

Trent 800 tests aim to silence critics

Boeing, Rolls-Royce step up efforts to develop technology to meet stricter Stage 4 requirements across product range

5 BOEING and Rolls-Royce plan to begin flight test of an experimental engine noise reduction package on a Trent 800-powered Boeing 777-200ER in mid-September as part of longer term efforts to find solutions across the product range to meet toughened Stage 4/QC2 requirements.

10 The Quiet Technology Demonstrator (QTD) being undertaken by Boeing and R-R could pave the way for noise suppression systems that the airframe manufacturer aims to offer to Boeing 747 operators from mid-2003. The company has stepped up studies in airframe and engine-related noise suppression following demands, particularly from cargo operators, for urgent action because of next year's implementation of new departure noise levels at London's Heathrow airport known as Quota Count 2 (QC2). Operators believe that if they can meet the new Heathrow requirements, they can meet noise legislation anywhere.

15 QTD technology, which consists chiefly of sawtooths, or chevrons, around the primary and secondary exhaust nozzles as well as extended areas of acoustic lining, is "applicable to a wide range of products", says Boeing noise engineer Belur Shivashankara. The chevrons generate vortices and enhance the mixing of fan and core jet streams.

20 For the tests the QTD is mounted on a loaned American Airlines-owned 777. The aircraft is fully compliant to the future noise requirements, but Boeing says the type provided an ideal engine/airframe testbed.

25 The flights are due to get under way with the first of the two primary test nozzles from 18-20

30 September. A second phase, lasting 10 days, is then planned in which primary and secondary nozzle effects will be tested. Shivashankara says jet noise reductions in the order of 3 EPNdB are expected.

35 The completely new fan case has 8.8 m² (95ft²) of acoustically treated liner, 30 % more than a standard Trent 800 inlet. The increase is achieved by deleting, for experimental purposes, an electronic engine control cooling inlet and a pressure sensor normally located near the inlet lip. The team predicts fan noise reductions of around 1.2EPNdB on the ground, and as much as a 7EPNdB reduction in the familiar fan generated "buzzsaw" noise heard inside the cabin.

40 Full-scale static engine tests will be conducted on an external nozzle centrebody design, suitable for the Airbus A300/A310, in the third quarter of next year. Similar tests for two internal nozzle centrebody designs should begin in the fourth quarter of 2002. The two Boeing-type configurations are believed to be tailored for the 747 family, which are thought to be the most threatened by QC2 rules.

45 Tests will verify noise reduction benefits from the chevron design which has demonstrated a 3.5dB reduction in peak jet noise levels, although the overall "perceived" reductions are around 1dB. The chevron will be offered as part of an overall package of inlet liner, fan aft case and fan thrust reverser treatments. The tests will also address the impact of the chevron on thrust levels.

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