

Stuxnet malware worse than expected, hides injected code on a PLC: all automation control systems at risk!

After the Stuxnet worm, all industrial control systems, PLCs and RTUs with embedded systems now have to be regarded as at risk. So says Walt Sikora of Industrial Defender Inc (ID) – but then he would say that, wouldn't he, as vice president of security solutions at Industrial Defender? However a recent webcast by Sikora presents an excellent outline of the capabilities of the Stuxnet worm as known at present, and gives a timeline presenting the events of the past two months, as evidence for his assertion that "This is a very sophisticated, very scary piece of malware."

In his webcast, first presented on 19 August, Sikora explains that the malware attacks the control system, and can insert itself into the internal communications to the PLC, being dubbed the first rootkit for a PLC device. While the Siemens PCS7 is the target in this instance, the Stuxnet worm is not the result of a bored school-boy prankster - it is described as a sophisticated cyber-war weapon, with a payload targeted at a specific industrial control system. The conclusion is that control systems are to be the targets for future worms: despite any future fast response from Microsoft, Siemens and AV suppliers, their actions can only slam doors shut after an attack has been successful.

Stuxnet time-line

The time-line for this story started over a year ago, when apparently the Stuxnet virus was launched. It was then discovered first June 17 by a Belarus AV development company, VirusBlockAda. July 15 Frank Boldewin, a security researcher, decrypted the worm and found it targeted Siemens WinCC and PCS7 control systems. July 22 Siemens posted a tool to identify and repair systems, followed by similar actions from AV vendors. July 27 ID hosted their first panel discussion in a webcast, hosted in order to disseminate all available knowledge about the worm. Aug 2 Microsoft issued the emergency patch. While Microsoft has acted very

promptly, demonstrating their commitment to support of the industrial control systems sector by issuing an emergency patch for .lnk files on the software systems that they regard as current operating systems, older systems such as Windows 2000, NT, or XP service pack 1/2, are no longer supported, and not included. Plus inevitably it will take time, resources and commitment by operators to test, approve and install this patch on even the new systems where it is needed.



Walt Sikora: "All industrial control systems are at risk today"

control and write values to the control system itself, and that is very very scary. All automation control systems are at risk today." The August 6 posting on the Symantec website by Nicolas Falliere, a senior software engineer, explains that "Stuxnet isn't just a rootkit that hides itself on Windows, but is the first publicly known rootkit that is able to hide injected code located on a PLC."

Beware of sleeping code blocks

Falliere continues with an unattributed example of the effects of these hidden, sleeping code blocks. He explains that by writing code to the PLC, the Stuxnet malware can potentially control or alter how the system operates. A previous historic example includes a reported case of stolen code that impacted a pipeline. Code was secretly 'Trojanized' to function properly, and only some time after installation, instruct the host system to increase the pipeline's pressure beyond its capac-

THEY SAID IT

"All automation control systems are at risk today"

Walt Sikora,
VP Security Solutions,
Industrial Defender
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"We are still examining some of the [Stuxnet] code blocks to determine exactly what they do"

Nicolas Falliere,
Senior Software
Engineer,
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"It's exciting to work with customers as forward-thinking as Statoil"

Steve Sonnenberg,
President,
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"This could lead to trade wars between countries"

Dr Abdulwahab Al-Sadoun,
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INSIDER

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Consultant.

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The Industrial Defender Host Intrusion Prevention System (HIPS) is a whitelist-based technology. Unlike reactive and performance-impacting antivirus solutions that rely on blacklists of known malware, HIPS enforces a relatively small whitelist of the authorized applications for each computer. By ensuring that only approved applications can execute, HIPS is designed to block all unauthorized applications including unknown malware and rogue applications installed by users. HIPS is suitable for securing control systems because it has minimal performance impacts, does not utilize significant bandwidth, and goes beyond simple whitelisting to stop the more sophisticated malware attacks (e.g. rootkits, memory exploits, and zero-day threats). HIPS is also the only application whitelisting product that instantly creates customized whitelists for each control system computer, automatically updates whitelists for new applications / upgrades, and provides centralized management and reporting.

ity. This, [he asserts] resulted in a three kiloton explosion, about 1/5 the size of the Hiroshima bomb. Thus, in addition to cleaning up the Stuxnet malware, administrators with machines infected with Stuxnet need to audit for unexpected code in their PLC devices. Falliere adds “We are still examining some of the code blocks to determine exactly what they do and will have more information soon on how Stuxnet impacts real-world industrial control systems.”

