

Combined effort

A CLOSE COLLABORATION HAS RESULTED IN THE DEVELOPMENT OF A COMBINATION VALVE FOR DRILLING RIGS THAT INTEGRATES THE COST EFFICIENCY AND PERFORMANCE OF A MOBILE CONTROL VALVE WITH THE FLEXIBILITY OF A MANIFOLD SETUP

In today's market, mobile equipment OEMs need to consider the array of varied functions and operating styles that their customers have come to expect. Their designs must be dynamic enough to allow for the demands of the end-user in different operating environments. Australian Drilling Systems (ADS) designs and manufactures multipurpose drilling rigs for applications such as underground directional drilling, methane drainage and coal-seam mapping. The company's machines are very compact and have a number of integrated functions. However, they have had some major issues with the envelope size and serviceability of the control side of their hydraulic system, which consisted of eight or nine different separate valve units in the form of manifolds and directional control valves plumbed together through an intricate network of hoses and pipes.

To solve these issues, ADS turned to hydraulic specialist Custom Fluidpower to design a combination valve that integrated all the control functions into a single unit. Following previous successful applications of Nimco's CV2000LS post-compensated proportional valve, a design that integrates the performance and cost efficiency of a high-end mobile control valve with the flexibility of a manifold design was developed.

Through a close collaboration between Nimco and partner Custom Fluidpower, a specially machined and equipped CV2000LS valve section was developed to meet the demands of the integrated design. By integrating some of the different control functions into manifolds and combining them with the high-performance, post-compensated, flow-sharing valve sections of the CV2000LS, a single module solution could be created.

The pump setup used to supply the system was two variable high-response pumps – one controlled to



ABOVE AND BELOW LEFT: **Track-mounted horizontal drill for use in explosive atmospheres**

deliver a constant pressure, and one in load-sensing configuration. These pumps supply different functions in the machine and are tied into the valve bank through a specially developed mid-inlet module. This raised no issues as the CV2000LS sections can be used together with both pump types without modification.

Machining requirements

One of the problems that had to be addressed in the design phase was that one section required a work port flow of 170 l/min with an integrated counterbalance valve, which required a special machining of the valve sections to integrate it in the valve assembly. This was solved by creating a side porting of the valve sections, making it possible to flange two sections on either side of a manifold containing the counterbalance valves to obtain the required functionality and maintain a low pressure drop throughout the circuit.

The machine design also required some customised spools to give the tramming function a half-speed reverse, which was no problem for the sophisticated spool design software developed by Nimco. The load cycles could only be simulated with some simple input conditions, and customised spool-metering notches were achieved to deliver precise load control and increased safety.

The end result of this collaboration was a highly customised valve assembly, which not only boosted the performance of the machine for the end user, but



ABOVE: **Hybrid CV2000 – a highly customised valve assembly that has boosted machine performance while reducing the size of its hydraulic system**

also eliminated several large multi-spiral hoses, which saves in both cost and assembly time. In addition, the envelope size of the hydraulic system was greatly reduced, and maintenance and serviceability of the machine was much simplified. These improvements are crucial, as any machine downtime is very costly.

Some of the advantages that the customer noticed immediately, compared with the previous applications using other valves, were the increased response time from operator input to machine movement, and a lower fluid velocity in the system, which meant less heat generation and more efficient operation. Using Nimco's post-compensated CV2000LS valve sections provided flow sharing that gave increased workability with smaller displacement pumps, which helped to reduce production and running costs, as well as installation size. **ivT**

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