PRESS RELEASE

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Bombardier Produces 'One-Piece' Nacelle Component as part of European Clean Sky Research Programme

Belfast, February 24, 2015 – Bombardier Belfast has designed and manufactured a large 'one-piece' composite engine nacelle component as part of a major European research programme aimed at reducing aircraft noise in the future.

The successful production of the novel one-piece (splice-less) carbon fibre intake acoustic liner is a significant milestone in the Clean Sky Sustainable and Green Engines (SAGE) integrated technology demonstrator programme.

SAGE comprises six separate research streams dedicated to demonstrating new engine technologies for a range of future civil aerospace applications. Bombardier Belfast, which has significant expertise in nacelle technology development, has been leading a €3.75 million project within SAGE3, known as Clean Sky SAGE3 ALTD (Intake Acoustic Liner Technology Development). SAGE3 focuses on developing advanced low weight and low noise nacelle component technologies for large turbofan engines.

The innovative intake acoustic liner, produced by Bombardier, will support Rolls-Royce's composite fan demonstration programme, and is unique in that it has been manufactured in a single composite piece – with no splices – which could help to significantly reduce noise levels. In addition, Bombardier also successfully assembled a one-piece lipskin, produced by EAST-4D in Dresden, Germany, to the intake liner.

At a small ceremony in Bombardier's nacelle facility in Newtownabbey, Northern Ireland, the full-scale intake liner with lipskin was formally handed over to Rolls-Royce. It will be assembled to the Advanced Low Pressure System (ALPS) demonstrator engine being developed at Rolls-Royce's facility in Derby, prior to ground testing.

Commenting on the achievement, Colin Elliott, Vice-President of Engineering and Product Development, Bombardier Belfast, said: "An intake liner is usually manufactured in two or three curved segments which are assembled to longitudinal splices. But with a zero splice, one-piece design, you get a much better noise attenuation, as you are able to apply an uninterrupted acoustic treatment to the liner, which has the potential to reduce noise. Additional potential benefits to a customer of a splice-less intake acoustic liner include a reduction in weight, and reduced maintenance and repairs.

"From a manufacturing perspective, the process we used to create the splice-less liner involved developing very complex tooling, which was integral to the zero splice design, and which has resulted in a reduced manufacturing cycle time. We are delighted to have produced a full-scale demonstrator of this nature, and we look forward to it being tested on Rolls-Royce's ALPS demonstrator engine."

Bombardier Belfast has more than 40 years' experience in composites technology, and more than 50 years' experience in nacelle development and after-market support.

About Bombardier

Bombardier is the world's largest manufacturer of both planes and trains. Looking far ahead while delivering today, Bombardier is evolving mobility worldwide by answering the call for more efficient, sustainable and enjoyable transportation everywhere. Our vehicles, services and, most of all, our employees are what make us a global leader in transportation.

Bombardier is headquartered in Montréal, Canada. Our shares are traded on the Toronto Stock Exchange (BBD) and we are listed on the Dow Jones Sustainability World and North America Indices. In the fiscal year ended December 31, 2014, we posted revenues of $20.1 billion. News and information are available at bombardier.com or follow us on Twitter @Bombardier.

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Clean Sky SAGE3:

- Partners in the Clean Sky SAGE3 ALTD project are: Bombardier Belfast; Irish Centre for Composites Research, University of Limerick; and the Institute of Sound and Vibration Research, University of Southampton
- The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) for the Clean Sky Technology Initiative under Grant Agreement n° 296115.
- Clean Sky aims to significantly reduce the environmental impact of aviation by developing cutting-edge technologies by 2020. This includes: halving external noise and CO_2 emissions by significantly cutting fuel consumption; an 80 per cent reduction of nitrogen oxide emissions; and ensuring a green product lifecycle from design and manufacturing to maintenance and disposal/recycling. The second phase of the programme, Clean Sky 2, aims to go even further by 2050. Founded by the European Commission and the European aeronautics industry, Clean Sky is the largest ever European public-private partnership for research in aeronautics. It brings together aeronautical leaders, SMEs, universities, and research organisations to develop and deliver the aircraft technologies of the future.

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