HIPS protection against Stuxnet

In the ID webcast Sikora continues with a demonstration of the Stuxnet, and then goes on to show that the new Industrial Defender HIPS [Host Intrusion Prevention System - see side panel] would stop the Stuxnet worm penetrating a protected system. HIPS is therefore offered as a valid method for in-depth protection of industrial control systems against such malware. This is a part of the ‘Defense in Depth’ strategy promoted by Industrial Defender. HIPS only allows good executables, from a “whitelist” of programmes allowed to run. It uses intrusion prevention and access management, and has no regular scanning issues, such as the scans used by AV software that tie up a computer or system for extended timescales. Sikora claims that HIPS would have prevented the Stuxnet worm accessing the known infected control systems.

Geographic spread of Stuxnet

Separately a white paper on the ID website gives further background, which also shows the major infection levels by the Stuxnet worm. On July 15 Kaspersky Labs in Russia, the AV vendor, reported 5000 compromised machines. By July 23 there were 45,000 infected machines reported, with main concentrations, according to Kaspersky, in India, Indonesia and Iran. The population infected in the USA is not known (as Kaspersky does not have much market penetration there, and other data is not available). Symantec data summarises that the major infections are in SE Asia, and that 48% of hits reported have been on Win-

dows XP SP2 systems, for which there is no official Microsoft emergency patch.

- A recorded version of the Sikora August 19 webcast is available on the Industrial Defender website, presenting his review of the development of current knowledge about the Stuxnet worm, and is recommended viewing!
- Industrial Defender has also announced Compliance Manager, a security process automation and information management system that enables control system managers in the utility, chemical, oil, gas, water and transportation industries to cost-effectively implement and sustain best practices that assure system security, availability

and compliance to corporate and industry security standards.

“Utilities are being overwhelmed by the amount of information, events and tasks that they need to manage as they continue to enhance their critical system security processes”, said Brian M. Ahern, president and ceo of Industrial De-



Brian Ahern - Meeting compliance auditing requirements for cyber-security

fender. “Industrial Defender’s Compliance Manager automates data collection and analysis tasks that would otherwise require extensive manual operations, while providing the tools needed to improve system integrity and meet the extensive compliance auditing requirements of NERC CIP cyber security standards.”

Compliance Manager and the associated Industrial Defender sensor and collector technologies are specifically built to operate with both mission critical automation systems (e.g., SCADA, EMS/DMS, DCS/PCS) and industrial end-point devices without impacting system performance and availability. It automates the collection, retention, analysis and reporting of a comprehensive set of system and security management information. It consolidates and

analyzes device inventories, event logs, system configurations, software/patch status and user accounts, as well as archives of log and configuration files for automation control applications, operating systems, firewalls, network devices and end-point industrial devices.

Workstations now have Achilles certification

Invensys Operations Management (IOM) has announced that Foxboro I/A Series distributed control system operator workstations have passed the Achilles Cyber Security Certification test, performed by Wurdtech Security Technologies. The testing was conducted on the Foxboro I/A Series Model P92 Workstation for Windows hardware and I/A Series AW70 human machine interface (HMI) software for the Microsoft Windows XP operating system, including I/A Series FoxView, FoxAlert, Alarm Manager and System Manager applications.

