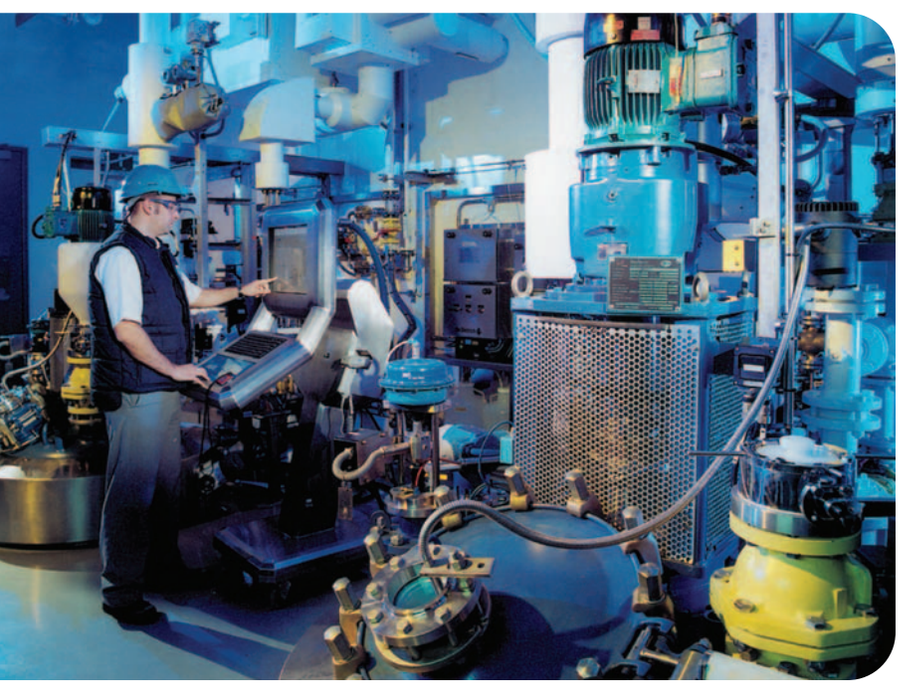
Instruments for control

Help is at hand for plant engineers facing up to the challenge of handling instrumentation and control equipment. Brian Tinham reports on recent developments

The fact of plant managers being forced by the bean counters to outsource day-to-day maintenance and operations of significant sections of all sorts of sites is old news. Today, more often than not, third parties look after everything from installing (and even specifying) plant equipment and instrumentation, to commissioning and maintaining it. And that's not only on site services, but increasingly main process plant, too.

What matters now, though, is that, with the movement of such responsibilities off the plant payroll, we're witnessing a worrying erosion of local detailed plant knowledge. Further, plant engineers, whoever their employer and whatever their grade, are finding ever increasing responsibilities landing on their broad shoulders.

That's not to say plant operations are becoming dangerous: health and safety, as well as security processes, are invariably in place, limiting access to plant and instrumentation to 'competent' engineers and technicians. However, if the expectation is that you will handle everything from instrument service and calibration to SIL (safety integrity level) assessments for hazardous plant, while also maintaining the mechanical, hydraulic, pneumatic and electrical aspects for which you were trained, even the best might struggle.



Technology puts plant engineers back in control

And, given that these requirements are likely to be on several different vendors' kit – process management systems from one, skid package plant and controls from another, turbine equipment from another, etc – it's clear that life is becoming somewhat challenging.

So, how to cope? The good news is that plant and equipment operators and manufacturers alike have been recognising these problems and making practical changes, founded largely on what modern technology can do. And that's revealing itself in several interesting ways. Top of the list is that the human interface for much of the instrumentation we come across is fast becoming standardised across instrument types. Second is that those same interfaces are becoming cleverer, with, for example, 'wizards' for set-up and calibration, as well as comprehensive help menus.

