



Bombardier Aerospace, Belfast

September 25, 2014

BOMBARDIER
the evolution of mobility

New organisational structure

On July 23, 2014, Bombardier Inc. announced the implementation of a new organisational structure.

This new structure is comprised of four business segments:

- Bombardier Transportation
- Bombardier Business Aircraft
- Bombardier Commercial Aircraft
- **Bombardier Aerostructures & Engineering Services – under which the Belfast operation will sit**

A detailed implementation plan will be developed over the next few months, and the new structure will be in place January 1, 2015.

Bombardier Aerospace in Europe

- **Bombardier Aerospace, Northern Ireland**
One of the largest aerospace companies in the UK and the largest manufacturer in Northern Ireland
- **Farnborough Regional Support Office**
Customer Services
- **Bombardier Aerospace Business Aircraft Sales, Farnborough, UK**
- **Amsterdam Schiphol Airport Service Centre**
Opened in 2010, first Bombardier-owned service centre in Europe for Bombardier business aircraft operators
- **Frankfurt Parts Distribution Hub**
Ships parts daily across Europe, the Middle East, Asia & Africa
- **Munich Regional Support Office**
Supporting customers operating CRJ & Q-Series aircraft in Europe, Africa & the Middle East
- **19 authorised service facilities (*includes Russia*) and an authorised training facility**



Belfast – who we are and what we do

- Largest manufacturer in Northern Ireland – 10% of manufacturing exports
- Bombardier investment of almost £2.5bn since 1989
- Centre of excellence – fuselages, nacelles, wings, composites, and component repair & overhaul
- Responsible for managing Bombardier manufacturing site in Morocco
- Workforce of approximately 6,000

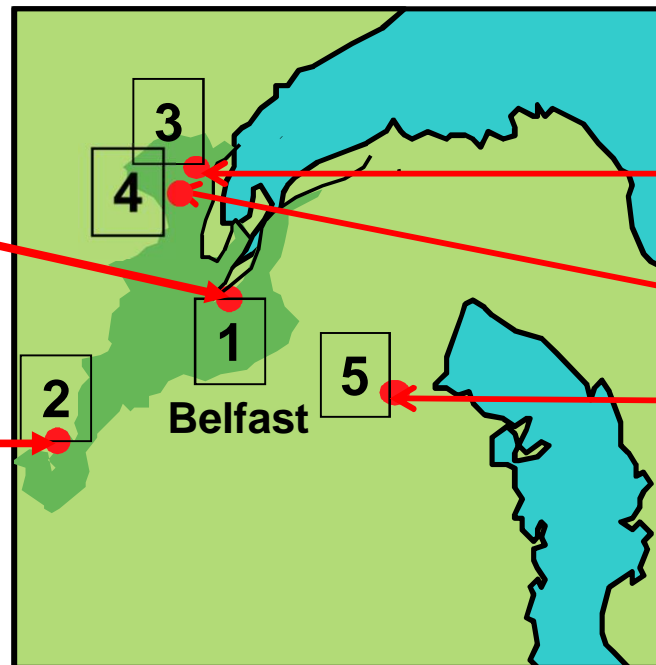
Location of our facilities

1 Queen's Island complex:

- Engineering
- Chemi-mill/metal bond
- Machine shop/fuselage assembly
- New wing facility