The I/A Series Model P92 workstations are the first host-based devices (HBD) to achieve this globally recognized benchmark for communications security and robustness and join a long list of certified controller products that have achieved the Achilles Certified designation. As proposed by the ISA99 security standard, an HBD is a general-purpose device running a general-purpose operating system capable of hosting one or more applications or data stores. Examples include HMIs, engineering workstations, historian servers and domain controllers.

Customers demand security

“Our customers demand the utmost in secure process control systems,” said Ernie Rakaczky, IOM security program manager. “The testing conducted using the Achilles Test Suite covers the most common cyber security threats. IOM has also embraced the underlying requirement of a well-established software development lifecycle that incorporates security fundamentally, and has also adopted Achilles Certification as an integral part of our QA strategy.”

Perstorp installs CHARMS on Emerson DeltaV v11

Emerson Process Management will install the latest version 11 of the DeltaV process automation system for Perstorp, the speciality chemicals group, at a processing plant in Sweden. Here the DeltaV will replace and upgrade the existing distributed control system, an Emerson RS3, which was installed in 1984 to control the chemical batch process making pentaerythritol (penta), an additive in paint and lubricants.

Perstorp felt the need to run the plant continuously with high product quality and reduced downtime, to remain competitive in a very tough marketplace. Jörgen Anell, Engineering Manager at Perstorp commented “Having considered a number of alternatives, we felt that Emerson’s DeltaV system provided the advance control and batching features we required, while also helping to minimise process disruption and cost during the migration procedure.” DeltaV version 11 has an ISA88 batch hierarchy, with integrated functions such as easy configuration and scheduling, advanced control and multi-stream formulations, and automatic data collection.

Speed of plant migration critical

For Perstorp, a major factor in the choice was also the speed possible for the plant migration to the new system. DeltaV v11 has I/O on Demand functionality, including ‘Electronic Marshalling’ to help minimise installation time and costly plant downtime during the upgrade. DeltaV Electronic Marshalling, launched last year (*INSIDER* December 2009, page 4) can eliminate up to two-thirds of the wiring and connections needed in conventional marshalling cabinets by removing the need to wire I/O to specific controller I/O cards. Instead, Perstorp will deploy 792 single channel Characterization Modules (CHARMS) to relay 3000 device signal tags to 60 DeltaV S-series I/O modules. The use of this wiring technology, thought to be for the first time in Europe, is expected to reduce downtime during this



After nearly 14 years as Editor and more than 11 as owner and publisher of *Industrial Automation INSIDER*, Andrew Bond is stepping down from both roles and passing over the reins and ownership of the title and its associated website to Nick Denbow. Nick has been taking an increasingly prominent role as Contributing Editor since the beginning of 2010 and now, with effect from the current issue, takes over full responsibility for *INSIDER*'s content and production and for the fulfilment of existing subscriptions, although Andrew will continue to maintain an association with *INSIDER* and provide occasional insight and analysis. Like Andrew a graduate in engineering from Cambridge University, Nick is also a Chartered Engineer and a member of the Institute of Measurement and Control. He brings a broad range of experience to *INSIDER*, including 25 years in technical sales support and marketing in the instrumentation industry and, more recently, spells in technical public relations and as editor of the pioneering *ProcessingTalk* process industry web site. The *INSIDER* website URL and editorial and subscriptions email addresses will remain unchanged.

Abriox has upgraded the lightning protection on its remote corrosion monitoring solutions for oil and gas pipelines, so that they withstand the worst that lightning strike test equipment can provide. This higher protection has been implemented on Abriox's Merlin cathodic protection (CP) monitor, after consultations and then practical tests by Cobham Technical Services. The Merlin CP monitor is one of the most widely-used cathodic protection monitors in the world, thanks to a very high degree of compactness, programmability, and a versatile wireless communications system that operates in all world regions using text-messaging over mobile or satellite phone networks. It is used to monitor pipelines, storage tanks and other buried metal infrastructure used in onshore oil and gas transport networks. Cobham subjected the equipment to increasing levels of lightning strikes. The upgraded protection worked perfectly, and continued to operate successfully beyond its target energy level protection rating corresponding to a 12 kA transient waveform. In the maximum 30 kA-rated final test step, the strike energy destroyed the front-end protection circuitry, but the Merlin monitor itself survived and continued to function.

