Les Hunt was invited to preview a novel development for the hydraulic and process industry market that could potentially save this sector hundreds of pounds on the cost of its data acquisition equipment

Affordable data acquisition for hydraulic and process engineers

Mention the name JBJ Techniques and most people in the mechanical and fluid power transmission sectors will probably think couplings, clutches, gearboxes and hydraulic motors. And while these and other related products remain at the core of JBJ's business, customers might be surprised to learn of a recent technical development that could herald the start of a new and additional enterprise for the company.

In its close dealings with both customers and suppliers, JBJ has become increasingly aware of the need for affordable electronic monitoring systems, particularly within the hydraulic and process industries. While this area is undeniably well supplied with both the data acquisition hardware and its associated software, the costs are high - often to the point where the expenditure may be difficult to justify.

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This leaves many system designers with something of a dilemma: buy at a price or design and build the necessary monitoring equipment in-house?

For JBJ, this posed a challenge that was well worth pursuing - how to offer a local readout to monitor performance, at a price which enabled fitting as a standard product, but with additional features that could turn it into a serious analytical tool. With the niche market need identified, the next step was to analyse the basic needs of the sector and come up with an affordable solution to an otherwise costly problem. Step forward JBJ's South West regional technical sales engineer, Tony Fletcher - a sales engineer by profession but a keen electronics and software enthusiast in his spare time.

The design brief called for data monitoring and logging system that, at its simplest level, would be capable of monitoring hydraulic line pressure, fluid flow and temperature. With his knowledge of the hydraulic engineering sector, Mr Fletcher reasoned that a four-channel system - accepting flow, pressure and two other inputs (for temperature or additional pressure sensors) would cover the requirements of most hydraulic systems. An instrument with these features was considered versatile enough to have applications in many market sectors. Assigning appropriate sample rates to the four channels was a key design task, and one that would clearly have an impact on component cost.

Arguably, the most important parameter to be measured in any hydraulic installation is pressure, so this channel was assigned the highest sample rate of 500S/s (a 2ms sampling interval which enables capture and analysis of high pressure transients and pressure ripple on a hydraulic system). The remaining 4-20mA channels are sampled at the much slower but nonetheless perfectly adequate rate of 20S/s.

The flow meter input is essentially a pulse counter and was designed to receive pulse output signals from JBJ's preferred flow measuring device, SEIM's MPV series volumetric flow meter. This compact unit offers excellent turn-down ratio and an accuracy in the region of 0.2% across the flow range.

The remaining three inputs are configured to accept 4-20mA signals from the temperature transmitters - a K-type thermocouple (fluid reservoir) and a strap-on thermistor type device (fluid line) - and a relatively inexpensive thick-film absolute pressure sensor with internal linearising electronics.

The unit, dubbed FD20 (the FD standing for 'Flow Display'), is housed in a standard quarter DIN panel mounting aluminium enclosure with a two-line alphanumeric LCD screen, pushbuttons and out-of-range alarm indicator. All connections to the display are at the rear of the enclosure. An RS232 port is provided to connect the device to a laptop computer, and two zero volt relay outputs are available for ancillary control functions (external alarm, for example).

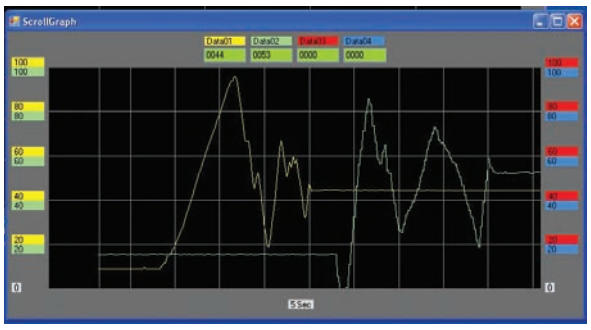
The test data display and logging functions have been created in VB.NET and the prototype GUI is most impressive. As can be seen in the screen-grab illustrations on page 12, there is a choice of analogue type meter, bar graph or digital display for each channel, and the channel ranges and alarm set points can be set in the panel beneath each meter. The data is displayed in graphical format, with variable time-base, zoom and full archive playback facilities. Displayed data can be exported directly into Microsoft Excel for further analysis.

The FD20 is initially set up as a fixed location test system, but as it is powered from a 12V dc source, this does open up the possibility of mobile applications. A handheld version is already being considered, with easy connector interfaces for the sensors. Specially tailored systems are also on the cards, though these developments are some way off yet.

The FD20 hardware

Left. The real time display showing the range of display options that can be set up for each of the four channels

Right. An example of the FD20's data logging function



But back to the all-important subject of cost. Clearly, the economies of design and the fact that all the development work was carried out in-house has had a very positive impact on the system's final pricing structure. JBJ considers that the FD20, which includes display and software with sensors at extra cost, will offer substantial savings on current market offerings - and that has to be worth a closer look.

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