2 Dunmurry

- Composites fabrication and assembly



3 Newtownabbey

- Composites fabrication and assembly

4 Aerostructures & Services

- Nacelles/Component Repair & Overhaul

5 Hawlmark, Newtownards

- Sheet metal component fabrication

A photograph of an early business development meeting



Wright Flyer

Isle of Sheppey, 1909

Back row: Oswald, Horace and Eustace Short

Front row: JTC Moore-Brabazon, Wilbur Wright,
Orville Wright and C.S. Rolls

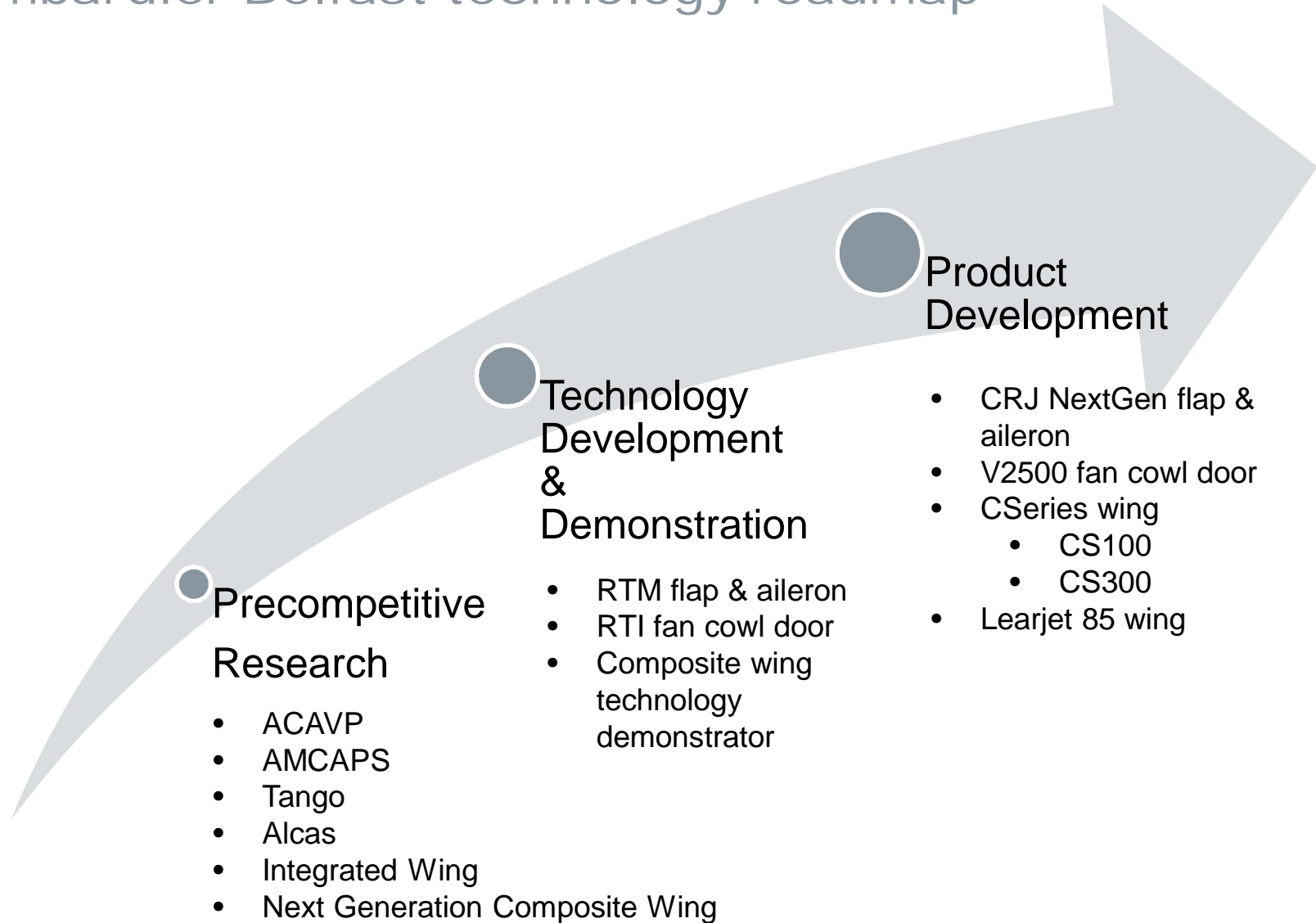
More than 100 years of innovation



- 1909 World's first commercial aircraft contract – 6 Wright Flyers
- 1912 World's first launch of an aircraft from a ship – S38
- 1922 World's first stressed-skin metal aircraft – Silver Streak
- 1959 World's first aircraft to transition from vertical to horizontal flight – SC1
- 1974 World's first purpose built regional airliner – Shorts 330

NOW World's first RTI carbon fibre composite commercial aircraft wing

Bombardier Belfast technology roadmap



New technology centre to advance capabilities

Northern Ireland Advanced Composites and Engineering Centre (NIACE)



Aerospace Growth Partnership (AGP)



Investing **£2bn** in Aerospace Technology

- £2bn industry-Government investment to create Aerospace Technology Institute



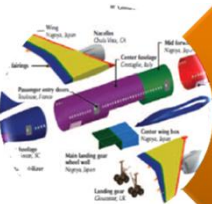
Committed over **7 years**...