Third is that reputable instrumentation companies have picked up on the skills gap and are offering ever more comprehensive help desks. And fourth is that even the most vigorously contested standards (most notably those surrounding newer technologies, such as fieldbus and wireless communications, but also old chestnuts like hazardous areas) are coalescing. Plant users are demanding it, the global standards bodies are seeing the sense, and control and instrumentation system vendors are caving in – as they realise not only that they can't carry the expense of developing products compatible with multiple standards, but also that their pet 'standards' no longer lead to commercial advantage.

First things first, and, on the instrument interface point, ABB's business development manager Les Slocombe makes the point that this control and instrumentation giant has, for some time, been

moving towards a common 'look and feel' across its range. "So, if you can configure a temperature transmitter, for example, then you can also set up a pressure device, a level instrument etc, because they all use the same terminology, buttons, menu systems and displays," he says. And he adds that the emphasis throughout is on "plain language" – and that applies not only to instrument set-up, but also calibration, whether the software runs on the transmitter itself or a laptop.

Smarter calibration

It's the same with instrument calibration – here assisted by a general move to instruments capable of covering the work formerly done by DMMs (digital multi-meters), pressure calibrators, thermocouple testers and data loggers, for example, all in one device. More than that, though, Graham Dawber, general manager of pressure measurement products at GE, observes that modern instruments also allow plant engineers to upload the calibration procedures. "Our Field Calibration Manager software is all about improving accuracy and efficiency by helping plant engineers to get the process right and so increase the levels of confidence plant operators can have in their systems," he says.

Key to this is not only ensuring that calibration routines are standardised, but also that all results and deviations are presented on the instrument itself. As Gordon Docherty, technical leader for GE's portable calibration products, puts it: "Our DPI 620IS calibrator was the first with this level of functionality, and it also provides help online, showing the technician relevant adjustment criteria and how to bring the instrument back into calibration and revalidate it." And he adds that GE's latest instruments also offer full HART communications, providing the same calibration and adjustment facilities for the wide range of HART-based devices.

Those are big steps forward. Nevertheless, ABB's Slocombe asserts that his company has seen a "tenfold increase" in calls for support over the last five years alone. "Some are from process engineers wanting basic instrument information; others are from electrical engineers needing installation details. But there's a general expectation that, once a technician has got through the security interlocks and is standing in front of a process instrument, he or she will be on the phone or radio wanting support. That's why we've strengthened our support teams. It's also why we've developed so many instrumentation training modules."

Many of those are available on-line – free for ABB equipment users and at a nominal price for non users. It's all about helping today's necessarily broader-based engineers and technicians to get by. And ABB is by no means alone: the industry as

Pointers

- Modern instrument interfaces are easing set-up for different parameters
- Reputable instrument firms now offer valuable engineer help desks
- Intelligent instruments have simplified calibration and maintenance
- Digital fieldbus networks are becoming easier, as standards bring a decade of in-fighting to an end
- New electronics and sensors can improve on existing plant optimisation
- Intelligent instruments can provide diagnostics that also extend out to associated field equipment

a whole is responding to a glaring requirement to prevent a skills vacuum.

Help is also at hand for engineers faced with installing or maintaining digital plant fieldbus networks. Developments here are largely about the imminent merging of technical 'standards', such as FDT DTM (field device tool and device type manager), favoured by instrument manufacturers, and the alternative EDDL (electronic device description language), traditionally the preserve of control system vendors. As ABB's wireless products manager Gareth Johnston puts it: "Those have been a pain and an expense to support. So we now have a new direction, FDI [field device integration, the technical spec for which is due out later this year], supported by the usual device vendors, as a new, integrated standard."

Open fieldbuses

This is significant – potentially bringing to an end a decade of in-fighting over preferred technologies for intelligent instrument communications. It could eventually free plant engineers to select instrumentation from any vendor – should they want to – by the functions they require, not the standards supported. No one is suggesting that changes the decision-making over which fieldbus protocol to use where, but even that has already been hugely rationalised (and for similar reasons).

As for bigger projects, again help is at hand from vendors keen to demonstrate their capabilities. Most of the front runners will offer whatever support you need – from remote system access, for instrument diagnostics or configuration, to skilled engineers on site. And the latter option can be invaluable.

