MARKUS NAGL

PUMP ACTION

A test bench for main fuel pumps, hydromechanical units and fuel metering units

BY MARKUS NAGL

Test Fuchs, a leading Austrian designer and manufacturer of test systems in the aerospace industry, is always happy to be able to work within its core discipline: the design and manufacture of tailored test systems.

In the past, the company has produced test systems for fuel pumps, hydromechanical units (HMUs) and fuel metering units (FMUs). Leading MROs in Europe have been using these test systems for the past decade with great success.

An important European MRO facility, which knows and trusts Test Fuchs, needed a new system to test main fuel accessories but was restricted by its infrastructure. This new development had to comply both with the customer's wide range of technical requirements and the local conditions of the customer's test facility. Test Fuchs engineers were challenged with several space issues and in the end came up with the ideal solution for the customer.

This new test stand for Main Fuel Accessories (MFAT) is capable of testing most of the main fuel pumps, HMUs and FMUs currently used in civil aviation. It is possible to test 11 different main fuel pumps and 13 different HMUs and FMUs on one single test system. Developing it was quite a challenge, considering that normally just one main fuel pump and one or two HMUs and FMUs can be tested on a single test stand. The new MFAT is divided into two independent test systems, one for testing main fuel pumps, and the other for testing FMUs and HMUs. This separation was an important step toward developing a future modular concept. The test stands can test pumps and FMUs/HMUs both independently and at the same time, using a common power unit, which is placed at a greater distance than usual. The challenge here was to successfully compensate for the loss of power due to the 15m distance between the power unit and the individual test stands. A cooling water unit is also located at a distance. With 500kW power, this completes the MFAT test system.

The highlights on the HMU and FMU test unit are the multicoupling adaptors with lever mechanisms. Since the units under test undergo various pressure measurements, it is time-consuming to change the adaptors for the different measurements. With this multicoupling adaptor, all adaptors can be connected before the test run. Up to 24 adaptors are at the user's disposal and preparation time is therefore reduced to a minimum, saving both time and costs for the operator. Once the multicoupling is fixed, the tests run automatically. HMUs and FMUs can be tested on the MFAT without the corresponding pump, because the test system uses its own pump, supplying the necessary pressure and flow. The UUT is driven by an engine with a capacity of 0-8,500rpm. The corresponding main fuel pump can be tested itself at the same time on the pump test unit. This technique gives the operator great flexibility, and makes him particularly time-efficient.

The handling of the UUTs is designed to be operator-friendly. According to the customer's requirements, both testing units feature either a crane or a telescopic crane, so that a single operator can install the units under test. The pump test unit has a spacious test chamber where the operator can adapt the pumps without space restrictions. The HMU and FMU test unit is protected by a two-door protecting cap that ensures the operator a maximum degree of access to the components, it being sometimes necessary to perform adjustments during testing. The doors on both test units can be locked, thus providing a maximum level of security for the operating personnel. A telescopic swivelling arm on the HMU and FMU unit completes the user-friendly and fully flexible design.

The accessibility of the hydraulic chambers for the maintenance of filters and other components of the test stand add to its user friendliness. Lockable

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ABOVE: **A test stand under construction**

RIGHT: **Multicoupling adaptors**

doors permit easy entrance to the respective components.

Among the technical highlights are the 1,400-liter tank volume for the calibration fluid MIL-C-7024E Type II, the low pressure supply for the pump test unit that performs a capacity of 70,000pph at 50psi, and a high-pressure supply for the HMU and FMU test unit with a capacity of 70,000pph at 2,200psi.

Another important feature is the extremely low noise level of the test bench. It is manufactured using an excellent noise proof design, reaching a maximum noise level of only 75dB(A) at 1m distance.

The MFAT, like all other Test Fuchs test systems with similar needs, is designed for universal use, and can easily be adapted to suit further requirements. "One feature our customers always ask for is the flexibility for future adaptions and modifications," says Benjamin Deimel, the head of the engineering team working on the MFAT. The Test Fuchs software, therefore, has to be similarly flexible, with the potential to accommodate possible adaptions in the years to come, something the software engineers always take into consideration. The user-friendly software for fully automatic test runs drastically shortens the testing time, it evaluates and controls test procedures, and records data such as flow, pressure or temperature. The integrated modem allows trouble-shooting and updating of the test stand software or test procedures directly from the headquarters, so there is no risk of losing time or money through the displacement of software specialists. The calibration of the whole test system is done via the Test Fuchs software, quickly and easily. The economic implications of such a test system are increasingly important to the operator.

There is also an element of danger in the handling of fuel components. The temperature of the test medium is therefore controlled below flash point, and a gas warning system, as well as technical ventilation, are integrated into the test system, to avoid any explosive atmosphere. The whole test system complies with the standards of ATEX directives.

This test bench for main fuel pumps, HMUs and FMUs has been tailored to the requirements of a specific customer. Since costs are a crucial factor in the maintenance industry nowadays, Test Fuchs engineers have also thought of a modular concept of bigger test benches like this one. With modular hydraulic test benches already available, modular test benches for main fuel pumps, HMUs and FMUs will be the next development. ▮

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