

# 1. AIRCRAFT TECHNOLOGY

## SPEEDING DEVELOPMENT OF TECHNOLOGIES TO MAKE AIRCRAFT CLEANER, QUIETER AND MORE FUEL EFFICIENT

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In March 2015, the Boeing ecoDemonstrator 757 took to the skies to evaluate more than 15 new technologies to improve commercial aviation's efficiency and reduce noise and carbon emissions.

Boeing collaborated with European customer TUI Group and NASA on flight tests for the 757, the third ecoDemonstrator airplane. On the 757's left wing, Boeing tested technologies to increase aerodynamic efficiency by reducing environmental effects on natural laminar flow, including a Krueger shield to protect the leading edge from insects.

Two technologies tested were under contract with NASA's Environmentally Responsible Aviation (ERA) project. On the vertical tail, NASA and Boeing tested active flow control to improve airflow over the rudder and maximize aerodynamic efficiency. Based on NASA wind-tunnel testing, active flow control could improve the rudder's efficiency by about 17 percent and may allow for a smaller vertical tail design in the future.

On the 757's right wing, NASA and Boeing tested "bug phobic" coatings that can reduce aerodynamic drag from insect residue, enabling more laminar flow by smoothing the airflow on the surface of the wing. Except for Boeing proprietary technology, NASA knowledge gained in collaboration with Boeing from ecoDemonstrator research will be publicly available to benefit the industry.

The ecoDemonstrator Program plays a key role in the company's environmental strategy by using testing to accelerate technologies that can reduce fuel use, carbon dioxide emissions and noise. In this effort, Boeing partners with selected suppliers, airlines and government agencies toward the shared goal of testing, refining and completing technologies that will make aircraft cleaner, quieter and more fuel efficient.

To date, the program has tested more than 50 technologies, using a Next-Generation 737-800 (2012), 787 (2014) and 757 (2015) as flying testbeds. In 2016, Boeing and Brazilian airplane manufacturer Embraer will test ecoDemonstrator technologies on an Embraer airplane.

