

Aircraft certification testing with imc solutions

Evektor chooses imc measurement systems



The Czech Outback

With a good product name, the intended application area is rather self-evident. This holds true for the twin engine turboprop “EV-55 Outback” manufactured by the Czech company, Evektor.

The aircraft has very low operating costs and is capable of short take-offs and landings on unpaved runways. Hauling cargo is also no problem for the EV-55 Outback with a payload allowance of up to 1,824 kg. This makes the aircraft ideal for the Australian Outback, and thanks to its efficiency and versatility, this small machine is also suitable for developing countries and mountain airports.

As part of its certification, the first prototype of the EV-55 Outback was tested for over 370 flight hours. The second prototype is intended for ground testing and is subjected to extensive load testing.

The test department from Evektor has chosen imc measurement systems for durability testing on this new aircraft design.

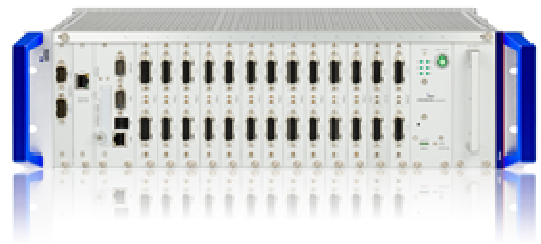


EV-55 Outback – durability testing with imc measurement systems

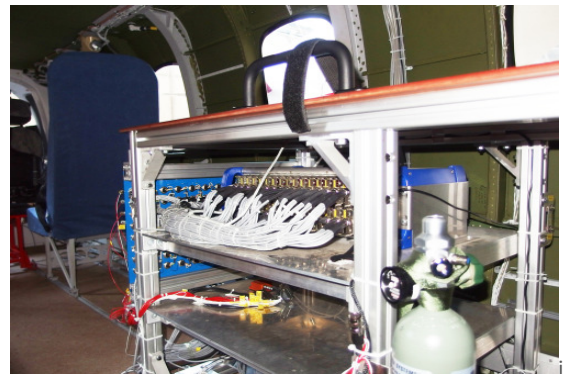
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Multi-channel, modular and robust measurement systems

The backbone for the data acquisition consists of robust, air-worthy imc measurement systems. The modular system design is particularly important in order to flexibly adapt to various measurement tasks. Universal measurement amplifier technology allows for task-specific, perfectly suited interfacing to sensors and measurement signals. With up to 100 kSample/s per channel and integrated signal conditioning and sensor supply, the imc CRONOScompact systems are ideal for demanding tests.



imc CRONOScompact in 19" rack version



imc CRONOScompact in flight test, © Photo: Evektor

In the aircraft, an imc CRONOScompact-400-11 and an imc CRONOScompact-400-17 were installed. 132 strain gauge channels were measured (full- and half-bridge).

The strain gauges were applied to the following components:

- wings (five ribs within the left wing and three ribs within the right)
- fuselage (two frames)
- motor mounts
- landing gear support
- six ribs within the horizontal and vertical stabilizers
- cable for control and steering force measurements

In addition to strain gauge measurements, four channels are equipped with pressure sensors for measuring speed and altitude. To measure the overload (aircraft's center of gravity and with respect to the horizontal and vertical stabilizers), ICP acceleration sensors are used on four channels. 46 CAN channels are in operation – whereby the RS232 interface is also read using RS232-to-CAN converters.

The imc CRONOScompact measurement devices enable synchronous data acquisition from multiple channels as well as the use of GPS for a basic orientation. In addition, real-time processing of measurement data has an advantage: with the imc display mounted directly in the cockpit, the pilot can monitor the data in real time during the test flight. The imc Online FAMOS platform provides mathematical functions, data reduction, events, filters, statistics, strain gauge rosettes, setpoint setting and much more.

Reliable, secure testing is ensured through black-box functionality, stable power supply within the imc systems thanks to integrated UPS, as well as redundant, configurable measurement data storage (internal and external).



imc display mounted directly in the cockpit,

© Photo: Evektor

Interface capability

At the same time, integration of communication with the aircraft's RS232 interface was necessary. This was made possible via CAN bus by utilizing an RS232 to CAN converter. In addition, the imc CRONOScompact supports other avionic fieldbus interfaces such as ARINC, IENA, AFDX. Further options for advanced testing functionalities include analog output of setpoints and load profiles, PID controller modules and the embedded imc HiL-Simulink platform (embedded target processor).

Measurement data visualization

Visualization of the acquired measurement data plays a decisive role at Evektor, where the test engineers rely on the imc FAMOS software. It offers them a wide range of visualization options for the recorded data. The imc FAMOS data browser is particularly suitable if measurements are carried out across numerous channels and are to be compared with reference profiles. It enables the fast viewing of data series, overlapping measurement data with reference curves and the rapid generation of test reports with automatic evaluation sequences. In addition, Evektor uses imc FAMOS for exporting data to formats such as .csv, .xls or ASCII.

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imc Test & Measurement GmbH is a manufacturer and solution provider of productive test and measurement systems. imc implements metrological solutions for research, development, service and production. imc has particular expertise in the design and production of turnkey electric motor test benches. Precisely outfitted sensor and telemetry systems complement our customer applications.

Our customers from the fields of automotive engineering, mechanical engineering, railway, aerospace and energy use imc measurement devices, software solutions and test stands to validate prototypes, optimize products, monitor processes and gain insights from measurement data. As a solution

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