FIRST SUPERCritical WING FLIGHT

The first flight of a new airfoil shape that could substantially lower the operating cost of future jet transports has been tentatively scheduled by the National Aeronautics and Space Administration for early this month.

The exact flight date depends on completion of ground tests and favorable weather conditions.

The new airfoil shape is called the NASA Supercritical Wing and will be flight tested by NASA's Flight Research Center, Edwards, Calif., aboard an extensively modified jet fighter. Thomas C. McMurtry, a civilian research pilot for NASA's Flight Research Center, will pilot the first flight.
Subsequent flights will be watched closely to see if the wing lives up to its potential for smooth and easy flight near the speed of sound.

The airline and aircraft manufacturing industries have shown great interest in the project.

At the cruise speeds of modern day jet transports, approximately Mach 0.8 or about 530 m.p.h., the air flowing over the curved upper surface of the wing reaches supersonic speeds. This results in local shock waves on the wing that cause a sharp rise in aerodynamic drag and a significant decrease in efficiency.

Almost directly opposite from conventional airfoil shapes, the supercritical wing has a flattened top surface. This delays the speed of the air flowing over the upper wing surface from reaching supersonic speeds until the airplane itself is flying at a higher speed.

It also moves the shock wave near the back of the wing and increases the total wing efficiency.

To compensate for some loss of lift that results from flattening the top of the wing, the rear portion of the lower surface curves slightly downward.

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The supercritical wing was developed in a wind tunnel at NASA's Langley Research Center, Hampton, Va., under the direction of Dr. Richard T. Whitcomb. These tests indicated that the new airfoil shape could allow highly efficient flight near the speed of sound, approximately 660 m.p.h. at cruising altitudes.

If the performance measured in the wind tunnel can be achieved in flight, it should be possible for future aircraft to cruise at the higher speeds with no increase in fuel consumption. This advantage could be converted into increased range and/or, by carrying less fuel, greater payload resulting in lower operating costs per mile.

The prime purpose of the flight test program is to verify the wind tunnel predictions and to explore the operational potential of the supercritical wing in flight.

For the first flight, primarily an operational checkout of the aircraft and the data acquisition system, McMurtry will take-off and land on Rogers Dry Lake Bed. The flight speed and altitude will be limited to approximately 350 m.p.h. and 10,000 feet.