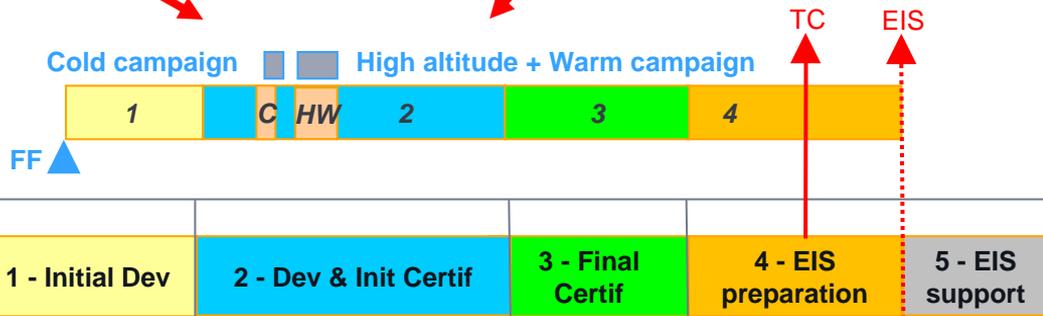
Flight Envelope
+ Systems & Powerplant



A350-1000 Flight Test Programme – MSN071



MSN071
Heavy FTI



Performance + Systems & Powerplant

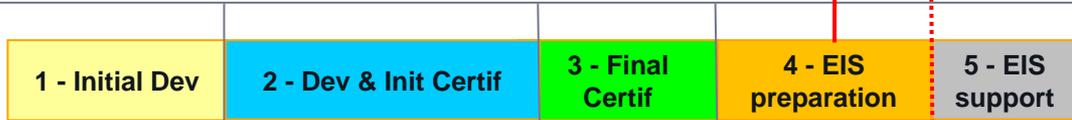
A350-1000 Flight Test Programme – MSN065



MSN065
Light FTI
CABIN A/C



Cabin development & certification + ETOPS + Route Proving



Flight Test installation on-board MSN059

- **Flight data acquisition**
 - More than **600,000** parameters
 - Up to **15** video cameras
 - **3,300** measurements (**220** different types of sensors) including:
 - 2,850 analogue measurements
 - 150 discrete measurements
 - 300 data bus tapplings throughout the aircraft
 - **140** remote acquisition units
 - **120 km** of orange wires routed all over the aircraft
 - **120,000** electrical connections
- **Flight Test Engineer stations :**
 - Aircraft monitoring station : for 3 Flight Test Engineers
 - Engine Monitoring Station : for 2 engine specialists
- **Data flow** aircraft to ground : average of **100 Mbits/sec**

Flight Test installation on-board MSN059 cont'd...

- Transferable water ballast allows in flight 10% center of gravity variation by transferring **10 tonnes of liquids** (water + glycol) from the forward to aft cargo holds in **4 minutes**.
- For external campaigns a **51-seat “flight test cabin”** can be installed in A350-1000 MSN059 to carry on board our ground support specialists and mechanics.



Flight Test installation on-board MSN059 cont'd...

- Flight Test Engineering Station
 - **representative situation** of cockpit and dedicated external views (landing gear, engines, flap slat) by video.
 - **8 copies** of the cockpit displays
 - **real time monitoring**, on dedicated configurable screens, many parameters that the pilots cannot see and access:
 - The time-based trace of each recorded parameter
 - **150 specific display pages** which focus on systems or on specific flight phases
 - Video signal coming from up to **15 cameras**
- Possibility to **modify the aircraft configuration** and up to **60 “special control” push buttons**



