



BelugaXL

First Flight – 19 July 2018

Bertrand GEORGE – Head of BelugaXL Programme

Veronique ROCA – BelugaXL Technical Director

Tim DOWN – Head of BelugaXL Testing

Patrick du CHE – Head of Airbus Flight and Integration Tests

Philippe SABO – Head of Airbus Transport International

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Oversize Air Transport – End to End solution crucial to Airbus production



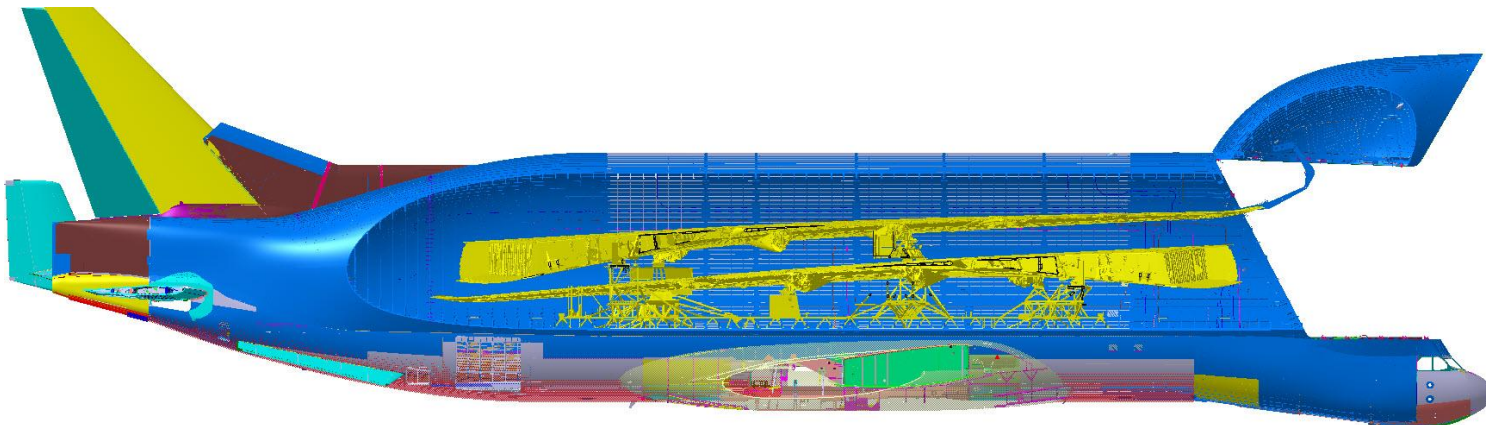
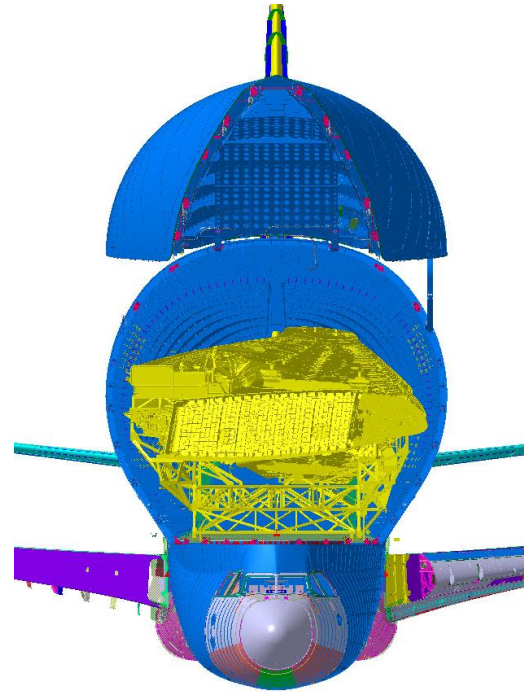
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- ❑ An airline, ATI, Airbus subsidiary since 1996
- ❑ A fleet of 5 Beluga ST
- ❑ A network of 11 stations
- ❑ Infrastructures & processes adapted to high production rates

Why a BelugaXL ?



