

## Aerospace Undercarriage Hydraulic System Qualification Test Rig

Along side our customers existing undercarriage test rig Mecelec Design designed & supplied the equipment that replicated the hydraulic system supplied by the aircraft's three Engine Driven Pumps (EDP's) to the main & nose landing gear.

This involved the supply of an acoustic enclosure which housed three large motors that powered the EDP's & the commercial hydraulic pipe-runs that take the hydraulic oil from the EDP's to the various aircraft interface points within our customers test rig. These hydraulic pipe-runs had to be designed to simulate the characteristics of the actual aircraft pipe pressure drops.

Mecelec Design also designed & supplied the cooling system for the hydraulic oil which incorporated external air blast coolers that supplied chilled water to plate heat exchangers within the acoustic enclosure.

Throughout the design process great care needed to be taken within our equipment regarding materials, coatings & BOF items due the corrosive nature of the Skydrol hydraulic oil used within the system.



Technical Data	
Hydraulic Pressure	5000 PSI
Hydraulic Flow (per pump)	250 lt/min
Hydraulic Fluid	Skydrol
Cooling Capacity	200 KW
Cooling Fluid	50/50 Water Glycol
Drive Motors (x3)	150 KW
Electrical Power Supply	3 Phase 400VAC @ 750A
Control System	NI CompactRIO Real Time
Control Software	NI LabView

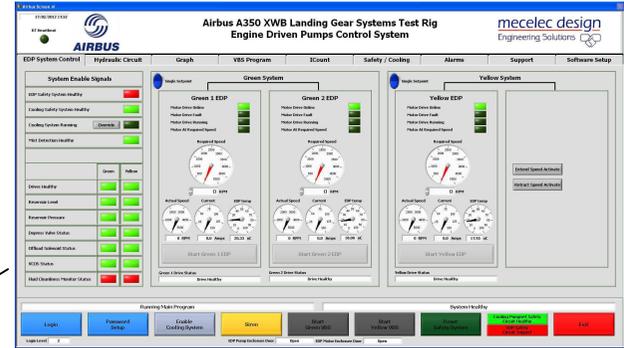


As well as the undercarriage there are many more loads on the aircraft hydraulic system during flight and therefore had to be simulated.

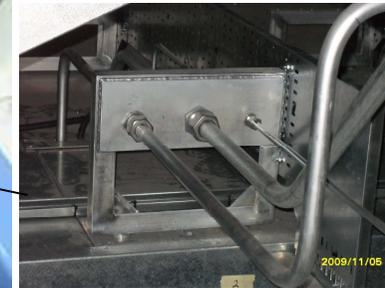
The variable bleed system was developed to allow extra flow to be drawn off the hydraulic system, this flow can be profiled to simulate that seen on the aircraft during flight in real time.

The control system is based around a Real Time NI CompactRIO data acquisition system with a remote host control computer located in the test facility control room.

The software is written in NI LabView and provides the operator with a comprehensive interface. The software connects with Microsoft Excel for set up parameters and calibration data



3 x 150kw motor and drive packages provided the power for the engine driven pumps.



The pipe work between the engine driven pumps and the undercarriage could not be laid out as in the aircraft therefore had to be substituted by commercial pipe work. However pressure drops in this pipe had to match what would be seen on the aircraft. Mecerlec Design developed a software package to simulate the pipe runs and carryout the calculations.



A large galvanised acoustic enclosure housed the 3 aircraft hydraulic engine driven pumps and the electrical drive motors. Segregation is provided between the pump and motor chambers due to the corrosive nature of the Skydrol hydraulic fluid used.

Plate heat exchangers are used to cool the oil and the oil contamination is constantly checked by an electronic monitoring system.

On an aircraft the fuel in the tanks is used to cool the hydraulic oil but not having the fuel available means that a large cooling system was required which can produce chilled water at 400 lt/min at 15°C.

Large air blast coolers external to the building are used to cool the water. Noise levels had to be kept below 60dB