- Certainty of investment allows industry to plan



To create and safeguard jobs...

- **115,000 jobs** could be created in the sector from investment in the ATI



At all levels in the supply chain

- AGP supports **businesses of all sizes**, including SMEs

Belfast involved in all Bombardier's families of aircraft



CRJ100/200 (1989)



Learjet 45 (1992)



Challenger 604 (1993)



Global Express (1993)



Q400 (1995)



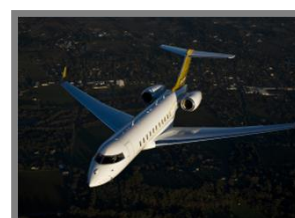
CRJ700 (1997)



Challenger 300 (1999)



CRJ900 (2000)



Global 5000 (2001)



Learjet 45 XR (2002)



Learjet 40 (2002)



Global XRS (2003)



Learjet 40 XR (2004)



Challenger 605 (2005)



CRJ700 NextGen (2007)



CRJ900 NextGen (2007)



CRJ1000 NextGen (2007)



Learjet 85 (2007)



Global Vision (2007)
(Launch year)



CSeries CS100/CS300 (2008)



Global 7000/8000 (2010)



Learjet 70 (2012)



Learjet 75 (2012)



Challenger 350 (2013)

For more information, please visit <http://www.belfast.aero.bombardier.com/categories/69/bombardier-aircraft-programmes.aspx>

Business development at Belfast

From design through manufacture to after-market support, Bombardier Belfast specialises in major aircraft structures including fuselages, wings, engine nacelles and flight control surfaces in metal and advanced composites.

Our operation plays a pivotal role in all Bombardier's families of commercial and business aircraft.

And...

We also produce nacelle components for Rolls-Royce, Airbus and General Electric.

- Bombardier Belfast has more than 40 years' experience in the design, development, manufacture and after-market support of aircraft engine nacelles
- The operation supplies complete nacelles, nose cowls, fan cowl doors, aprons and Engine Build Units (EBUs)

“The creation of the Aerostructures and Engineering Services business segment will also help us to market our expertise in this field to the aerospace industry, thus generating new revenues”

-P Beaudoin July 23, 2014

Business development at Belfast

Dedicated Business Development Team,
with the mandate to exploit our expertise in the following market segments:

- **nacelle** structures and nacelle integration
Complete integrated nacelle for PW1440G
 - **wing structures** and wing integration, and **complex composite** structures
C-Series wing using low cost and weight RTI technology
- And, complementary to the above, to :
- grow our **aftermarket** business
Learjet 85 wing skins and Global 7000/8000 horizontal stabiliser
24/7 support + worldwide network coverage for spares and repairs

Bombardier Belfast's history in nacelles

- Belfast has developed a business in aircraft engine nacelles since entering the market in 1968 with nacelle components for RB211-22B (L1011)
- Nacelle activities at Belfast account for a major proportion of our overall business