❑ **The Beluga ST cannot carry 2 A350 wings at the same time**

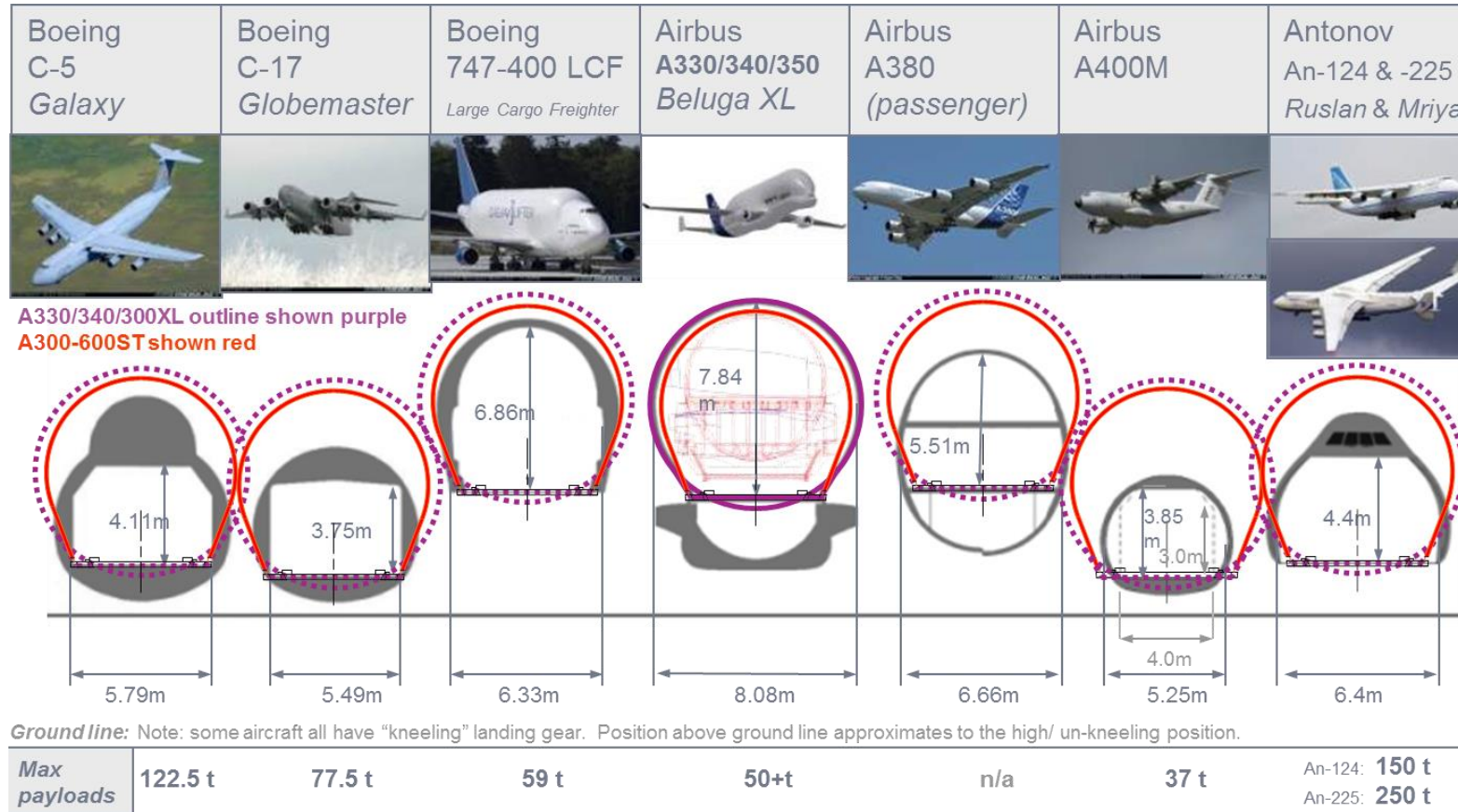
❑ **Beluga ST Flight Hours**

- A320 : ref
- A330 : x3
- A350 : x7

❑ **A system reaching its limits**

- Up to 5 flights / day, 6 days / week
- 8600FH in 2017
- Road and sea transport less flexible and more costly

Why a BelugaXL ?



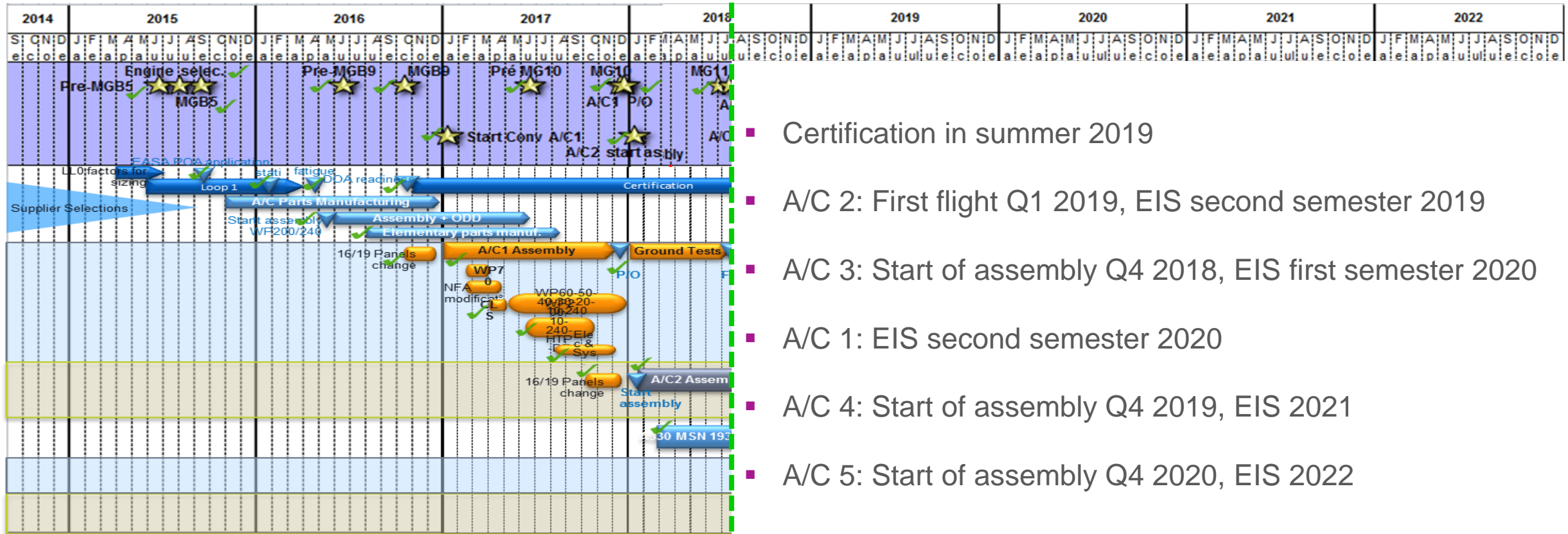
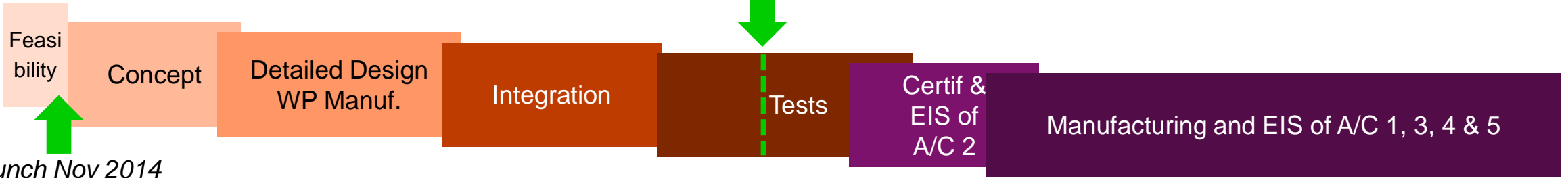
❑ Requirements:

- 2 A350 wings
- Compatible with existing infrastructures, jigs and tools
- T/O & landing on all sites runways
- EIS in 2019