"With Cobham's help, we now know exactly what our lightning protection system is capable of" said Jason Hanlon of Abriox.

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upgrade by two days, helping to reduce lost production. The migration procedure will be performed by the Perstorp engineering team and is expected to take two weeks to complete.

"Emerson is extremely pleased to be able to further its excellent relationship with Perstorp by providing the latest version of the DeltaV digital automation system," said Bob Sharp, president, Emerson Process Management - Europe. "Minimizing plant downtime is critical for projects such as Perstorp's, and DeltaV Electronic Marshalling will play a significant role in ensuring a quick and smooth migration process."



*Bob Sharp:
Minimizing plant
downtime is critical*

- In Norway, Emerson Process Management is one of three suppliers chosen for a long-term frame agreement with Statoil that positions Emerson to bid on future automation and safety systems for the international oil and gas producer.

The agreement supports Statoil's strategy of using innovative technologies to solve the energy needs of the future, including making the most of emerging opportunities in shale gas, heavy oil, and deep-water production, as well as in further development of the Norwegian continental shelf. Emerson's integrated safety and automation system - which includes the DeltaV digital automation system and DeltaV SIS process safety system - will help Statoil maximise production, while reducing operating costs and minimising safety and environmental risks.

Smart Wireless offshore

Statoil and Emerson recently collaborated to apply Emerson's smart wireless technology on two offshore platforms. Such trials have shown that wireless measurement networks offer significant cost and weight savings in these applications.

"It's exciting to work with customers as forward-thinking as Statoil," said Steve

Sonnenberg, president of Emerson Process Management. "We expect this new agreement to strengthen our existing relationship - and open the door to new opportunities for improved results."

The five-year frame agreement covers process safety and automation systems, including engineering services, for new capital projects, as well as upgrades to existing facilities. Emerson control valves, measurement instruments, asset management solutions, and related services will help Statoil optimise its operations.

Hima-Sella partners with HIMA through to 2013

Stockport-based systems integration specialist Hima-Sella has renewed its partnership with the leading German independent designer of automated safety solutions, HIMA Paul Hildebrandt GmbH + Co KG, for a further three years, up to summer 2013.

First appointed exclusive UK & Ireland agent for the HIMA range of safety systems in 1983,



*Ian Wright:
"The industry's proven,
most reliable safety
systems"*

Hima-Sella has always enjoyed a close working relationship with HIMA, the European market leader in safety-related process automation. Since the management buy-in to Hima-Sella in 2007 by Ian Wright, Eddy Turnock and John Blackwell, all coming from Transmitton, the

relationship between the two firms has flourished. Previous to his md role at Transmitton, Ian Wright was md of Fisher-Rosemount in the UK.

Using HIMA's intelligent control technology, Hima-Sella offers flexible solutions, in programmable and non-programmable formats, providing protection up to

SIL3, to its UK process industry customers. Hima-Sella launched the HIMax programmable electronic system in the UK in 2008, and in September 2009 successfully installed the first HIMax system for a major refinery in the UK.

Hima-Sella managing director Ian Wright commented: "We're delighted to have renewed our partnership with HIMA. We both value integrity and expertise and share an uncompromising focus on personnel and plant safety. Growing our business in the UK depends on us having the industry's proven, most reliable safety systems, backed by the quality of support that HIMA offers all its international partners. With two new offices opening in the East Midlands and in Scotland this summer Hima-Sella is in a very strong position to move forward as planned."