 Rolls-Royce



1968-78

**Cold end components
& analysis methods**



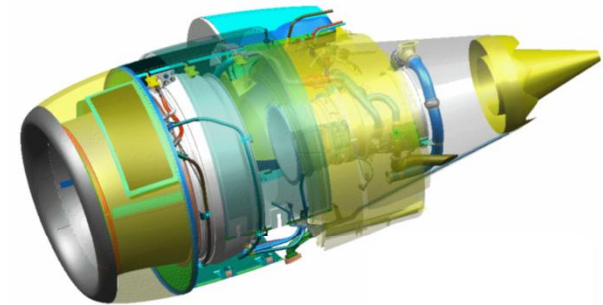
1978-84

**Composite
structures**



1984-95

**Expanded
portfolio**



1995-03

**Complete nacelle
including T/R**

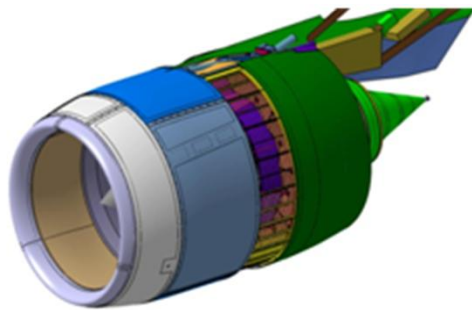
2004 - Present

**Advanced
Nacelle designs**

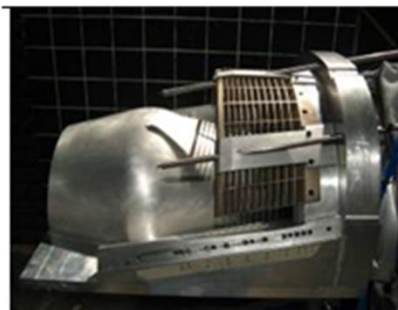
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Advanced nacelle technology development

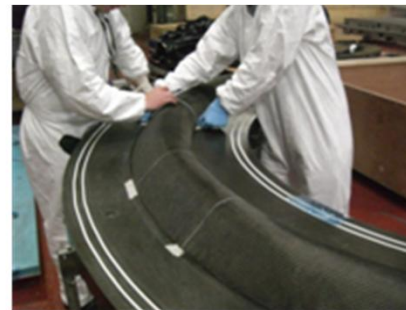
- Development of Integrated Powerplant System (IPS) and/or advanced technology nacelle components for future aircraft – focusing on meeting ACARE goals
- Also supporting growth of Customer Services side of business



IPS design studies



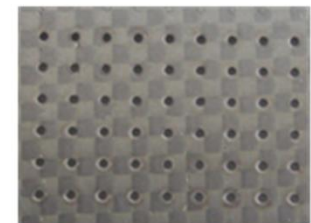
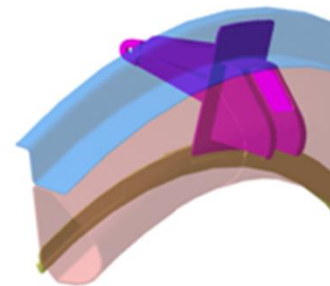
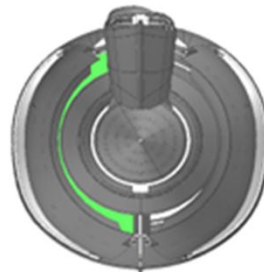
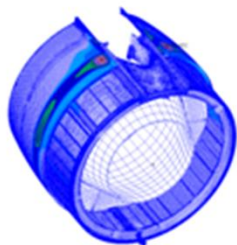
Thrust reverser testing