❑ No existing solution on the market

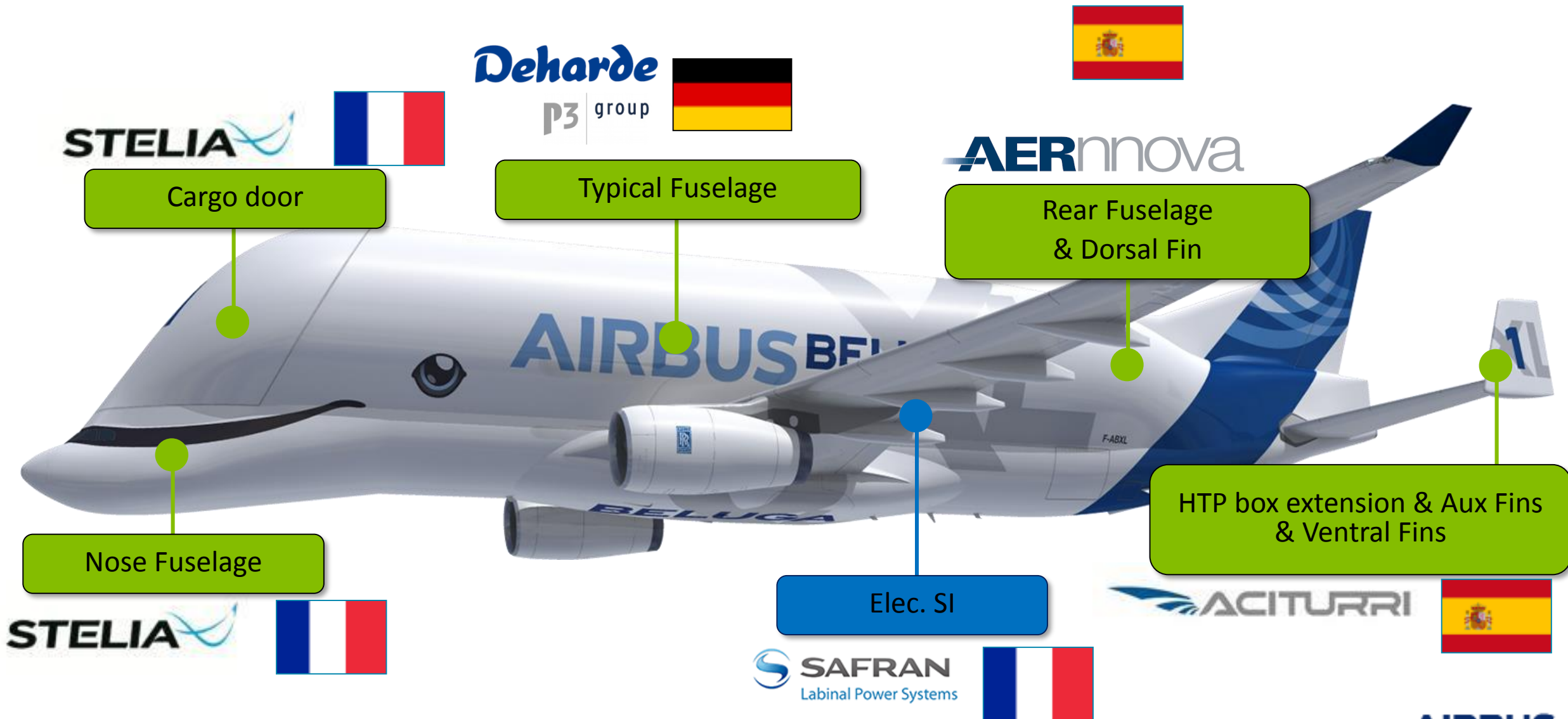
❑ The Beluga (ST & XL) cross sections are much bigger than those of all existing cargo A/C

BelugaXL Overall Planning



- Certification in summer 2019
- A/C 2: First flight Q1 2019, EIS second semester 2019
- A/C 3: Start of assembly Q4 2018, EIS first semester 2020
- A/C 1: EIS second semester 2020
- A/C 4: Start of assembly Q4 2019, EIS 2021
- A/C 5: Start of assembly Q4 2020, EIS 2022

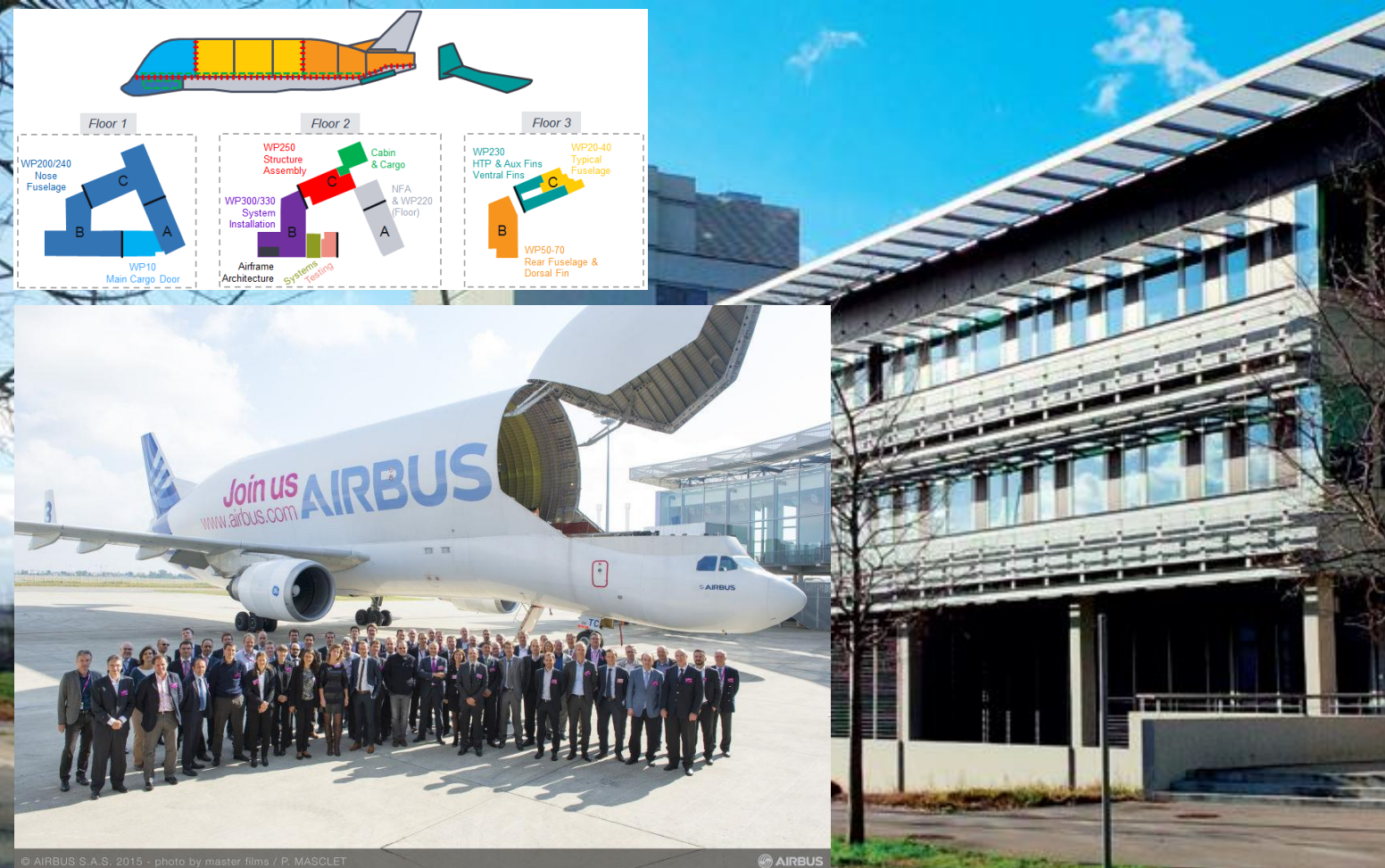
A Team work - Major Structure & SI Suppliers