Show-piece UK dairy processing installation

Siemens and Tetra Pak CPS have supplied a major part of the plant and automation control systems for a modern teaching dairy at Reaseheath College in Cheshire, one of the UK's premier agricultural training establishments. Tetra Pak CPS now describe this new facility as a show-case for the complete range of CPS state-of-the-art automated dairy processing plant. The CPS business was started in 1885 by the Gate family, which became Unigate, and then changed its name to Wincanton Engineering, still specialising in the engineering and control of plant and processes for the dairy, food and beverage industry: it moved to the present 3 acre complex in Sherborne, Dorset, UK in 1998. Acquired by Carlisle in 2001, the name changed to Carlisle Process Systems (CPS): after 5 years another acquisition led to a new name: Tetra Pak Cheese and Powder Systems – a name that failed to describe the major milk and dairy business activities, but retained the CPS brand, widely known for dairy process equipment. So now it is just called Tetra Pak CPS.

The new facilities include a highly automated raw milk offloading, storage and

distribution system, a low throughput milk separation plant and a flexible mix, pasteurisation and ageing/incubation plant for processing various milk products including yoghurt, custard and ice cream. Tetra Pak CPS involvement included the design and build of processing plant and specialist application, engineering and servicing advice, all linked by conscientious project management.

Sales Manager for Tetra Pak CPS

Tony Casey commented: "Our knowledge and expertise has been the foundation of this development and we have not only supported the college with guidance, materials for the build, educational tools and maintenance and equipment training but have also strengthened our relationships and position within the dairy manufacturing sector."

Siemens PLCs, HMIs and drives

Siemens Industrial Automation also made a substantial donation to help the college, through the Siemens Cooperates with Education programme (SCE). The SCE programme allows educational establishments to purchase Siemens equipment at significantly reduced prices, so that students can gain hands on experience and get to grips with control and process instrumentation equipment. In the case of Reaseheath College, the project was being operated on such a large scale that the SCE team worked with Siemens industry sector experts in food and beverage, to ensure that the equipment was provided and installed seamlessly: it included the supply of the required control equipment such as PLCs, HMIs and standard drives.

Jim Dyke, for Siemens commented: "Our in-depth expertise and experience in providing process control solutions across



*Tony Casey:
"Our knowledge and expertise has been the foundation of this development"*

Omniflex provide site-wide alarm management systems in accordance with the requirements of IEC61508 and EEMUA 191 standards, through subsidiaries and distributors worldwide. All safety critical alarm monitoring systems require SIL rated alarms to be hard-wired, either using copper or fibre-optic cables. Manufactured in South Africa, the fibre-optic systems from Omniflex provide conditioning of the front-end process signal through SIL rated trip amplifiers, and transmit the alarms via SIL2 rated fibre-optic transmitters/receivers and fibre-optic cable, into SIL rated alarm annunciators and sub 1 millisecond sequence of event recorders. Omniterm fibre optic transmitter/receiver modules (FCT & FCR) provide the ability to send a digital contact signal up to 4km over a single optical fibre. Fail safety is a key feature in the design of these modules and care has been taken to ensure the highest level of reliability: the FCT and FCR modules have a probability of failure on demand suitable for SIL2 applications, and are ideal for areas of high electrical interference, critical failsafe alarms and safety interlock systems. Previously known as Conlog, the company has engineering and sales subsidiaries and distributors worldwide.

PureBallast, the control and purification system for marine ballast water discharge, has been supplied to over 30 vessels in the last year by Alfa Laval. One of their most prestigious orders is for two systems for the Royal Australian Navy, which confirms PureBallast is fully capable of meeting the strict requirements of naval applications. These systems will be fitted aboard the Australian LHD (Landing Helicopter Dock) vessels to be built by Spanish shipyard Navantia Ferrol. Vessels of this type are of strategic interest as nations shift their military focus from territorial defence to international response and peacekeeping operations. Each PureBallast system will have a treatment system flow of 250m³/h. Since naval vessels are exempted from the IMO's pending ballast water treatment requirements, the decision by the Royal Australian Navy to install ballast water treatment and control systems is a voluntary one. It was made in part to protect Australia's sensitive coastal environment, which has already been threatened by the invasion of non-native organisms in ballast water. For more info on this please see the stories on www.iainsider.com. Among other recent PureBallast orders is one for a system from Samsung Heavy Industries for the drilling vessel Stena DrillMAXICE.

the food and beverage industry meant we could add value to this enterprise and ensure the appropriate control equipment was made available for Reaseheath.”

