

# Second only in number

PEOPLE TALK ABOUT MSN 001'S RESULTS IN THE STATIC TEST A400M, BUT THAT WASN'T THE FIRST AIRCRAFT PRODUCED FOR THIS JOB. MSN 5000 WAS, AND USED 7,000 STRAIN GAUGES TO VERIFY PERFORMANCE UNDER SIMULATED CONDITIONS

BY DOUG MACLENNAN

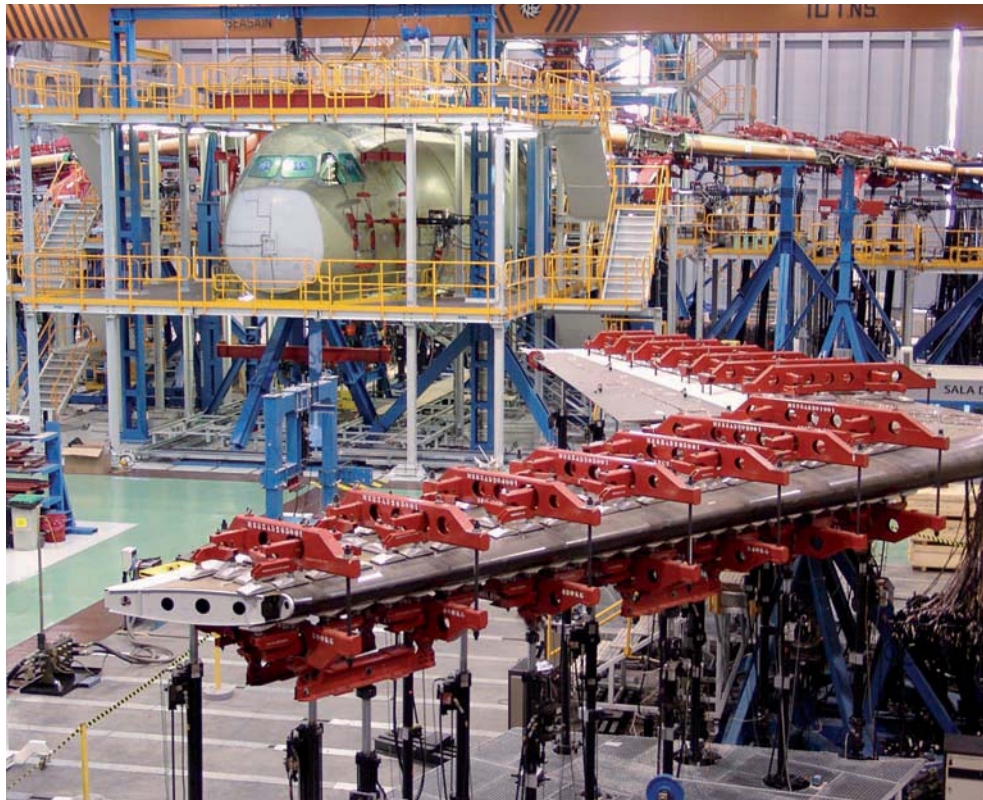
Much attention is focused on the status of A400M Manufacturer's Serial Number (MSN) 001, the first flight test aircraft of the €20 billion (US\$30 billion) program, and Europe's largest ever collaborative defense project.

The very first complete A400M airframe to be produced was, in fact, MSN 5000, the static test specimen assembled and now installed at the EADS-MTA facility in Getafe, near Madrid. The airframe was fully commissioned in February 2008 following fine-tuning of equipment and test systems. A spokesman for the structural test team at the facility says, "Working closely with our test system partners and suppliers ensured we were ready to start testing when we needed to be."

Testing began in March 2008 and the process essentially simulated the loads, temperatures and pressures the aircraft will experience during operational use. Actuators apply mechanical loads to the airframe wing and fuselage, and engine and propeller torque loads are simulated by applying appropriate forces to dummy engines and pylons. It is envisaged that some 40 load cases will be studied and tested, first to what is called 'limit load', then to 'ultimate load', then beyond these limits, possibly to destruction. By applying mechanical loads exceeding those the aircraft will experience in service, the validation process ensures maximum structural integrity and reliability prior to certification.

Data from more than 7,000 strain gauges, distributed strategically around MSN 5000, are monitored, captured and measured by HBM's Data Acquisition (DAQ) System, comprising the MGC-plus DAQ system combined with the distributed strain gauge amplifier system known as CAN-HEAD. This DAQ system, is designed to provide high-quality measurement data that can also greatly reduce the cost and burden of cabling that, in the case of MSN 5000, requires more than 21km of wiring, weighing up to 8,000kg. A member of the testing team at EADS CASA (MTAD) comments, "We have always experienced superior service and quality from HBM and are confident we can rely on the Data Acquisition System for dependable data."

Digitally acquiring the measurement data from the load, strain (stress) and displacement signals is an important part of the test program. It



validates stress calculation methods by comparing measurements obtained from the test specimen with predictions from mathematical models. Engineers can then verify the performance of the airframe under simulated operational conditions by putting design theory into practice.

Structural testing of the airframe will continue at MTAD and will incorporate tests of the fuselage pressurized to twice nominal cabin pressure, fatigue testing of airframe CFRP parts (ES wing), tests on the cargo doors, tests on the refueling probe, and a separate static and fatigue test of the horizontal tail plane (HTP). The entire test program is expected to be completed by mid-2010.

Although MSN 5000 will never actually fly (that privilege is left to MSN 001), it is crucial to the A400M development program. ■

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The CASA test installation near Madrid, Spain. (Pictures courtesy: EADS CASA)