Manufacturing demonstrators



In-service evaluation



Competitive strategy for nacelle market

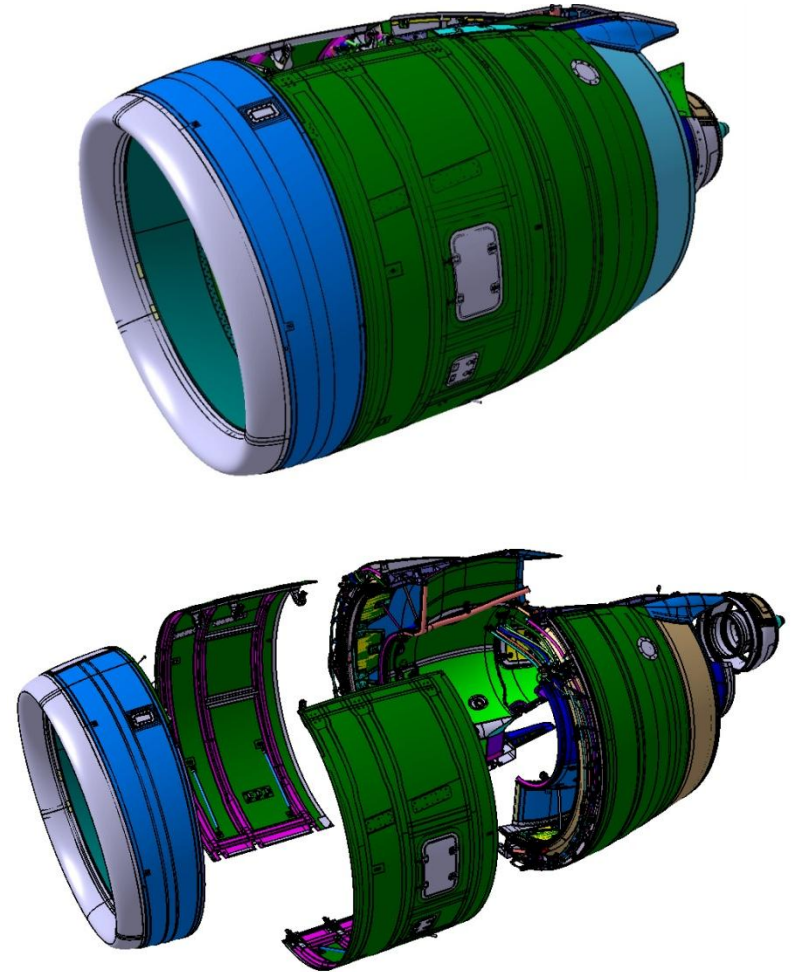
1. Exploit the opportunity of established programmes

- Airbus A320 / IAE V2500A5
- Airbus A330 / Rolls-Royce Trent 700
- Bombardier Global 5000 and Global 6000 / Rolls-Royce BR710
- Bombardier CRJ700/900/1000 / GE CF34-8
- Bombardier Challenger 605/850 / GE CF34-3
- Gulfstream GV / Rolls-Royce BR710



Competitive strategy for nacelle market

2. Develop and build on the opportunity created by programs currently in the development phase (PW1400G /MC-21)
3. Focus investment on strategic technology
4. Maintain Belfast as a centre of excellence for design and manufacture of complete nacelles
5. Leverage our competitive cost structure and maximise the benefits of the site industrial strategy.



Composites market is set to grow, representing good potential revenue for Belfast



*The aerospace composites **market is set to grow** from under **\$10B today to ~\$20B** by 2022 as programmes with high composites content ramp up production



81% of composites use will come from **commercial and regional aircraft**



There are **significant contracts to be won** in the composite wing components empennage and wing control surface markets

*Source Aerostructures 2013

** Potential total revenue over the programs life cycle

CSeries aircraft composite wing programme in Belfast



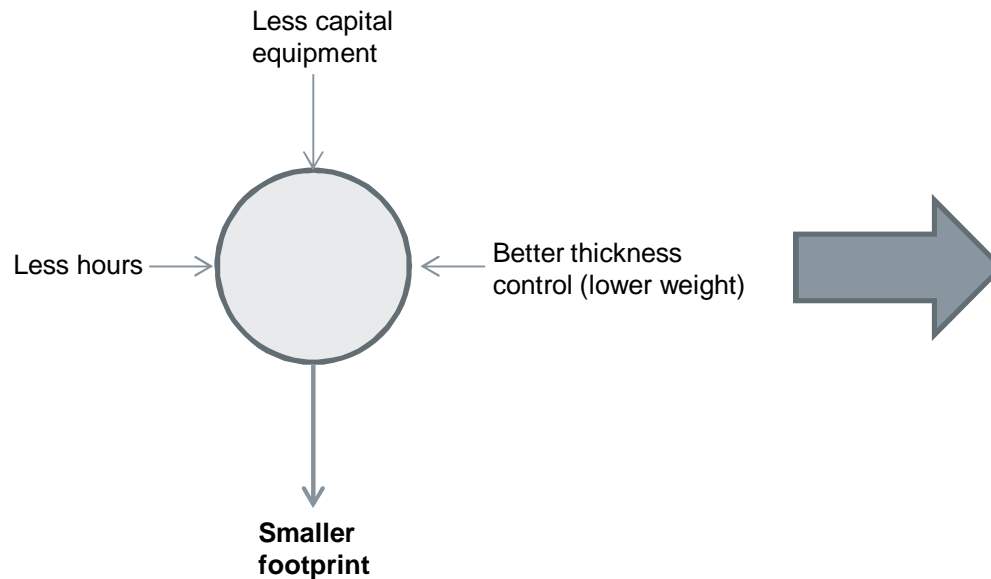
- £520 million investment in Belfast – largest ever inward investment in Northern Ireland and one of largest in UK
- Step change in aircraft wing technology – development of Resin Transfer Infusion (RTI)
- Unique RTI production system under one roof: from receipt of raw materials to delivery of complete and tested wings