- In New Zealand, GEA Process Engineering has won a fifth order in three years for the delivery of a full milk processing plant in a new greenfield operation to meet the growing international demand for milk powder products. Worth more than Euro20m, the new Miraka Ltd operation will be located near the town of Taupo and will have a full processing line, including a milk reception area, standardizing, evaporator, spray drying facility and powder storage bins. The plant will have the capacity to process in excess of 1 million litres of milk a day and will be engineered with state-of-the-art technology according to best practice benchmarks within the milk processing industry. Energy used in the milk-drying process is delivered by the nearby Tuaropaki geothermal power station. In addition, up to 60 GJ per day of waste heat from the process will be recycled to further improve the energy efficiency of the plant.

Pharma Suite 2.1 offers electronic batch records

FactoryTalk Pharma Suite applications now incorporate electronic batch recording (EBR) capabilities, being tailored to meet the needs of pharmaceutical and biotech manufacturers. The new EBR capability is said to enable users to address exceptions and process deviations in real-time, reducing wasted time, money and materials.

Rockwell Automation presented these new capabilities at the 11th Annual International Life Sciences Symposium in Montpellier, France. The event brought together senior managers from the world's top 50 pharmaceutical companies and gave them an opportunity to network, share best practices and learn more about the latest industry trends.

With the new software, exceptions during batch recording can be reviewed and

addressed in real-time, not after the fact, as is typical for paper-based or “paper-on-glass” workflows. The exception handling during the EBR execution occurs during the manufacturing process, allowing the operator on the shop floor to address exceptions as the manufacturing rules are enforced in real-time, hence reducing wasted time, money and materials.

New usability capabilities also allow quality personnel to start investigating process deviations as they occur on the shop floor, rather than waiting for batch completion. Collected exceptions are the starting point for the batch review process. The online batch record review capability allows more efficient judgement of the documented deviations, closing out the review process more quickly and with fewer process deviations.

Faster throughput of batches

Because the new EBR capability reduces the amount of time spent on batch review after completion, the finished products spend less time warehoused waiting for release. This reduces inventory costs, increases turnover and allows the product to spend more time in the distribution channel before its shelf life expires.

All quality-related processing information is compiled in a holistic batch record based on the ISA S88 standard. Pharma Suite also provides the capability to render batch record information in different publishing formats like PDFs, HTML, XML and classic paper-based reports.



*Martin Dittmer:
Breaking “the old
‘paper-on-glass’
paradigm”*

“Pharma Suite 2.1 is the next logical step to break the old ‘paper-on-glass’ paradigm,” said Martin Dittmer, FactoryTalk Pharma Suite product manager, Rockwell Automation. “For years, EBR has been interpreted as putting the old paper system behind computer

screens; however, computer-based systems are capable of much more. Pharma Suite continues to incorporate new and exciting capabilities to assist our customers in accelerating their innovation and shortening time to market. Pharma Suite is optimized to help users maximize their productivity at each step of the recipe lifecycle from recipe design to execution, review and approval.”

Recipes modelled graphically

Typically, recipes are modelled graphically and aligned with the ISA S88 standard. Visual tools and intelligent search mechanisms help ensure that all information required for recipe design can be accessed quickly and easily. Recipes are assembled from reusable parameterized building blocks that represent standard functions such as adding material to a process or checking equipment against requirements. The re-use of pre-configured building blocks allows accelerated recipe design, reduced errors and quicker validation, resulting in faster deployment.