A Team work - Major Equipment / Systems Suppliers

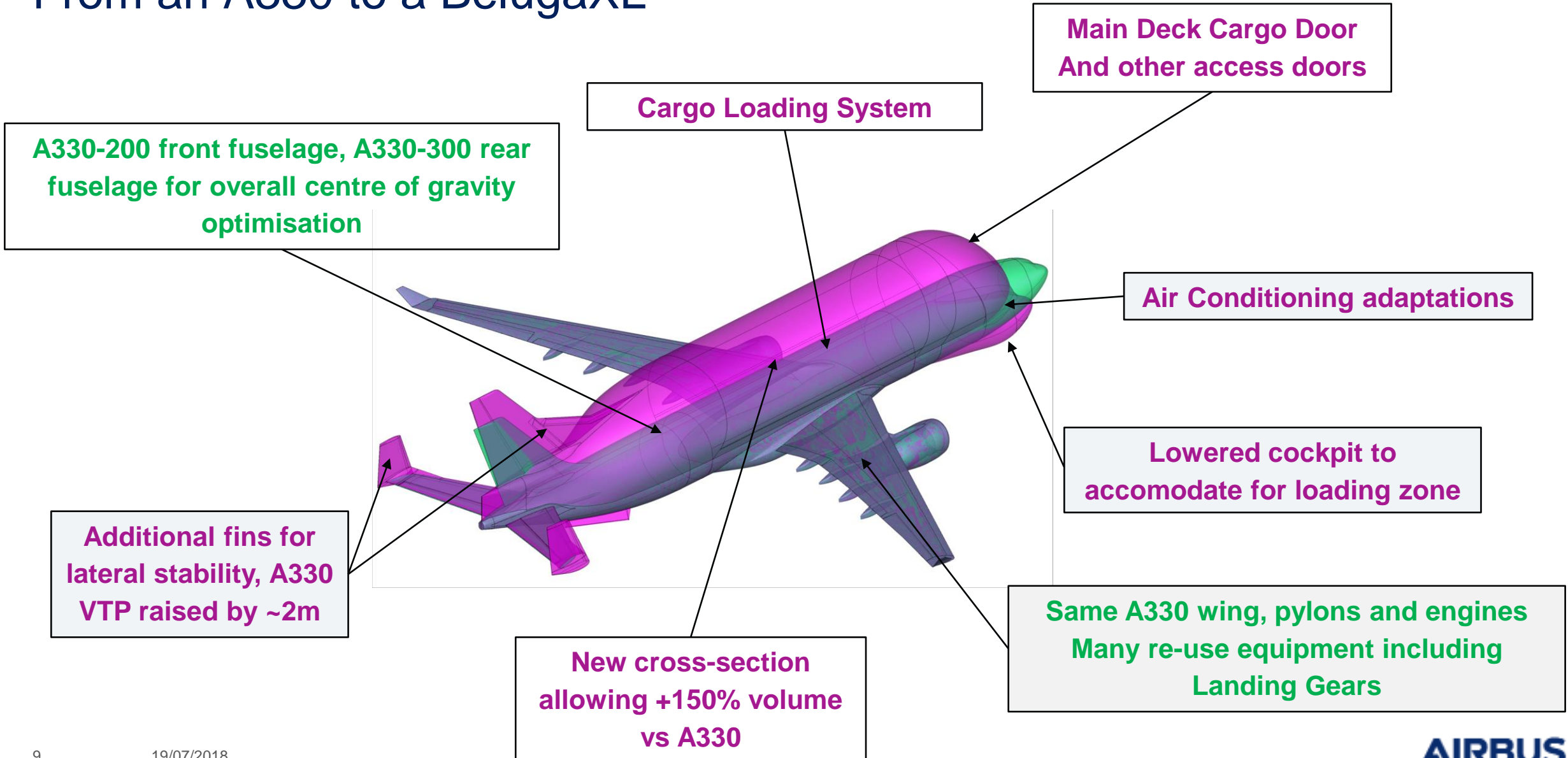


2 years of development

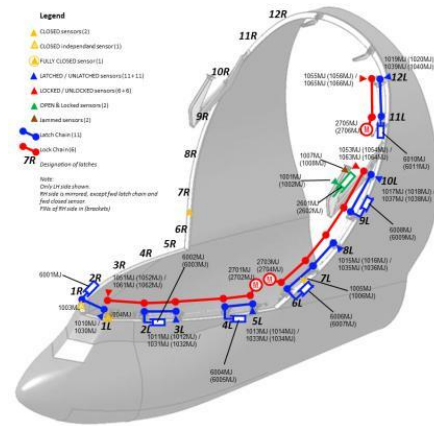
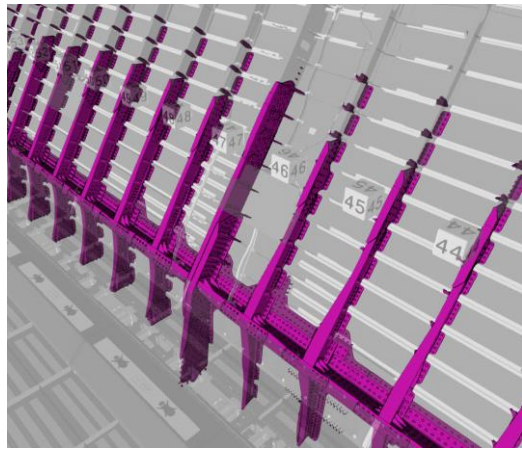
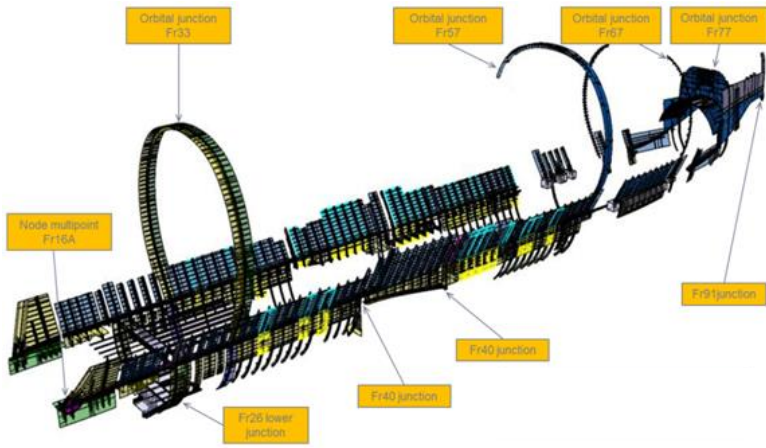


