MULTI-SKILLED ENGINEERS NEED MULTI-SKILLED PRODUCTS

Until recently, system integrators have been forced to regard electrical and pneumatic sub-systems as separate entities. Jacqui Hanbury, Product Manager at Festo, believes that the end of this segregation is now clearly within sight.

Festo's CPX valve terminal, equipped with a powerful CoDeSys embedded controller, makes a perfect integrated automation platform.

Given the steady growth in process automation systems employing a mix of electrical and pneumatic motion control technology, it may seem surprising that there are so few integrated process control systems on the market. Partly, this can be explained by the fact that only a handful of the larger automation component manufacturers cover both sectors in any depth. Another reason may simply be that because control engineers have tended to specialise in one or other of these technologies - not both - they have not actively sought integrated, all-in-one control solutions.

However, this is now changing fast. Witness the number of universities offering degree-level courses on mechatronics, and the growth in specialist companies providing multi-disciplined engineering training. The current economic climate is also having a major effect. In response to acute supply pressures, system integrators are being forced to take a fresh look at how they can build systems with less people, in shorter time frames. One obvious way, which many are beginning to adopt, is to develop more flexibility within their workforce, by training their engineers to be multi-disciplined.

This concept has had a long gestation period. It wasn't so many years ago that even the very structure of engineering functions within companies conspired to ensure that the disparate worlds of pneumatics and electrics would never meet. At the process automation level, this meant that the technologies rarely worked well together - and even when they did, the cost of closing the gap was extremely high in terms of labour. In fact, it was often the case that the two disciplines only came together for the first time at the final system commissioning stages. Which is hardly the best time to be resolving critical system integration issues.

A typical front end, continuous process plant comprises of a series of skid sets. They may include gas and liquid management systems; pneumatic, pilot operated valves in zoned control panels for the actuation of diaphragm and other process valves. PCs or PLCs control recipe and dosing systems via proportional actuators. Hazardous gases and liquids require safety valves and interlocks in carefully segmented zones, some with explosive potential. Such a plant is a good example of the challenges facing an automation and controls engineer in such an application, demanding significant time overheads for sub-system integration, wiring and commissioning.

During final commissioning, what starts off as a simple task can rapidly become more complicated, as the various feedback systems are incorporated. Analogue, physical and chemical detection systems from simple distance and pressure sensors to complex systems, etc., will all require separate devices to be built into the control panel and connected; and even if fieldbus has been employed to help save on wiring, there are still the issues of configuration files, addressing and parameterisation to be resolved for each device. Individually this isn't a problem, but locating the files, deciphering the documentation from lots of different suppliers and bringing it all together takes far more time than most people realise.

Safety considerations...

Process safety issues also require a multi-disciplined approach. Consider, for example, a system where only a small number of the pneumatic control valves need to be exhausted in a safety situation, whilst others need to be held 'on', to ensure that crucial valve states do not change. Typically, this can be achieved on a pneumatic manifold quickly and easily, by zoning the pressure. However, the best practice solution is to also 'zone' the electrical power supply, thereby ensuring that even if the pilot valve failed, no power would be available to drive its solenoid.

So, given that we are now on the threshold of having control engineers who are happy to embrace electrical and pneumatic systems, where are the multi-technology products they need to make their life easier? Well, they do exist, but it is important to note that not all such products are, or are ever likely to be, equal. Table 1 shows some of the key points to look out for, when choosing an integrated automation platform.

The multifunctional capabilities of Festo's CPX are ideal for process automation systems

Things to look out for in integrated automation platforms

Feature	Checklist
• Platform architecture	Accepts both pneumatic and electrical control modules
• Component sourcing	Modules for all the functions - pneumatic and electrical
• Scalability	Platform accommodates expansion facilities
• Pneumatic valves	Different sized valves can be accommodated on one terminal
• Electric drives	Platform offers control modules for servo and stepper electric drives
• Power supply	Flexibility to select multiple power zones to suit control needs
• Communications	Industry-standard Fieldbus and Ethernet nodes with variants for specific industry segments e.g., automotive
• Standalone control	Localised control capability for pre-processing or modular architecture
• Software	Open-source free software including wide range of function libraries
• I/O capabilities	Range of analogue and digital I/O modules
• Remote diagnostics	Diagnostic capabilities to suit application requirements
• Environment protection	IP-rating options enabling components to be located in cabinet or directly on machine

Festo's CPX multifunctional valve terminal probably comes closest to the ideal - some 8 years after it was launched, it is still the only product on the market with a backplane bus that spans both pneumatic and electrical functions. And since that time, the Festo development team has significantly extended the CPX's range of pneumatic and electrical technology modules. The latest addition is a CoDeSys embedded controller - essentially an industry-standard PLC with additional functionality - which provides a technically elegant means of controlling all the units in a CPX terminal, regardless of whether they are for pneumatic or electric drives, or for I/O functions. The controller can operate autonomously or in conjunction with a host controller such as a master PLC, and can also be used as an intelligent slave in fieldbus-based systems, to provide localised signal pre-processing.

Fully integrated automation platforms offer a wealth of advantages to engineers who are prepared to embrace both electrical and pneumatic disciplines. Imagine being able to combine temperature and pressure measurement side-by-side, with all signals sent via a fast backplane to a fieldbus or Industrial Ethernet (IE) node, or directly to a PLC running a small part of the system! Other significant benefits include reduced commissioning time and faster, more accurate diagnostics.

Integration in universal networks based on Ethernet opens up a number of new possibilities, especially with regard to additional IT services such as web-based monitoring and diagnostics. At last, with the advent of 'multi-skilled products', this is a practicable proposition. Engineers are finally free to design systems without having to worry about combining disparate pneumatic and electrical functions.

Festo Ltd
Bracknells, Northampton
Can be contacted on:
Tel: 0800 626 422 Fax: 01604 667001
E-mail: Jacqui_Hanbury@gb.festo.com
Web: www.festo.com