Case Study
Aerospace
English

Aerospace Valve Matching Rig

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Aerospace Servo Valve Spool and Bush Matching Production Test Rig

The valve matching rig was developed to assist in the production, assembly and testing of aerospace servo valve spool and bushing assemblies.

The spool and bushing are fitted to generic tooling which simulates the servo valve assembly. The spool is attached to a stepper motor drive with linear encoder feedback which moves the spool within the bushing. At the same time the control software measures the flow and pressures across the valve and determines the position of the lands. From this a calculation is carried out to determine if the lands are in the correct position or if they need to be machined.

Normally these units consist of a spool operating in two bushings one being the control ports and the outer being the switch bypass mechanism.

Once the machining has been completed a range of tests are carried out such as general flow plots, leakage tests, pressure gain and spool transfer load.

The machine was initially developed to run 1 variant but due customer requirements it has now been expanded to run 8 variants, this was made possible by the flexibility in the mechanical design and software structuring.

Technical Data	
Control System	NI CompactDAQ
Control Software	LabView
Stepper Motor Positional Control	1/10000* 0.5mm
Encoder Positional Feedback	0.0005mm
Load Monitoring	0 - 500g
Flow Range	0 - 100lt/min (via 3 flow meters)
Hydraulic Pressure Range	5000 PSI (proof test to 7500 PSI)
Leakage Monitoring	0 - 100 cc/min

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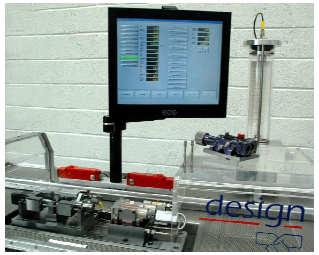
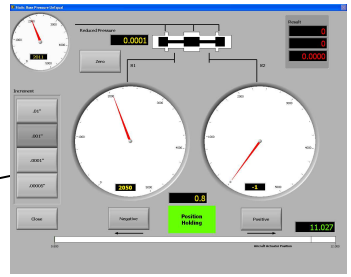
The test rig has a fully guarded test area which slides out of the way to enable easy access for the operator to load and unload the components





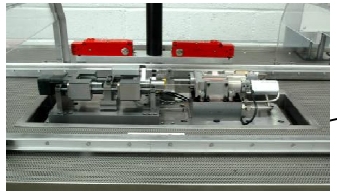
The test rig is controlled by a bespoke National Instruments LabView program.

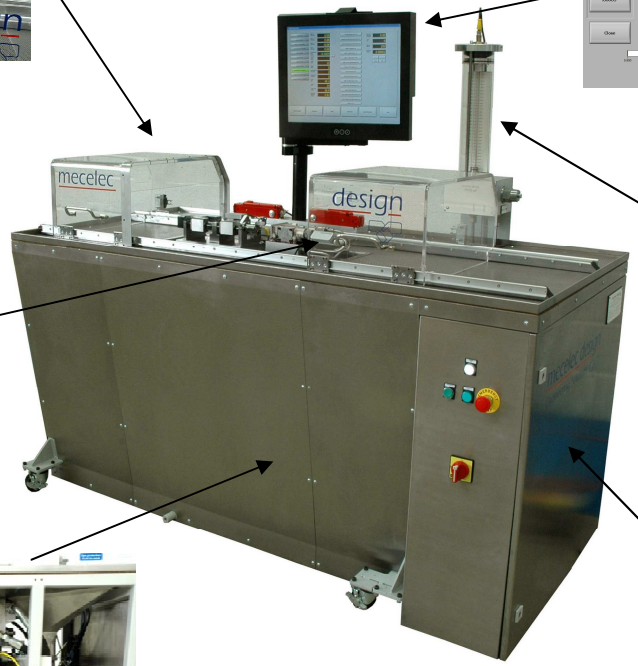
Test sequences and parameters are profiled using Microsoft Excel which interfaces to the LabView program.

Comprehensive reports are produced at the end of each test, these are used to determine the required machining left to do or are saved as the valve performance data when supplied to the end customer

The unit under test is loaded into interchangeable manifolds for the specific valve type.

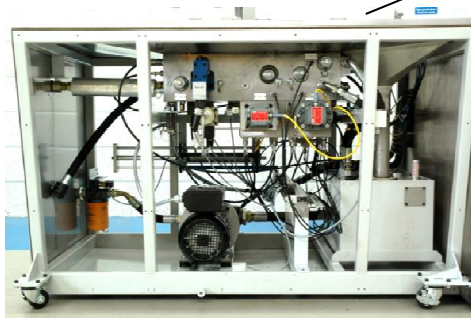
The spool is moved within the bush using a geared stepper motor with position being monitored by a linear encoder.





A visual indicator is mounted on the top of the tooling plate for the operator to monitor the valve leakage over a timed period

The machine has its own built in hydraulic supply module and control instrumentation neatly packaged under the machine.



The electrical enclosure mounted to the end of the rig keeps with the compact design the customer required.

Internally is housed all the switch gear, instrumentation amplifiers and the industrial computer along with the data acquisition system.

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