- ❑ Co-location in D55, JLL
- ❑ Up to 1200 people at peak
- ❑ All Airbus functions & partners
- ❑ Open book & Trust

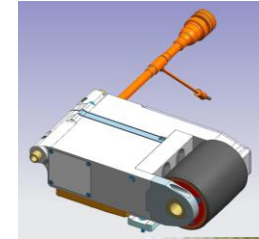
From an A330 to a BelugaXL



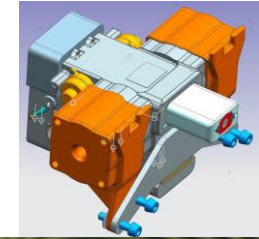
From an A330 to a BelugaXL



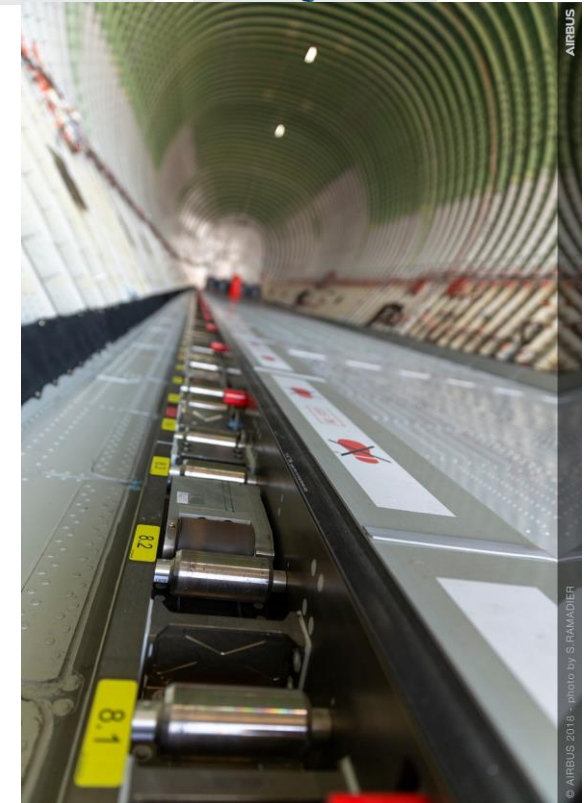
Power Drive Unit



Power Lock Unit



TCU Sensor



Design in Full 3D of the junction between A330 and new upper fuselage

Main cargo door and cargo loading system concepts similar to Beluga ST designed for compatibility with existing infrastructures

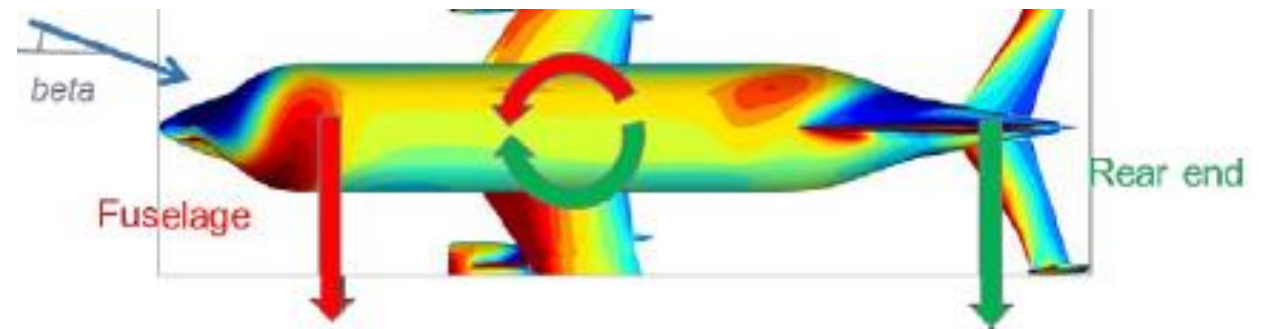
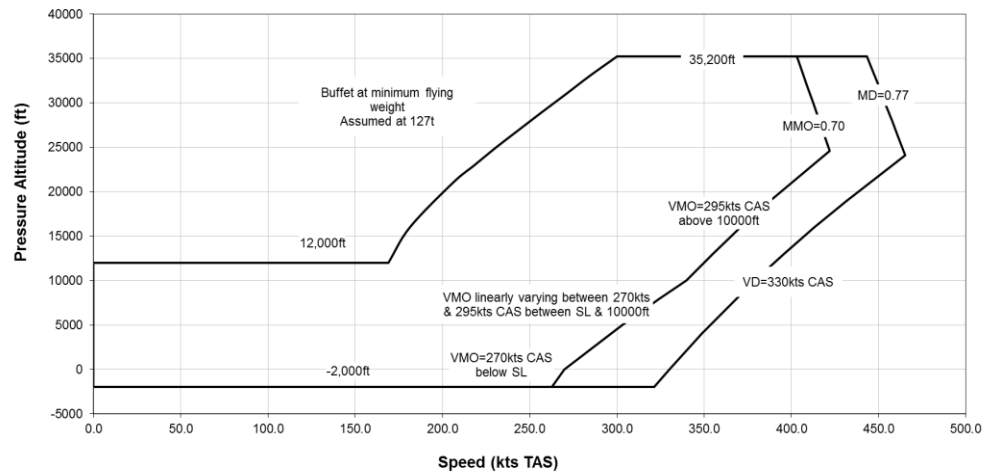
Next steps:

Full certification Mid 2019

Requirements basis frozen since 2015

About half of documentation (i.e. the ones non Flight Test related) already available

Flight Test campaign used first for development then demonstration.



End 2016, the A330 platform is ready for 1 year of integration



Cutting of A330 upper fuselage



Junction



Rear Fuselage



Nose



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HTP and Aux Fins



Main Cargo Door



January 2018 - Aircraft moves



- ❑ A/C #1 moving from conversion to test station...