Burkert expand into systems engineering

The Burkert Group have acquired BBS Systems AG of Switzerland, a developer and supplier of products and process engineering for hygienic applications in the biopharma, food and dairy business area. BBS Systems was formed in 1993 from the combination of Hematech, founded by Heinz Bolli in 1985, and Wyss Werkzeugbau, founded by Markus Wyss in 1982.

Greenfield Scottish plant

Burkert have shown off their systems capability in a recently completed project on a new plant and wastewater treatment facility for Mersen in Holytown, Scotland, a manufacturer of carbon-based thermal insulation materials. The plant incorporates many Burkert level and flow measurement instruments, plus their 8644 Airline Process Actuation Control System. This integrates with the Allen Bradley

plc used for plant overall control, actuating the Burkert butterfly and T-ported ball valves, plus other valves: an approach quoted to save up to 40% on total system costs through engineering efficiencies. The Type 8644 provides a remote field I/O network which is compact, and not exclusive to any specific communication protocol. It is said to combine digital I/O, including a full complement of solenoid pilot valve outputs, analogue I/O and fieldbus connectivity into a single node.



*Neil Saunders:
Flow and level
quote led to full
project contract!*

“What this project highlights is our unique ability to cover the complete control loop in process applications,” said Neil Saunders, Burkert UK & Ireland Sales Manager: “Our current product range extends from solenoid valves to process and analytical valves, mass flow controllers, pneumatic actuators, and one of the widest ranges of sensors for process applications. In this project we have taken a broad cross section of these products and integrated them to provide a complete control solution – including system design, panel building and commissioning – from a single source, and one that exactly meets our customer’s needs.”

Total project value was not specified, but this was not a bad result, based on an original request to quote for some level and flow transmitters!

PIMS designed for UK pharmaceutical plant

Industrial Technology Systems (ITS) has been awarded a project to implement a Plant Information Management System (PIMS) at the Brunner Mond Northwich site, in Cheshire, UK, a business originally part of the ICI Group. Brunner Mond is a supplier of Sodium Bicarbonate EP/

Alfa Laval has announced a \$700m offer for Swedish company Munters AB, a manufacturer of energy efficient solutions for air treatment, based on expertise within humidity and climate control technologies. Munters has 2100 employees, and will add 15% to the overall Alfa Laval group turnover

Pfautler has extended its portfolio of pH probes made in their ‘Glassteel’ material, a type of high quality silicate glass, to include a new ring-shaped sensor range that can be installed in between two flanges, directly into the sides of the pipeline. Easy to install in any orientation, the new probe requires no nozzle or special process port, making it suitable for glass-lined and non-glass lined systems. The sensor is extremely resistant to acid and pressure, it is self-cleaning and very low on maintenance. With no flow obstruction in the line, Pfautler ring-shaped probes are ideal for highly viscous products and suspensions with high solids content. Pfautler also produce temperature, liquid level and pH sensors coated in the Glassteel material for use in glass lined systems.

The Technology Strategy Board in the UK is to run a competition to fund the development and commercialization of innovative processes that will generate high value chemicals through industrial biotechnology. Up to £2.5 million will be invested and the Board is inviting applications for both feasibility and collaborative research and development projects. Projects should look at how industrial biotechnology can be competitively applied to the production of high value chemicals. All applicants must show how their project will make an overall positive contribution in terms of economic, environmental and social impacts, taking into account the full product lifecycle. The competition opens on 12 October 2010. Proposals for collaborative R&D projects should be business-led and include an end-user. Proposals for feasibility projects may be from business-led consortia or single companies.

USP to the pharmaceutical industry. The company therefore needed a reliable, robust Management Information System to link to their Emerson DeltaV process automation system, and replace the current Prism information system.

Proven Prism/Questar replacement

The ITS Fusion PIMS product was the recommended solution, as a proven Prism/Questar replacement. Fusion PIMS is a zero footprint, web-based reporting and data entry tool with an optional calculation engine for producing process accounting data, based on an AspenTech InfoPlus.21 database. It was specifically designed for companies with locked down desktops, and is ideal for the regulated industries.

