Branching **out**

Hydraulic ring mains and mixer circuits that respond in milliseconds, yet improve energy efficiency, are under development. Brian Tinham reports

We may soon be seeing hydraulic power circuits able to respond to demand changes in just a couple of hundred milliseconds, instead of the usual seconds. That's if work currently being undertaken by specialist Branch Hydraulic Systems comes to fruition.

Technical director Alex Tatlow says he's filed for patents, so can't give away too much detail. However, he reveals that plant engineers can also expect to see accuracy and energy efficiency significantly improved on ring mains, as well as mixer circuits – and maintenance requirements reduced. All of which will come as good news for plant engineers, particularly those concerned about responsiveness on equipment for mobile and hazardous area applications.

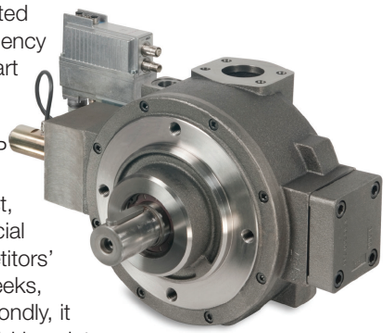
So what's behind this development? Tatlow explains that Branch's idea builds on existing, off-the-shelf equipment, but focuses on novel integration and control techniques. "Variable speed drives, electric motors and digitally-controlled pumps are all mature and relatively low-cost technologies," agrees Tatlow. "But it's their combination with a PLC [programmable logic controller], configured to watch the combination and make adjustments on the fly, that will allow motors to run at lower speed and save power, while enabling more responsive control."

Responsive control

Energy saving is one thing, but more responsive control? Yes, says Tatlow, pointing out that pump response times are far faster than those of motors. "Typically, it takes a couple of seconds to accelerate an electric motor, whereas a pump responds in one tenth of that time, or less. So the objective will be to signal the pump to follow rapid changes in demand that aren't too big, and let the motor follow up at its leisure.

"With the PLC built into the drive, we will achieve constant pressure control, with the pump leading in a way that has never been done before. The motor may run over its constant rated torque for a short time, but it will be equipped for adequate over-temperature to manage that."

Tatlow says that Branch Hydraulic is building a test rig for the new system now, using a digitally-controlled pump, and that the firm expects to be running tests by the middle of the year. "Our development work is around going beyond existing applications that use variable speed drives equipped with hydraulic constant torque software. Those can only run over a limited range before they come up against efficiency and cooling problems, as the motors start drawing too much torque."



Stand by for a new era of responsiveness for hydraulic power circuits in industry

The digitally-controlled pump currently being proposed is a Moog RKP D radial piston pump. Tatlow says there are several reasons for that choice. "First, it's a standard pump – nothing that special – and, compared to some of the competitors' pumps, it's on a fast lead time of five weeks, compared to five months for some. Secondly, it offers good technical features, such as fairly quiet operation, robust design and suitability for a wide range of fluids – all the way from Skydrol to mineral oils. In fact, all hydraulic types. And the range runs from 5.5kW to 75kW as a single pump. If you want to run in tandem, that rises to 150kW."

And he adds that the pump's software makes it very suitable for flexible set-ups. "If, for example, we want to run it as a tandem unit, then there's an automatic master-slave mode where you effectively get digital control of both pumps with only one digital controller," comments Tatlow. "What's more, the unit offers pressure-compensating software, as well as flow control. Also, communications between the pump itself and the drive PLC can be standard analogue or [digital] fieldbus. CANbus seems to be their favourite."

Sounds good? Tatlow makes the point that it's not just about achieving a new level of responsiveness at low cost. It's also about effectively eliminating interactions where there are several services on a single ring main.

"If they want, perhaps, a change in demand of, say, 25% of full rated flow to happen in 200msec, rather than two seconds, we hope to be able to deliver that," he says. PE