

# AEDC tests Japanese space plane

By John Blackburn  
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AEDC's capability to test the aerodynamics of aircraft models on the ground at hypersonic speeds brought the Japanese to the center in February to test a futuristic space plane concept.

The Japanese aerospace plane (JASP) is a single stage to orbit vehicle that would employ horizontal take-off and landing. It is similar to the United States' X-30 program.

While the center has tested aerospace equipment for other

countries, primarily European, this was the first test for Japan at the center. Just recently, the center opened its doors to commercial testing and is quickly establishing a worldwide reputation as the test center of choice, noted center officials.

"Representatives of Japan's National Aerospace Laboratory (NAL) came to AEDC to have their model tested in a calibrated facility that would generate a large data base for validation of computational fluid dynamics methodologies, which will assist in the design of the spaceplane," said Larry

Wingfield, the Air Force project manager at AEDC. "They also wanted to compare AEDC's test results with those they will obtain later on the same model from their Mach 10 facility at NAL in Tokyo."

The model was manufactured by Micro Craft Inc. in Tullahoma. "That enabled AEDC engineers to support the model design from the start," said Wingfield.

Dr. Masataka Maita, head of Space Plane System Studies at NAL, and Mitsubishi Heavy Industries Ltd. (MHI) engineers Hiroki Sakurai and Hiroshi Kawato were at AEDC

for the test. The United States intermediary was Science Applications International Corp. (SAIC). A long history of collaboration with AEDC enabled SAIC engineers to aid MHI in planning the test to accomplish the NAL objectives. SAIC also performed pretest computational predictions for the JASP model and is performing the data analysis from their Wayne, Penn., and Huntsville, Ala., offices.

The test was performed at Mach 10 air speed in the von Karman Gas Dynamics Facility Tunnel C, one of AEDC's 50-inch hypersonic tunnels.

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Engineers used a new digital valve flow control system in Tunnel C for the first time during the test. "This allowed us to pass high pressure air through the sting, or model support hardware, to simulate plume jet effects," said project engineer Joe Donaldson, an employee of Micro Craft Technology, aerospace flight dynamics test contractor at the center. "The aerodynamic characteristics of the JASP configuration were then measured with and without the plume, which will enable NAL to address the important issue of airframe/propulsion integration."

There were three phases of the test, according to Donaldson. "We began with a surface pressure phase, followed by a force and moment phase, and lastly, an oil flow phase where we coated the model with oil to study the surface streamline patterns. During the surface pressure portion, we used a water-cooled, electronically scanned pressure module package to keep the pressure instrumentation from overheating," he said.

Wingfield said this test also served as a "pathfinder" for the Japanese HOPE program, an H-II rocket-launched, unmanned, winged, orbiting cargo vehicle. The HOPE vehicle would have a flight profile similar to the U.S. space shuttle. "Plans are being made for the initial HOPE test this summer and for possible additional testing in 1996," he said.



Dr. Masataka Maita, head of Space Plane System Studies at Japan's National Aerospace Laboratory, examines a model of Japan's futuristic space plane concept prior to

undergoing testing in one of AEDC's hypersonic wind tunnels.





