

Press Release

Hydraulic Services Contract For Airbus 380 Wing Jigs

£1.4 million order for design and installation from Electroimpact USA



Airbus A380, the world's only twin-deck airliner, scheduled to enter service in 2006

Bosch Rexroth, The Drive & Control Company, has secured a major £1.4 million contract for the design, supply and installation of hydraulic services for three Wing Assembly Jigs at the Airbus manufacturing facility at Broughton, Cheshire, from US aircraft assembly equipment specialist Electroimpact of Mukilteo, Washington. The giant jigs, each of which holds a port and starboard wing of the new A380 twin-deck aircraft, measure in the region of 60m long x 30m wide x 30m high and comprise five levels of high rise staging, providing worker access to the wing panel surfaces. Each unit incorporates 170 hydraulically-operated elevating platforms, known as 'flip floors', 24 panel loader stations, a series of HAWDE lifts for manoeuvring automatic drilling machines and 34 10,000psi remote tool stations for cold metal working on the wings.

The Industrial Hydraulic division of Bosch Rexroth UK was initially awarded a £27k contract in October 2001, for the design of the in-jig hydraulic services, which was won against competition from the design house and hydraulics sectors. The contract involved all of Rexroth's design engineering resources and, after several reviews at Electroimpact's Seattle offices, was approved in March 2002. Rexroth then tendered for the installation stage, once more against stiff competition, and was selected by Airbus UK, following recommendations by Electroimpact.

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The latest £1.4m order covers hydraulic hardware, including centralised pump units and local control panels, extensive pipework installations and the flip floor hydraulic cylinders, which were designed in association with Bosch Rexroth Sweden. The three jigs are due to be completed in strict phases during 2003, in line with schedules for the first flight of the prototype A380 Airbus in early 2004 and entry into service in 2006.

Designed in collaboration with major airlines, airports and airworthiness authorities, the A380 is described as the most advanced, spacious and efficient airliner ever conceived, which will seat 555 passengers in a three-class interior layout and have a range of 14,800km. Thanks to new generation engineering and advanced wing and undercarriage design, it will be quieter than today's largest airliners, with a more efficient fuel burn. A number of innovations will ensure considerable weight savings, despite the aircraft's prodigious size, including the use of carbon fibre-reinforced plastics for the central wingbox and advanced aluminium alloys for the wing panels.

In common with other Airbus aircraft, the A380 is being manufactured at different sites across Europe, each responsible for producing a complete section, although due to their size the new airline parts will be delivered by surface transportation for structural assembly in Toulouse, rather than air-lifted. Electroimpact is working in close collaboration with Airbus UK on the A380 wing manufacture and is the main contractor for two major projects. For Stage 0 panel assembly, it is supplying four 165m-long automated lines for building the upper and lower panels, while on Stage 1 it is building the three wing jigs, which accept the panels from Stage 0, together with the spars and ribs. On completion, the wings are removed by overhead crane, painted and fitted with electro-hydraulic systems and loaded onto a barge on the nearby River Dee, for shipping to Airbus France.

Rexroth has designed and is in the process of installing the purpose-built hydraulic cylinders, valve control packs and zinc-plated pipework mains, which operate the 170 flip floors on each jig, in addition to the centralised pump units that serve this and other functions. These retractable floors are attached along the full length of each stage, allowing work on various parts of the wing; each has two pivot points and is pushed through 90° by Rexroth hydraulic cylinders, which retract when the floor is in the 'down' position and are extended for the 'up' mode that also serves as a safety barrier. The cylinders are regulated by a total of 288 single and double flip floor valve panels, each of which houses one or a pair of Rexroth 4WE6 double solenoid, directional control valves and 'pilot assist' speed control modules, mounted on a manifold block and connected to the hydraulic ring main.

Fluid power for each jig is provided by a centralised pumping system, consisting of a hydraulic power unit and fluid reservoir assembly. This comprises four Rexroth variable displacement axial piston pumps and motors, with two Type A4VSO units serving the flip floors and panel loaders, delivering a total output of 110 litres/min @ 210bar, and two Type EA10V10 pumps, with an output of 290l/m @ 80 bar, dedicated to the HAWDE lifts. Pressure switches detect when there is a 'no demand' situation and after 10 minutes full pump flow will unload to the reservoir at virtually zero pressure, while after a further 20 minutes the pumps will revert to 'shutdown' mode.

The innovative A380 wing assembly jigs incorporate automatic drilling machines, for skin-to-spar and skin-to-rib drilling, which are carried on goods elevators, known as HAWDE lifts, and parked at different work stations, with the flip floor retracted. Each jig is equipped with four 4-storey and four 2-storey HAWDE lifts and Rexroth is also responsible for the eight isolation & flow control manifold units, stainless steel hydraulic tube and pipework, as well as the centralised pump units that drive them. There are also 24 panel loader stations which lift/lower the aluminium panels between levels and present them to the wing, and these will utilise the same flip floor hydraulic pump system.

Rexroth has also collaborated with aircraft fastener systems specialist, Huck International, on the design of a 10,000psi high pressure hydraulic circuit for operating Huck swaging tools and advanced FTI (Fatigue Technologies Inc) cold-working equipment. Huck supplied three of its Hydramet hydraulic systems and a total of 34 remote tool stations (RTS), each with up to four power take-offs, while Rexroth installed the power units, hydraulic reservoir and all the RTS pressure and return lines, complete with autoclave end fittings.

A Rexroth project manager and pipework supervisor will be on site at Broughton throughout the project and strict milestones have been established for completion. Some idea of the scale of the undertaking can be gained from the fact that 8,000 litres of fire-resistant Quaker Quintolubric hydraulic fluid will be used for the first fill of the centralised pumping units, Hydramet packs and pipework installation.

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