Technology and standards

With the announcement, by Siemens, of devices supporting Wireless HART (leaving only Honeywell, among the main automation system vendors, out in the cold), as well as backing from NAMUR (following multi-vendor trials at BASF, Ludwigshafen) and formal ratification by IEC (IEC 62591Ed. 1.0 on 26 March), this wireless industrial sensor network protocol has moved beyond de facto standard status to certified standard.

For now, that leaves North America's ISA 100.11a standard rather eclipsed, certainly since its failure to achieve ANSI (and thus IEC) backing late last year – although ISA now claims that IEC will ratify its standard in 2011.

However, the most likely outcome – excepting academic niceties, commercial pressures and technological dogmatism – is convergence. Quite when is unpredictable: the protracted fieldbus wars of the 1990s bear witness to that. For now, what matters to plant engineers is the simple fact that there is globally recognised, proven and supported technology that enables modern instrumentation, regardless of vendor, to be 'connected' wirelessly – at least in non-critical monitoring applications.

No one is suggesting wireless is going to overtake wired installations, but this development does lend credibility to claims by Emerson Process Management and others of over 100 million hours of cumulative run time for Wireless HART devices. It opens the way to much larger scale adoption where conventional instrument wiring is prohibitively expensive or difficult to maintain. The only remaining concerns are battery life and data rates – the former seeing continued improvement as energy scavenging technologies (vibration, solar, temperature differential) improve; the latter typically limiting application to non-control applications.

Beyond wireless and standards, though, intelligence in sensors themselves is also improving. ABB's wireless products manager Gareth Johnston suggests that the industry is rapidly reaching the point where it is economically feasible to build maintenance monitoring features into transmitters that recognise external, as well as internal, problems.

"Our equipment will now detect problems such as plugged impulse lines on a pressure transmitter, without having to kick off software from a laptop," says Johnston. "And, in R&D, we're looking at being able to see problems, such as thermowell fractures [using additional vibration sensors, for example] on a temperature sensor. We recognise that plants don't just want temperature from a transmitter, but also information about the measurement's validity. It's about helping demanned plants to function more effectively."

Will that increase costs? Johnston says not: "The cost of temperature devices today is in the metalwork, not the electronics: we're just taking advantage of processor power."

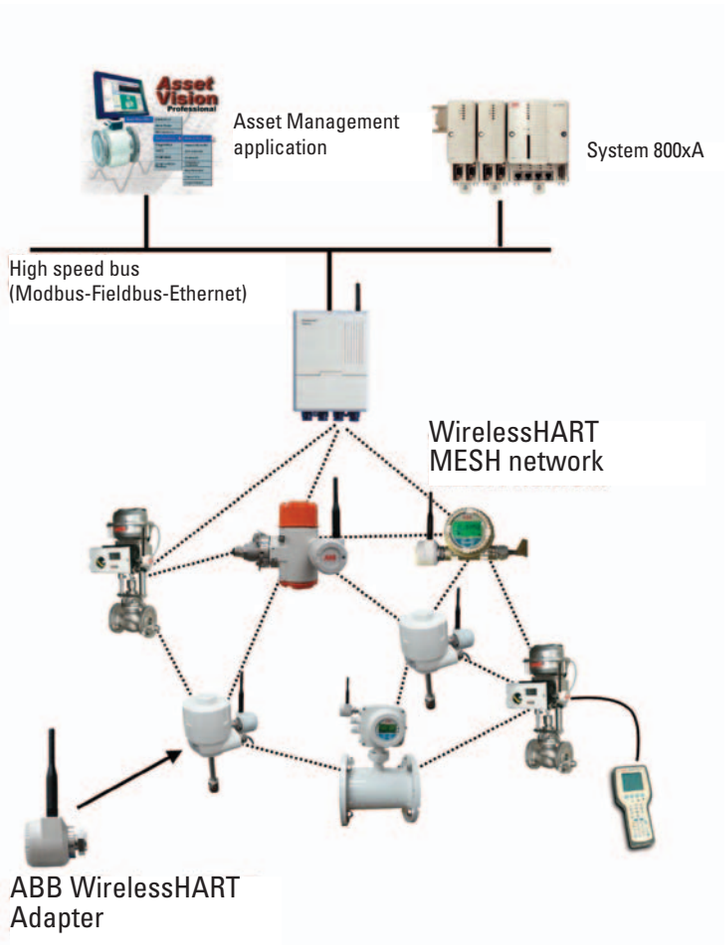
Slocombe points to the problem that site engineers, struggling to keep on top of the day job, have little time to keep abreast of technology – so external eyes can make a big difference.

