Boeing, Rolls-Royce Work On A Quieter Future For Commercial Aviation

Boeing Commercial Airplanes and Rolls-Royce Aero Engines have completed a noise reduction flight test program that promises to make quiet jets even quieter.

Known as the Quiet Technology Demonstrator (QTD), a Rolls Royce Trent 800 engine was modified with a package of noise reduction technologies developed collaboratively by the two aerospace companies. Using a 777-200ER, the three week flight-test demonstrated noise levels significantly below those of a standard 777, which is known as one of the quietest airplanes in service today. Takeoff jet exhaust noise was reduced by up to four decibels and inlet fan noise was reduced by up to 13 decibels.

Engineers used saw-tooth-shaped aerodynamic devices at the rear of the nacelle and on the exhaust nozzle to control the mixing of the hot jet exhaust, the bypass stream and the ambient air. The shape of the devices was determined by computational fluid dynamics modeling and verified in wind tunnel tests using scale models.

Fan noise also was reduced with extensive acoustic improvements to the redesigned engine nacelle inlet. A new technology called Amax (area maximization) increased by 30 percent the area of acoustic treatment in the inlet casing. A new lining design was used that reduces objectionable "buzz saw" noise passengers often hear during takeoff and climb.

The flight tests, conducted at Boeing's Glasgow, Mont., airfield, verified the computer and laboratory results. Some 200 microphones were placed on the ground along the flight path, and 100 microphones were affixed to the 777. Teamed with computers, the microphones became an "acoustic camera" that accurately and dynamically pinpointed high-frequency noise sources on the airplane as it took off, flew the flight test pattern and landed again. This ground noise monitoring capability was made possible by NASA sponsorship.

Although the purpose of the QTD program was to reduce noise heard on the ground, levels within the cabin -- equally important to the airlines - also were analyzed. Nearly 100 microphones placed along the entire length of the cabin registered a reduction of forward cabin buzz-saw noise by seven decibels.

The culmination of years of work, these successful tests mark one of the final stages before QTD noise reduction technology is implemented in service. Combined with airframe noise reduction and engine redesign efforts being pursued separately, the new technologies can be incorporated on a new airplane program or as a retrofit to airplanes in service.

###

For further information:
Mary Jean Olsen
425-234-0901