Key product development projects to be leveraged – C Series wing



With a strong expertise in composites,
Belfast is well positioned to compete in this market

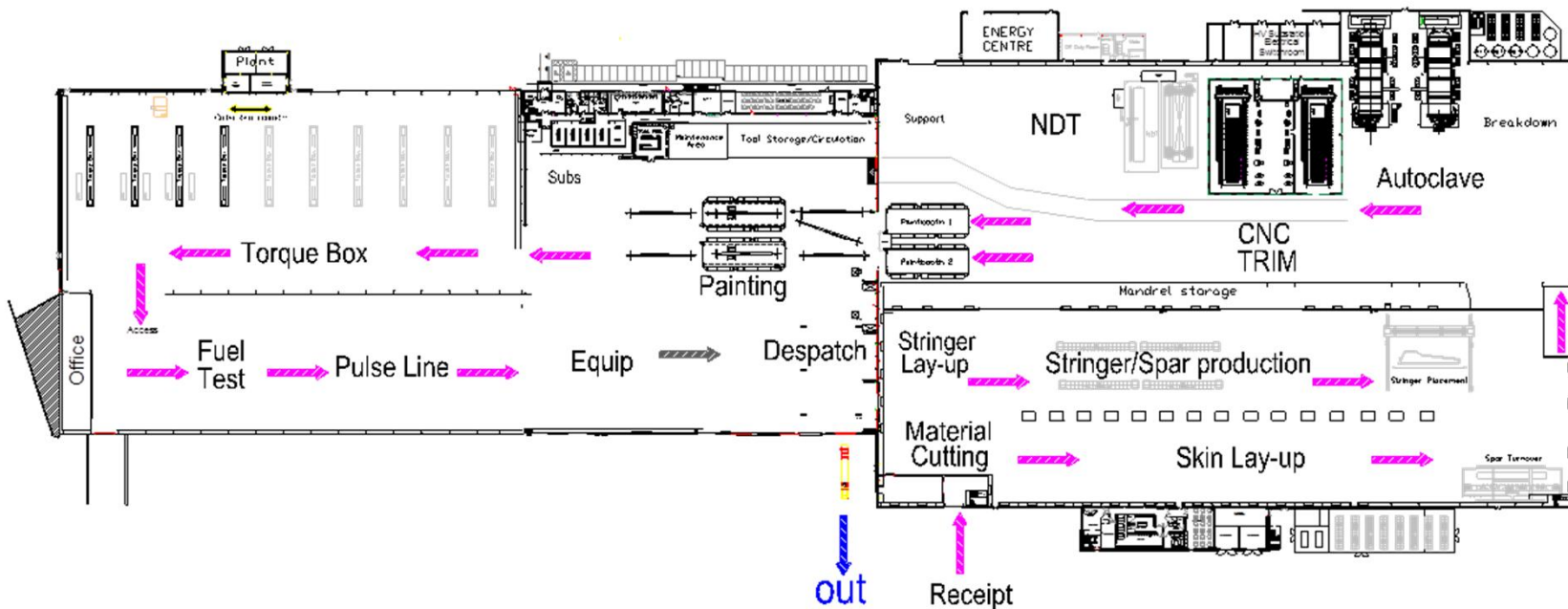
RTI advantages



- Wing box
- Wing components
- Empennage
- Wing control surfaces

Our composites expertise is competitive and is applicable to several work packages

Wing Production Unit Product Flow



Private & Confidential

Conclusion



We have extensive expertise in component manufacturing



We supply all families of products developed by Bombardier



We are now going to market this expertise to the aerospace industry to generate a new revenue stream

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