aerospace notes

POWER CONVERSION

Hopping up the Rankine cycle

An improved version of a power conversion system that may find use in nuclear-powered spacecraft has been successfully tested by Aerojet-General Corp. in Azusa, Calif.

Called an organic Rankine cycle system, it follows a closed circuit in which a fluid is heated into a pressurized vapor, which drives a turbine and is then cooled back to a liquid to go around again. Aerojet's modification uses a device called a jet condenser, which pulls the low-pressure vapor out of the turbine much more rapidly than it would ordinarily flow.

With the jet condenser, the outlet pressure from the turbine can be as little as 0.1 pound per square inch, compared to 1.0 without it. The efficiency of the Rankine cycle increases with the difference between the inlet and outlet pressures, and is more than doubled, Aerojet reports, with the jet condenser.

MANPOWER

Aerospace will drop 16,000

At the end of 1967, more people were employed by the aerospace industry than at any time since World War II. By this September, however, predicts the Aerospace Industries Association, the peak of 1,430,000 workers will have fallen to 1,414,000.

"No one's going to predict any farther than that," says an association spokesman, largely because of the $6 billion cut that President Johnson is making in the Federal budget.

The largest change will be due to reductions in the civilian space program, according to the association. Fixed-wing aircraft and helicopter production, research and development are expected to remain at about their present levels, as is non-aerospace employment within the aerospace industry (oceanography, waste management, desalination, etc.). Missile and space employment is expected to slip from 522,000, as of last December, to 502,000 by September.

AIRPORT ENGINEERING

Fast-fix cement for runways

One of the problems besetting the U.S. Air Force in Southeast Asia has been the need to constantly repair runways damaged by mortar and rocket fire. Now a new cement, which reportedly hardens in only half an hour to the strength of concrete that has set for 28 days, has been developed to speed the task.

In tests at Eglin Air Force Base, Fla., a simulated bomb crater 40 feet in diameter and 14 feet deep was filled to within a foot of the top with sandy debris. The last foot was filled with uniform aggregate, and the cement was poured on top of that at 1,000 gallons per minute. After 30 minutes, the cement successfully supported a test aircraft with a load of some 58,000 pounds.

The cement can be carried by conventional cement trucks, or can be stored in flexible rubber containers for use in remote areas. The material is also being tested commercially in well-trafficked streets in Dallas, Tex.

INSTRUMENTATION

Wire and weight in the SST

A system that reportedly could replace 80 miles of wire and save up to 1,500 pounds of weight in the supersonic transport is under study for the plane's builder-to-be, the Boeing Co. of Seattle.

The multiplexing system will continuously sample some 600 electrical, hydraulic and other devices and transmit their signals back to the flight deck over only a few wires. Without multiplexing, each signal point would need its own wiring, resulting in thousands of wires running along most of the 306-foot plane.

V/STOL

U.S. and France study tilt rotors

A joint plan to study tilt-rotors for vertical-flying aircraft has been signed by the U.S. Army, the space agency, and the French National Office for Aerospace Research.

The project is aimed at studying the effects of aeroelasticity on tilt-rotor performance at loads of 10 to 25 pounds per square foot over a speed range from near-hover to about 520 miles per hour. Scheduled to begin in 1969, the study will also cover the effects of scale-size and wind-tunnel walls on performance test results of vertical-flight aircraft.

Aeroelasticity is the relationship between the aerodynamic forces of flight and the structure of the aircraft. Foreknowledge of aeroelasticity is particularly important for a tilt-rotor because of its movable configuration.

The first step will be small-scale tests in a seven-by-ten-foot wind tunnel at NASA's Ames Research Center in California. Rotors will be tested with different twist and camber combinations to simulate the effects of aeroelasticity. Then large-scale tests up to 230 miles per hour will be run in Ames' big tunnel. The French 26-foot tunnel at Modane will be used for the high-speed runs.

PROPULSION

Hydrazine thrusters for ATS-D

The first U.S. satellite to use monopropellant liquid hydrazine for its main maneuvering thrusters will be the fourth Applications Technology Satellite, scheduled for launch late this month.

Liquid hydrazine is a more efficient propellant than hydrogen peroxide, producing more thrust per pound, so it can save weight by reducing the amount of necessary fuel. The specific impulse, or efficiency rating, of liquid hydrazine is about 225, compared to 180 for hydrogen peroxide, according to Hamilton Standard division of United Aircraft Corp. in Windsor Locks, Conn., maker of the thrusters.

Other U.S. spacecraft, such as the Mariner planet probes, have used hydrazine, but only with an accompanying oxidizer. The ATS thrusters, tested on ATS-3 last November, need no separate oxidizer. The six-inch-long rockets are designed to operate for five years, much longer than the planned life of the ATS satellites. The rockets will also be on ATS-5, planned to be placed in orbit in about mid-1969.