What now? Aircraft monitoring during the first flight



In Telemetry room

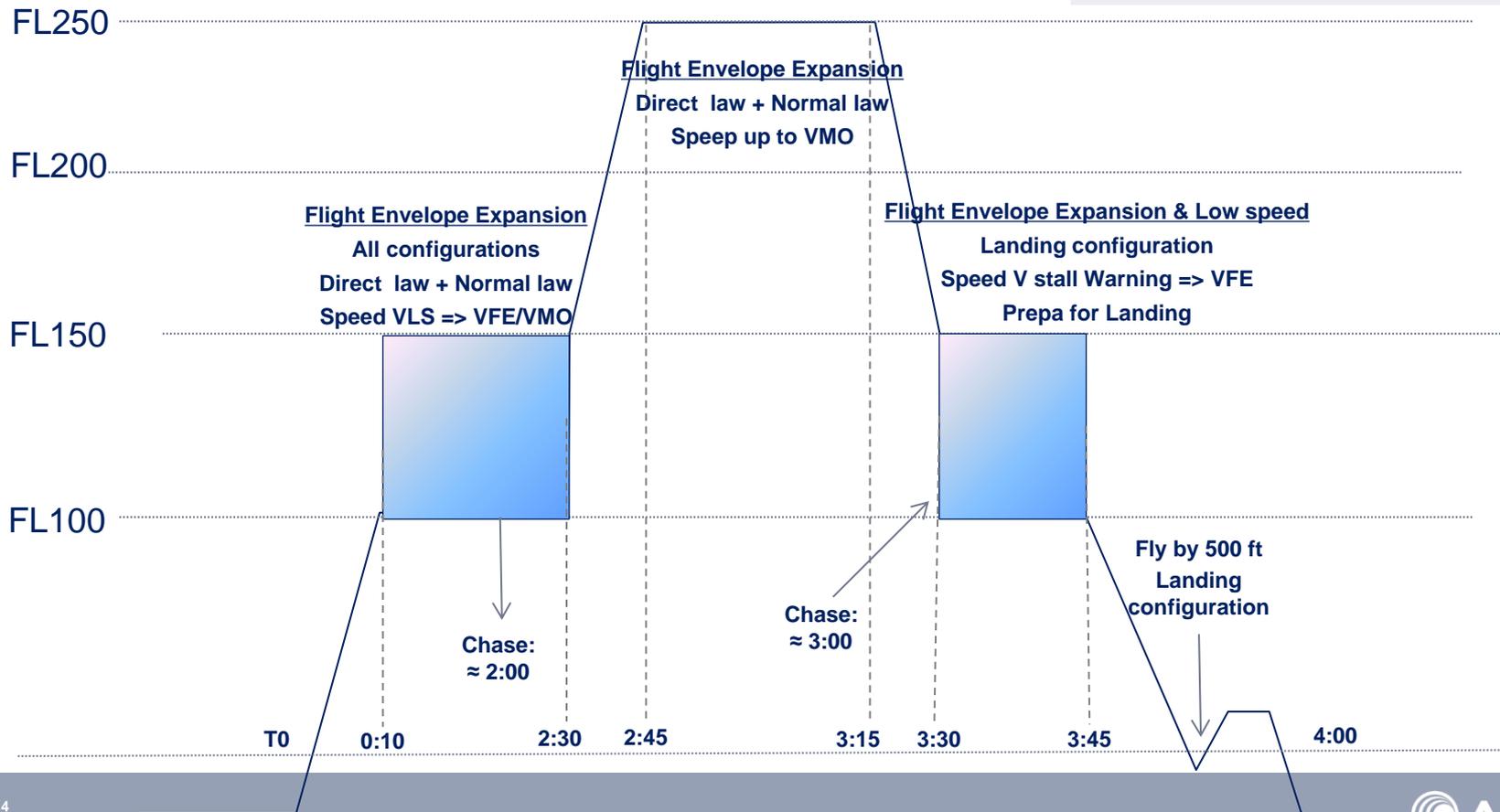
- Real time analysis and Systems monitoring
- More than 100 ground specialists
- 5 Telemetry rooms (2 in Toulouse, 1 in Bremen, Hamburg and Filton)



1 Chase aircraft:

- Falcon 20

A350-1000 First Flight Profile



Thank you!



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