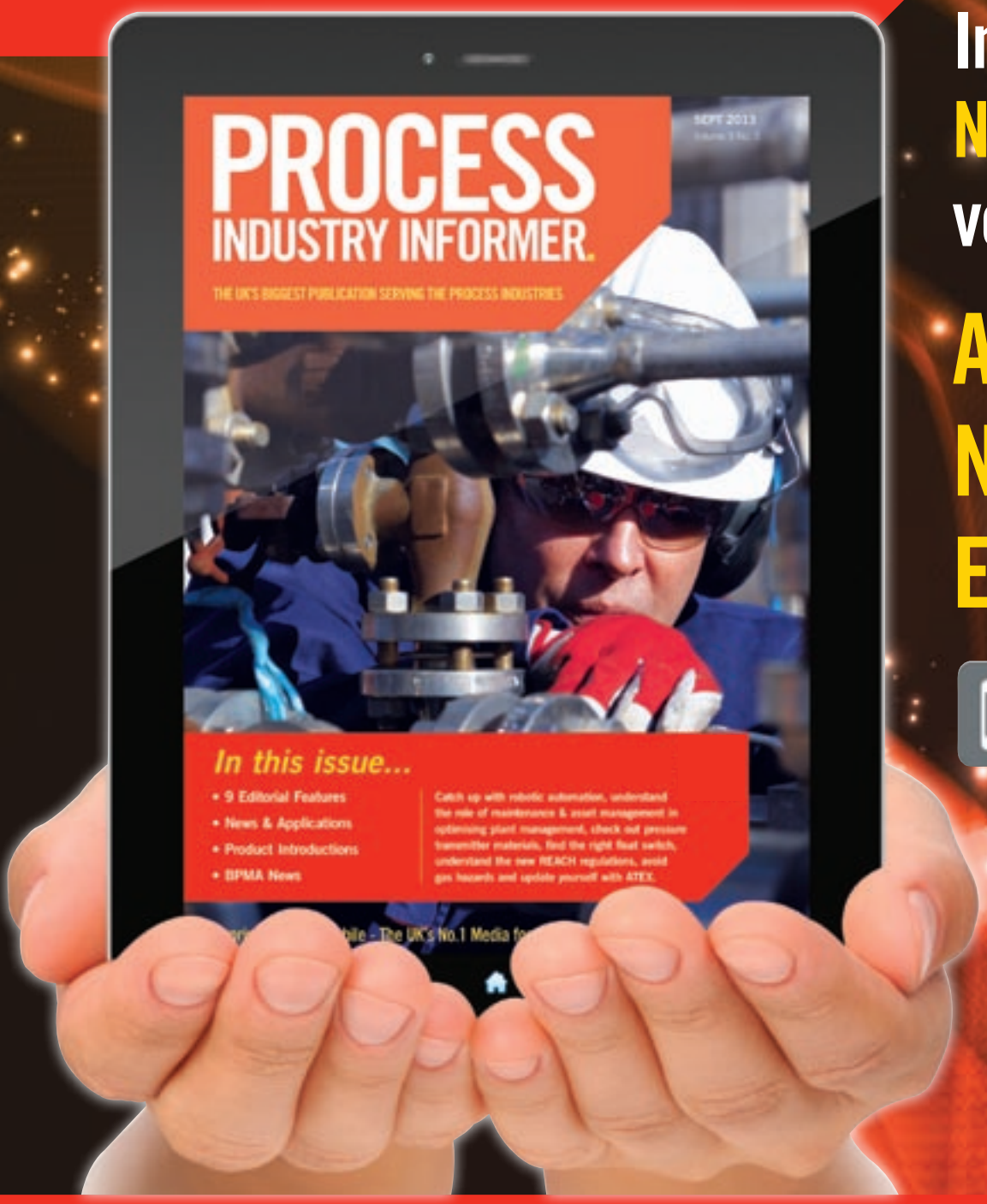
PROCESS INDUSTRY INFORMER.

OCT/NOV 2013
Volume 9 No. 6

THE UK'S BIGGEST PUBLICATION SERVING THE PROCESS INDUSTRIES



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SCADA and DCS battle for globalisation

The line of functionality between SCADA and DCS is blurring. These two traditionally disparate technologies are now seen as competitors in similar application environments. Here Frank Horden, business development and marketing manager at Yokogawa, argues that the changing nature of globalisation means that there are still distinct benefits in using SCADA as an umbrella layer on top of a DCS core.

Not many things in life remain constant and ultimately change is inevitable. The much loved cartoon show *The Simpsons*, seems to have flouted this rule as it enters its 25th season this year. The show has captivated millions for nearly a quarter of a century.

One of the key reasons for its success is the protagonist Homer Simpson. Viewers can relate to his on screen antics and naivety. His lovable nature however, seems somewhat paradoxical to his job as a safety inspector at Springfield's nuclear power plant.

It's frightening to think that human beings, with our haphazard Homer tendencies, still form an integral part of such a highly regulated, automated and controlled environment.

At the heart of such environments, lie platforms such as the distributed control system (DCS) which has developed over the years, from humble beginnings as a single loop controller housed in a panel. It is now cheaper and more intuitive, partly as a result of the use of PLC interfaces.