- ❑ And A/C #2 arriving in conversion station

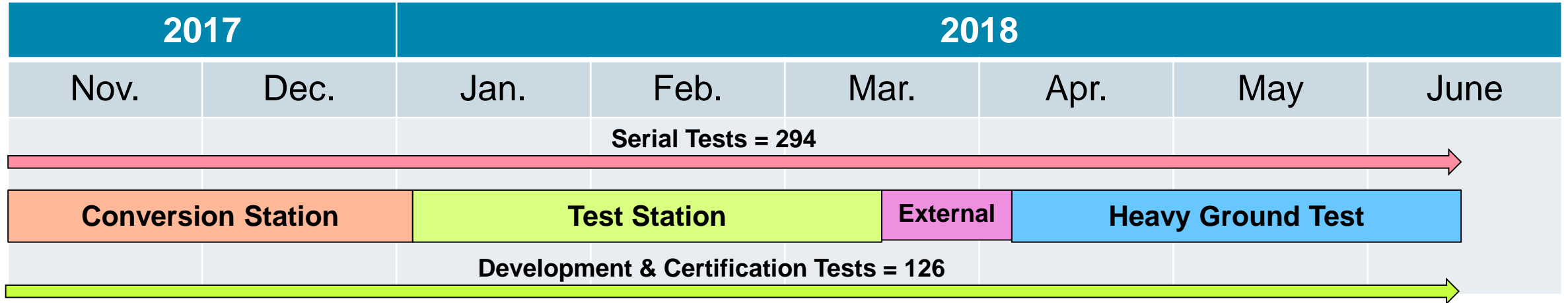


Going through ground tests

Tim DOWN – Head of BelugaXL Testing

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6 months of Ground Tests



Fuel and Hydraulic line tests

Pneumatic systems
 Flight Test Instrumentation functionality
 Flying Controls
 Nose Landing Gear Clearance
 Cargo Door
 Cargo Loading System 1st trials
 pressurisation of forward zone with payload

Weighing
 Loads Introduction
 Ground Vibration
 Cargo Loading System with full payload
 Final Instrumentation checks



Lets focus here!

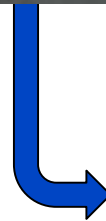
Aircraft Weighing



Weighing at 0 degree. Pitch & Longitudinal Centre of Gravity identification



Weighing at 10 degrees. Pitch and Vertical Centre of Gravity identification



Unloading 8T pallet – first use of Cargo Loader

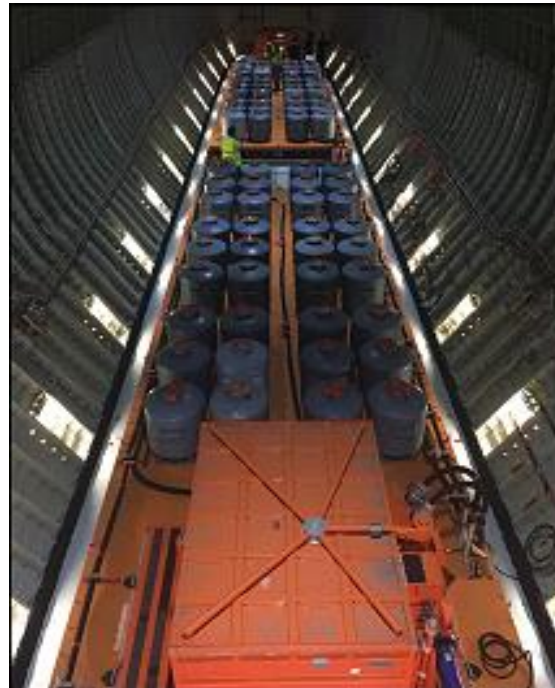
Loads introduction for Model Validation



Ground Vibration Tests



Cargo Loading Trials



2 weeks of painting end of June





Getting ready for first flight

Patrick du CHE – Head of Airbus Flight and Integration Tests

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BelugaXL First Flight Crew

Christophe CAIL
Captain
Experimental Test Pilot
Chief Test Pilot



Jean-Michel PIN
Test Flight Engineer



Bernardo SAEZ-BENITO HERNANDEZ
Experimental Test Pilot

Philippe FOUCAULT
Flight Test Engineer



Laurent LAPIERRE
Flight Test Engineer

BELUGAXL Flight Test Aircraft



MSN1824 – Flight Test Aircraft

Medium FTI (Flight Test Instrumentation)

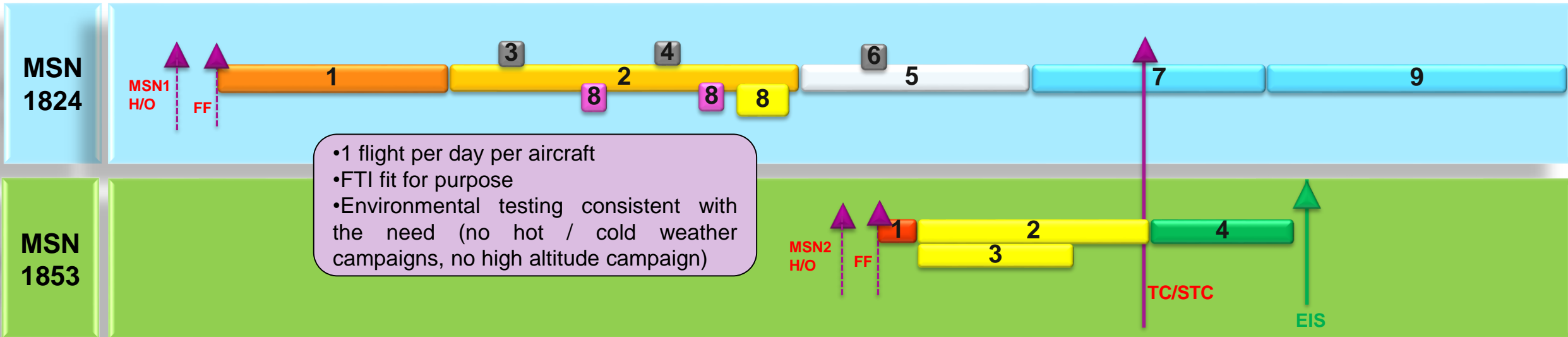
MSN1853 – Flight Test Aircraft

No FTI (Flight Test Instrumentation)



- ❑ **One instrumented Flight Test aircraft**, for development and certification
- ❑ **One serial aircraft** mostly for operability testing & Functionality and Reliability testing
- ❑ **Both aircraft will be part of Airbus Transport International fleet after completion of the campaign**

Flight Tests Program Overview



MSN1824

| | |
|--|---|
| 1- Initial phase | 6- Ice Shapes Certif |
| 2- Development & Init. certif phase | 7- Post TC tests |
| 3- Ice Shapes Dev | 8- Operability Bremen, Broughton |
| 4- External noise | 9- Post TC Phase 2 Complement to MSN 1853 |
| 5- Certification Phase | |

