FLIGHT TESTS VERIFY NASA SUPERCRITICAL WING CONCEPT

Actual flight tests of the NASA Supercritical Wing have demonstrated that the new airfoil shape does permit jet aircraft to operate more efficiently at speeds near Mach one, the speed of sound.

This conclusion and other results from the flight tests of the new aeronautical concept were described Tuesday, Feb. 29 by the National Aeronautics and Space Administration at a one-day technical meeting at NASA's Flight Research Center, Edwards, Calif., which conducted the flight tests of the new wing on a modified F-8 jet fighter.

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The NASA Supercritical Wing was developed and tested in wind tunnels under the direction of Dr. Richard T. Whitcomb at NASA's Langley Research Center, Hampton, Va. The top side of the new wing has been flattened and the rear portion of the underside is curved concavely.

The flight tests confirm the wind tunnel predictions that the aircraft would be able to fly at increased speeds before encountering a significant rise in aero-dynamic drag, an adverse force on the aircraft. This means that the aircraft can fly faster without using more power.

Since its first flight on March 9, 1971, the F-8 with the Supercritical Wing has made a total of 27 flights reaching a top speed of Mach 1.2, about 1267 kilometers per hour (792 mph) and a peak altitude of 15 kilometers (51,000 feet).

Summarizing the flight test program, Joseph Weil, Director of Research at the Flight Research Center and Chairman of the afternoon session of the meeting said, "I feel that the overall performance goals of Dr. Whitcomb, as demonstrated by the delayed drag rise, have been achieved. Overall agreement between the wind tunnel and flight data is quite good."

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Reporting on the piloting aspects of the new wing, civilian project pilot Thomas C. McMurtry said that the flight test program indicated that the piloting procedures and tasks at near sonic cruise speeds should be as routine as present day jet transport operations. He concluded, "The introduction of the Supercritical Wing is not expected to create any serious problems in day-to-day air transport operations."

For applications in which near sonic speed is not required, the advantages of the supercritical wing can be used to permit a thicker wing section, with a resultant saving in structural weight, and an increase in usable internal volume. At the meeting, a report on the flight tests of a thick supercritical wing mounted on a T-2C jet trainer was made by William E. Palmer of the Columbus Division of North American Rockwell who made the flights under joint NASA-US Navy sponsorship.

Future plans for the Supercritical Wing were also described at the meetings. These included the addition of side fairings for increased area ruling, a configuration more likely to be used with a supercritical wing on commercial jet aircraft, and the determination, by simulation, of the effects of wing roughness that might be caused by manufacturing imperfections. Plans for possible follow-on flight programs to further the readiness of new technology for application are currently being developed.

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