"Consider a tank that's been on site 15 to 20 years, with its level transmitters wherever they were installed," he suggests. "Given today's health and safety limitations, they may not be in ideal positions or maybe the plant needs tighter control. It's about using different techniques. With newer electronics and sensors, we might bring measurement points into a safe area, or re-engineer that tank's instrumentation to provide more information about the plant and so improve its optimisation."

Sounds expensive? It can be, so you need to choose such projects carefully and examine the return on investment. However, in your calculations, another point to factor in might be the depth of integration available with new intelligent field instruments. If they are capable of providing remote access not only to process values, but also diagnostics, then nascent plant problems can be automatically detected.

They can also be signalled to engineering, via an asset management system, such as Maximo. And that, in turn, can generate maintenance work orders and severity notices, while also checking the parts inventory and ordering spares, if required. It might also send an SMS to the maintenance supervisor and instigate involvement with the instrument and/or control system vendor's support team.

If the problem detected was on an oil rig in the North Sea, you can see the value. But it doesn't have to be anything like as extreme as that to make a lot of sense. PE



Safety systems update

Spending on SIS (safety instrumented systems) continues to grow more rapidly than on general control and instrumentation. Ian Curtis, process safety systems lead for Siemens, believes that is because of the increasing awareness and enforcement of legislation and standards – notably IEC 61508 (functional safety of electrical, electronic and programmable electronic safety-related systems) and 61511 (specifically for the process industries).

"Most of that growth is in the high hazard industries," he says. "Incidents such as Buncefield and BP Texas City have raised awareness of the need for functional safety and maybe even recalibrated our approach to ALARP [as low as reasonably practical], shifting the emphasis even more towards caution." But Curtis believes that functional safety is also percolating through to other industries, such as pharmaceuticals and life sciences, and even the water utilities, not typically classified as high hazard. "Rather than thinking simply of cost of safety systems, end users are thinking more about the savings from not having serious incidents," he says.

And then there are the subtle changes with standards such as 61508, which put the onus on plant managers and engineers involved with specifying, installing, maintaining and testing safety systems to prove competence. It's not that people were previously complacent about competence and it's not that application of the standard is mandatory. It is that, in the event of an accident, parties would be required to demonstrate that they meet best practice – and that sharpens the mind.

Curtis suggests that, for plant engineers, the issue is ensuring that they have an understanding of the big picture – the overall context in which their systems are operating. "They don't have to be experts in every facet, but they do need to understand that the integrity of their safety functions is predicated on a regime of regular testing. Compromising that will impact on safety system performance, increasing its probability of failure on demand. Regular testing is the only way of ensuring that they will operate as required, if and when the demand comes."

Above all, he says, plant engineers must not allow management to cut testing as part of cost saving measures. Also, in general, they need to remain diligent – a warning that applies to all such systems. Cutis observes, for example, that there is increasing emphasis on safety systems in the water industry, with more demand for SIL-certified PLCs and online analysers.

"SIL certification of the components has become the most practical route to demonstrating that they are SIL capable. But engineers need to look at how these components fit together: do they combine to give the required overall PFD for the safety instrumented function and do they meet the architectural constraints posed by the standard for the required SIL level? SIL certification is a starting point, not a finishing point."