MSN1853

- 1- STC Flight Tests**
- 2- Operability**
 - Sites validation: Broughton, Hamburg, Toulouse, St Nazaire
 - Flight crew training
- 3- F&R in parallel of operability**
- 4- Customer acceptance phase**

Flight Test Installation

A lot of volume... but just a few pressurised

- FTI equipment in non-pressurized area at low temperature \Rightarrow need to acclimatize up to room temperature.
- Flight Test Engineer station behind the cockpit.
 - Seating capacity for 2 Flight Test Engineers (FTEs)
 - Technical capacity to be shared between FTEs (no individual means)
- No windows hence little external visibility \Rightarrow video is key
- FTI Based on modular system and Remote Acquisition Units / Remote Power System
 - 917 on board measurements
 - More than 90'000 parameters on the Flight Test Instrumentation database
- 30 GB of data recorded per flight hour



Flight Test Installation

- **MEMS** (Micro Electro Mechanical Systems) give aero pressure distribution on tails and on main cargo door.



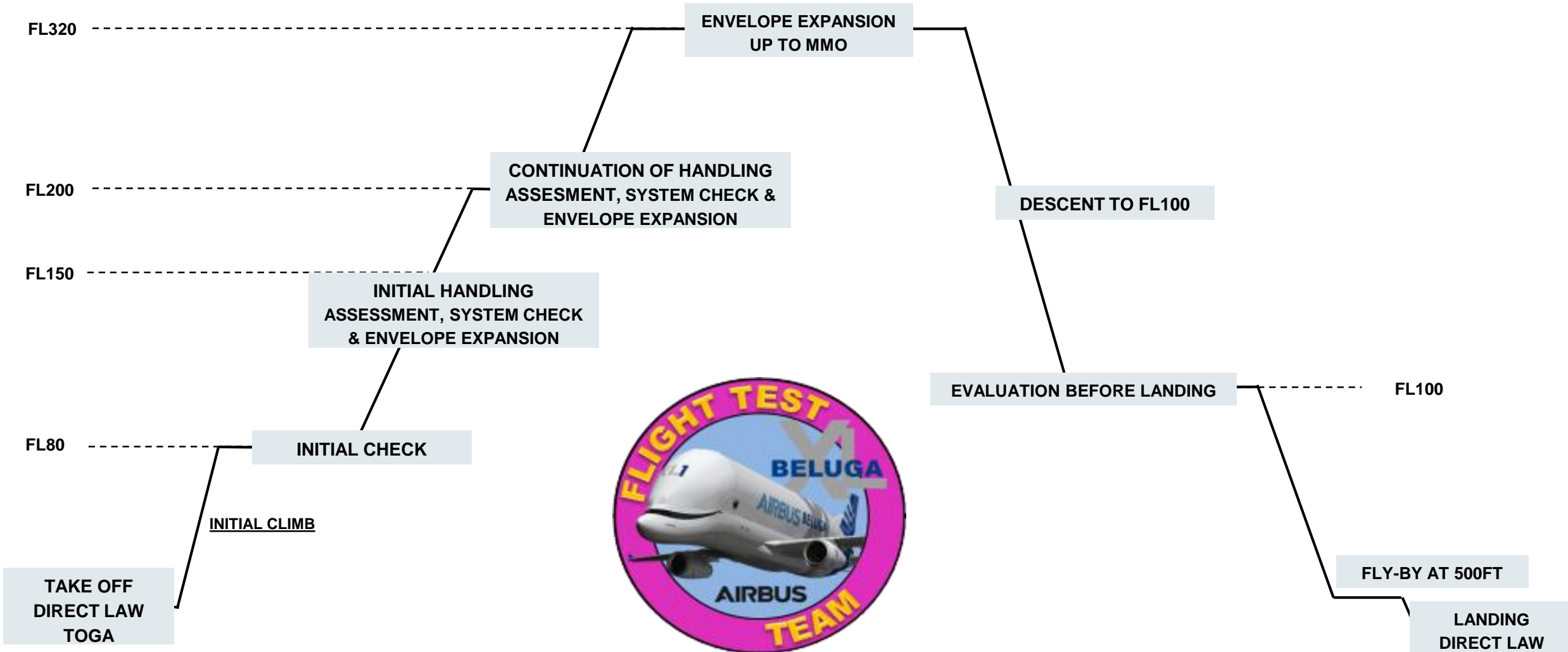
- **High and Low Platform Jig** with transferrable ballast to cover the Weight / Centre of Gravity domain



- Main Cargo



First Flight profile





What's next

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A/C #2 and A/C #3



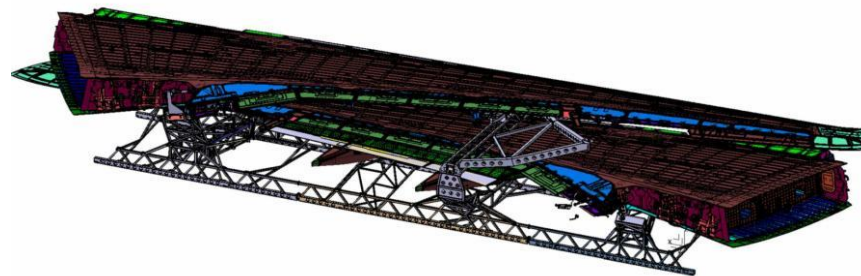
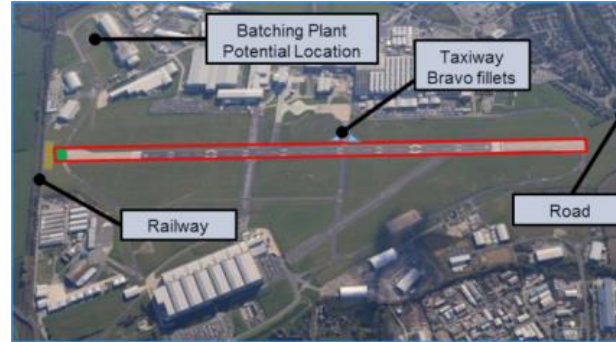


