

# A320 HYDRAULIC SYSTEMS TESTING

Airbus and Test-Fuchs have partnered to create a hydraulic testing solution for a new single-aisle production line without interruption to other key production tasks

The fundamental requirement for new hydraulic testing equipment for the Airbus A320 production line was that it fit under existing aircraft jigs and inter-jigs, where there was a maximum clearance height of only 900mm. The unit was designed, manufactured and put into service to test assembled fuselages. Extreme flexibility was important. The hydraulic test is performed on several aircraft production stages, with very short times between the test stations. The complete hydraulic test has to be performed within 90 minutes, fully automatically.

Test-Fuchs, with Airbus, solved the design challenge by creating hydraulic test equipment comprising four main units.

First, the hydraulic power unit (HPU) supplies a staggering 800 liters of hydraulic fluid per minute. It consists of four motor pump units, two main hydraulic fluid reservoirs, each with 2,000-liter capacity, and two pneumatic compressors (combined with four 32-bar pressure vessels of 2,000 liters each). An electrostatic filter for waste air ventilation is fitted within a duct for approximately 4,500m<sup>3</sup>/h up to the building roof. Four switch cabinets manage a power supply of 234kVA. To take full advantage of the space in the facility, HPU installation is on the ground floor under the logistic jigs in a sound isolation room. Connection to the other main units is achieved using a widespread tube system in the basement ducting of the assembly hangar.

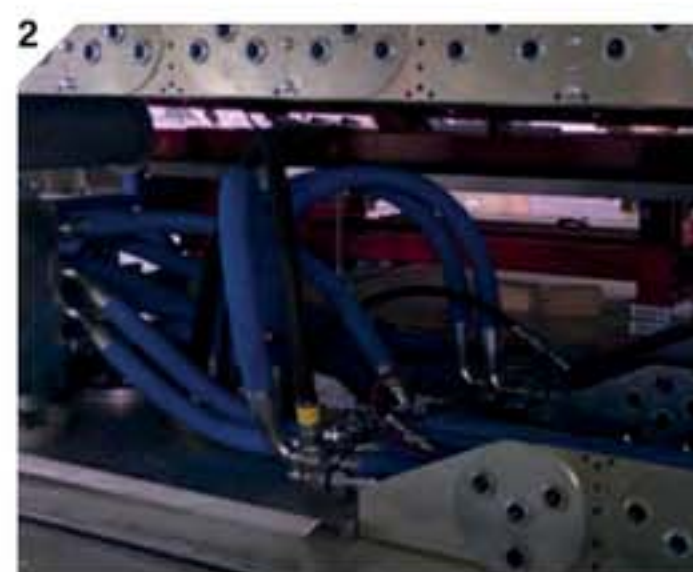
The second main component is the connection unit (CU), which distributes and regulates the hydraulic fluid flow at different pressure levels to all circuit connections in the aircraft fuselage. This important and enormous component weighs 10 metric tons, measures 6 x 6m, and moves on rails between two test points and a maintenance station. A 16m energy, control cable, and

hydraulic hose assembly provides flexible connectivity throughout this range.

Available space limited the maximum unit height to 900mm under the aircraft jigs on the ground floor. Test-Fuchs designed special hose towers that can be lifted into an upright position. They feature integrated hose drums for low- and high-pressure circuits and are easily connected to the single aircraft hydraulic connection interface, 3m above the ground floor. On the first floor of the aircraft jigs, the fold-out hose towers slide perfectly through the jigs with just millimeters of clearance space.

The third main unit is three individual particle measurement trolleys. Their task is to provide fully automated measurement of the aircraft's hydraulic circuits at 36 outlet ports. They send data to an HMI where the state of the hydraulic tube system can be seen on a screen. Furthermore these units return all hydraulic fluid to the main reservoir of the HPU via dedicated pipework and hoses. In this way the medium is used in a closed loop hydraulic circuit.

The fourth main component is the HMI, which provides fully automated control of the test equipment system's complex tasks. Designed and engineered as a mobile unit in a stainless-steel case, it is equipped with large screens, keyboard, trackball and blotting pad, all designed in accordance with



1 // The mobile connection unit (CU) for hydraulic fluid distribution to the aircraft

2 // The connection between the connection unit and the hydraulic supply

European ergonomic guidelines. It contains the control and measurement PC where all the test data are collected and stored.

The automatic tasks performed on the aircraft are flow and leakage tests using air (up to 30 bar), hydraulic system filling, leakage tests at low and high pressures, system flushing, particle measurement and contamination checks, and draining the fluid from aircraft pipes.

In addition to the technically sophisticated requirements, space and time were critical issues. After a thorough study of the premises and possibilities, Test-Fuchs engineers solved the space limitations by designing most of the units to be on wheels or rails so that all the test equipment can be moved around safely and quickly. Practical storage of hoses and cables avoids accidents among personnel and saves production time. \\\

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