The strength of a DCS lies in a single database setup with minimal complexity and low risk of data redundancy. Recent developments have seen a push towards better smart reporting and relaying of management information (MI) through Human Machine Interfaces (HMI).

On the other hand, the supervisory control and data acquisition system SCADA (Supervisory Control and Data Acquisition), has developed from a simple visualisation tool used in a bank of relays. It has reached a point where it can now provide an increasingly object oriented approach, storing hard I/O tags from numerous devices in its fast Historian databases.

Simultaneously, it can maintain its inherent flexibility by storing soft logic operation tags and using these to generate HMI based mimic diagrams and trend and diagnostic data along with MI, troubleshooting, logistics and maintenance schedules.

Advancements in high power computing have also reduced the complexity of SCADAs multiple database setup and minimised the risk of data redundancy. This means that applications can now take more analytical advantage of the wealth of information available and interpret that data in more intuitive ways.

The confusion

This convergence of the two overlapping technologies has created a level of confusion in the industry. At first glance, it seems that SCADA and DCS have become direct competitors, doing essentially the same thing.

Vendors are partially responsible for this widespread misunderstanding. In continuous production environments, which are highly proportional-integral-derivative and PID control intensive integrated packages are beneficial. Examples of this include chemical, power generation, oil and gas, refining and water treatment.

Buyers look to vendors that provide turnkey solutions with proprietary hardware that requires a minimal amount of customisation. However vendors may often use this as a marketing tool and promote overlapping functionality in order to maximise sales.

Essentially, DCS systems are sometimes sold under the SCADA label and SCADA is sometimes branded as DCS. This does more harm than good for the industry by blurring the boundaries.

The boundaries are evident when the production environment is seen as a garden. DCS is an 'inside the fence' solution best suited to those continuous, PID control intensive applications. In contrast, SCADA can be seen as an 'outside the fence' solution, better suited to geographically dispersed environments using commercial off the shelf hardware.

SCADA is traditionally suited to batch and discrete production. Batch production includes food and beverage, pharmaceutical and general processing, whereas discrete production normally describes packaging and automotive applications.

Globalisation

The evolution of these technologies has come amidst a greater shift in globalisation. Supply chain networks are being strengthened by advancements in international trade, improved transport infrastructure and telecommunications such as fibre optic broadband.

Although this has reduced response times, production environments are under greater stress to deliver. With recent news of Toyota's recall of 885,000 vehicles in the US, it is evident that non-traditional duties such as reverse logistics are placing undue stress on production environments.

With the rise of multinational corporations diversifying their operations, control systems have to increasingly cater for business management operations in remote locations around the globe.

The Nord Stream offshore gas pipeline exemplifies this issue. It supplies natural gas from plants in Russia to plants in Germany and is operated from control rooms in Switzerland. A DCS setup performs reliably on an individual plant level, but is unable to extend large distances over various networks. This means it struggles to manage the three remote plants, especially when limited satellite bandwidth issues arise.

The use of SCADA in this situation allows business managers to benefit from a rich picture of events. The supervisory capability can be used to respond to political and market demands to remotely control the system, performing initiation and shutdown events as necessary.

Holistic architecture

At Yokogawa we have always favoured an integrated approach. The developments in globalisation have meant that new norms in control architecture are now upon us. The irony is that a theory developed in a pre World Wide Web era is more relevant today than ever.

Purdue Enterprise Reference Architecture (PERA) is a reference model for enterprise architecture in computer integrated manufacturing. Developed in the nineties, PERA theory led to the modern enterprise control standard known as ANSI/ISA-95.

The ISA-95 standard breaks down control environments into levels of integration. Level zero is defined as the physical process in a plant. Level one consists of intelligent devices such as smart sensing and actuation. Level two brings in control systems DCS and SCADA for supervising, monitoring and controlling the process.

Level three introduces operation systems to manage workflows such as batch, continuous and discrete and maintenance and historian activities.

Level four concludes with Enterprise Resource Planning (ERP) activities such as asset and inventory management as well as shipping and scheduling.

It is evident that modern developments have blurred the lines between these levels. As such, Yokogawa's integrated approach seeks to compliment the robust control of DCS on a plant level, with SCADA as a supervisory umbrella at the hybrid enterprise level.

The future

So what of the future? Only five years ago the forward thinking trend was for real time information and big data. The Internet of things justified the idea of context based events, from alarm notifications to smart diagnostics.

The trend is now moving towards mobile devices, operators in the field are given autonomy whilst maintaining a connection to a centralised system. This can bring together disparate resources such as human capital, in real time, from anywhere in the world.

A field engineer on duty at a reservoir site in the Philippines can seek assistance from an expert in the Gulf of Mexico. Wearing a heads up display such as Google glass, a live feed could be streamed over cellular networks.

A new era of HMI is rolling out through the use of intuitive touch screen tablet devices. Maintenance crews can be notified via satellite ground positioning systems (GPS), of nearby alarms, allowing them to respond immediately, pulling up PDF troubleshooting and data sheets in the process.

All this data is increasingly being stored in the Cloud. Although there are still security concerns for mission critical applications, improvements in data encryption mean that this is fast becoming a viable option.

As we move towards an uncertain but exciting future, one thing remains certain, that change is constant. Human beings are still very much part of the process and will remain so for the foreseeable future. We can only hope that we have as lasting an impact as Homer Simpson.

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