ATI getting ready to welcome the BelugaXL

Philippe SABO – Head of Airbus Transport International

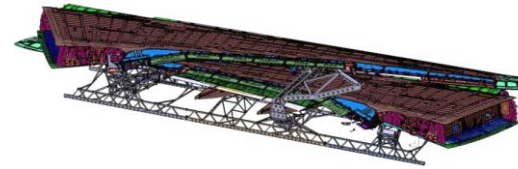
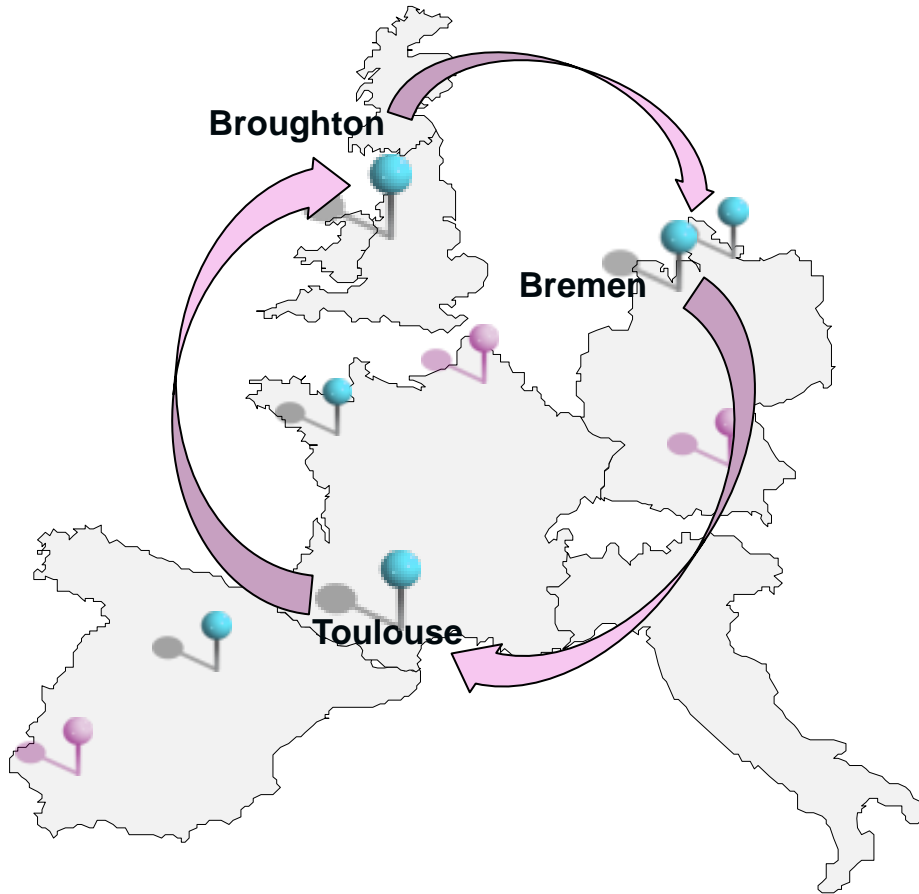
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In parallel, the airline and infrastructures are getting prepared



- Stations adaptations
- Broughton runway re-surfacing
- Adaptation / development of jigs

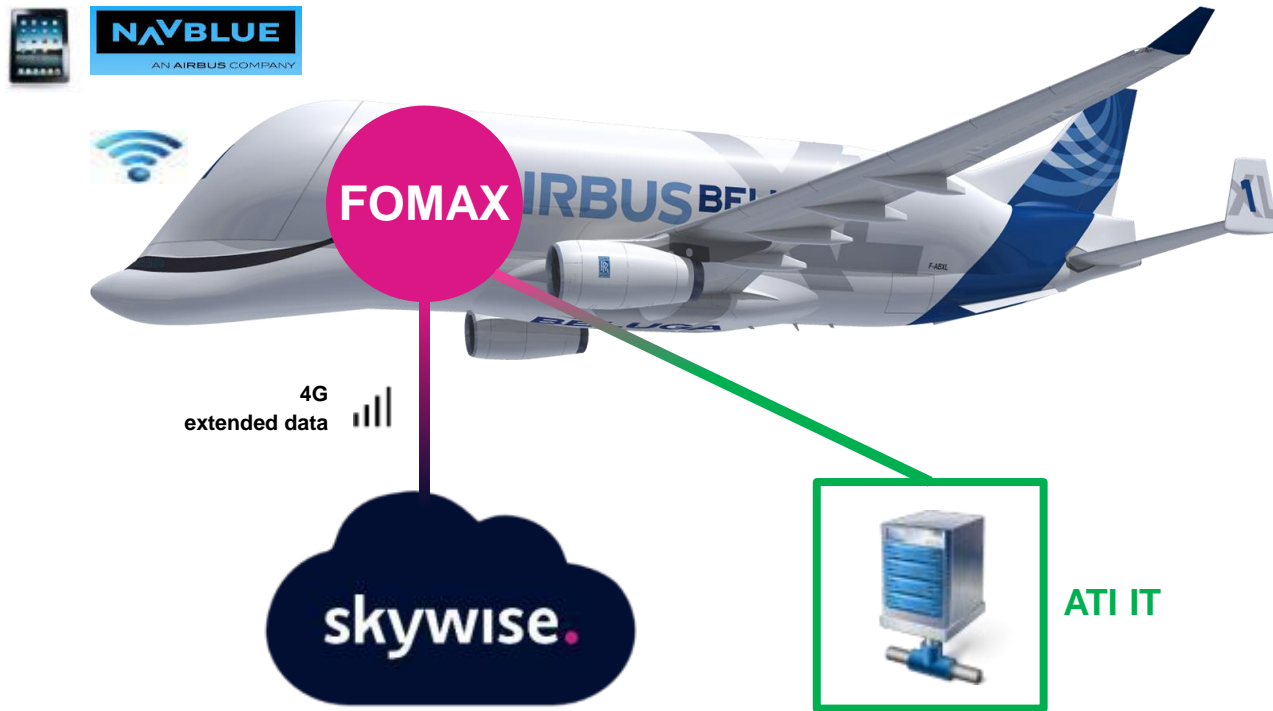
In parallel, the airline and infrastructures are getting prepared



❑ **Toulouse – Broughton – Bremen**
1st route to be operated for A350
Wing transport

❑ **Current Beluga ST Flight Crew will**
perform 10 weeks type rating
training to fly XL

BelugaXL connectivity will enable a new operation model



- Global and simple architecture
- Strong Security Requirements enabling key functionalities
- Airbus End to End services
- FOMAX functionalities to decrease operational costs

❑ BelugaXL - Digital Aircraft

❑ New maintenance & operation model:

- Improved Reactive Maintenance – Skywise Health Monitoring
- Massive data collection and transmission enabling for ATI:
 - Predictive Maintenance: action plan in anticipation of imminent event
 - Skywise investigation tools suite
 - Optimization of flight allocation

Time for
Q&A



Thank you