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FRCSW Maritime Program:

New Lathes Spinning Up

NEW STRAIN SENSOR CALIBRATION SYSTEM TESTED AT FRCSW

One of the tools the Navy uses to assess the service life of its aircraft and components is the fatigue life expectancy (FLE) value.

The FLE reflects the use history of an aircraft and is based upon stress-related factors affecting areas of the airframe, such as wing attachment points.

FLE data may be gathered through the measurement of strain sensors that are installed on the aircraft. The sensors reflect the state of an aircraft's components, making it possible to avoid unnecessary repair or replacement.

To improve the accuracy and efficiency in calibrating strain sensors, F/A-18 engineers from Fleet Readiness Center Southwest (FRCSW) provided technical and logistics expertise to ATA Engineering, Inc., in developing a new calibration system for the sensors: the Flash*Cal*™ Calibration System.

A prototype of the system was successfully tested on an F/A-18 Super Hornet at FRCSW's flight line in early February.

The portable system uses an electromechanical actuator to move aircraft appendages and equipment to measure the strain sensors' output. A mating connector directly accesses the aircraft's sensor signals, and custom adapters enable the system's actuator to safely exert force on the aircraft at key locations.

By monitoring the strain sensor output and the applied force, the system determines the "sensitivity" of each sensor. The entire process is done automatically through a software interface on an attached computer.

The test program also showed that the new system enables a two-person team to calibrate an aircraft's strain sensors within one shift. A preliminary set of calibration factors was documented which may be

ATA engineering technicians install a Flash*Cal*™ calibration system onto an F/A-18 Hornet aircraft at the FRCSW flight line.
Photo by Joe Feliciano

used by the Naval Air Systems Command (NAVAIR) structural health assessment team to adjust the flight-measured data and ultimately the FLE for the aircraft.

"With the Flash*Cal*™ system we will be able to control and correct for the aircraft-to-aircraft differences in sensor response, which will provide an economic benefit to the fleet while retaining current levels of safety on the aircraft structure," said Tim Fallon, NAVAIR's directing engineer on the program.

Continuing development of the system is underway for use on other aircraft, such as the Joint Strike Fighter. Future systems will be designed with the durability required for use at the squadron level so that strain-sensor prognostics can be performed after damage or repair in theatre.

"Developing this capability was an excellent way to solve a long standing issue we have had with using the strain sensors for accurate FLE calculations," Fallon said.

"We truly thank the FRCSW engineering and support personnel for their outstanding contribution. Their support was paramount to this successful initial test of the system," he said.

(Editor's note: Joshua T. Davis of ATA Engineering, Inc., contributed to this report.)