Fusion provides a single repository for all operational data. Its flexible and simple interface enables users to configure screens easily and efficiently, and to identify faults quickly. Integrated with an InfoPlus.21 database, Fusion enables users to manage weekly, monthly or periodic operating reports, process loss accounting, batch information etc. Many types of data can be automatically retrieved from plant equipment, DCS systems, PLCs, or other databases, reducing the need for manual collection of data.

Malcolm Knott, md at Industrial Technology Systems, commented: "Our in depth knowledge of the AspenTech suite of products, the pharmaceutical industry, and system validation, made ITS an ideal candidate for the implementation of this project."

Smart Grid management software market to grow

The electric power Smart Grid operations management software and services market will grow by greater than 65% over the next five years, advises ARC Advisory Group, developing their recent comments on the electric power SCADA market growth, particularly in India, China and the Middle East (*INSIDER* August 2010 page 3). This substantial growth, equivalent to a compound annual growth rate

(CAGR) of 11.1%, will result from a wave of new technology and worldwide infrastructure spending driven by sovereign investment programs. Such programs will be heavily focused on technology to improve grid reliability, efficiency, and information management capabilities. Smart grid operations management software is a critical element in the development of more efficient and reliable electric grids.

Major markets in USA, India and China

The United States, China, and India are the countries currently allocating the greatest amount of public capital to grid expansion and improvement initiatives. "The concurrent deployment of the \$8B in US smart grid investment, \$180B in Chinese grid investment, and \$10B for the Indian R-APDRP program is serving as the catalyst for exceptional growth in this technology-driven market," according to Clint Reiser, Enterprise Software Analyst, and the principal author of ARC's "Smart Grid Operations Management Software & Services Worldwide Outlook". The growth is also being supported by expansion projects in emerging markets such as the Middle East and Latin America.

Transmission and substation automation

In the USA, software vendors anticipate growth to occur in transmission and substation automation technology, but see the greatest growth expected with spending on distribution technology to enhance network control, efficiency, reliability, and power quality. In particular, vendors have noted that utilities have shown interest in new distribution management system and outage management system applications.

In China, ARC believes that smart grid operations management software and other intelligent grid elements will account for an increasing percentage of total spending as the current shift in focus toward grid modernization continues: a number of foreign technology and service providers have already established a presence in China in anticipation of the growth opportunities. In India, 87 communities have been designated as eligible for SCADA and distribution management systems under their restructured APDRP program.

Petrochemicals and wind power suffer with tariffs

Protectionist tariffs are threatening the Gulf petrochemical industry, where recent multi-billion dollar investments in chemical plants have been based on target markets in Asia, comments Dr Abdulwahab Al-Sadoun, the secretary general of the Gulf Petrochemicals and Chemicals Association. He explains that Gulf exporters are battling a 21% anti-dumping tariff on Chinese imports from the Gulf on methanol, a basic building block of the chemical industry, in place since last summer, and face new plastics tariffs proposed in India. "The drive behind it is of course the recession and politicians who are trying to safeguard lost job opportunities," said Al-Sadoun.

China buys more than 55 per cent of Gulf petrochemical exports, and the market was expected to continue to be the global centre of demand growth. The tariffs imposed by India and China are based on the fact that GCC producers have some of the lowest production costs in the world, because they buy oil or natural gas from their governments at prices set far below international market rates. This was the basis on which the Gulf has built its chemicals industry. "This could lead to trade wars between countries, I don't see a winner in this war, everyone will be losing", continued Al-Sadoun.

Wind turbine protectionism

The problem is not just about basic chemicals: look at the so-called emerging high tech products - like wind turbines. China, Germany, Spain, UK and the US vie with others to reap economic and environmental benefits of domestic green-energy sources while positioning themselves as market leaders in providing those technologies to export to the world. Like the

UK, China intends to meet 20 percent of its energy needs from renewable energy sources by 2020.

Last year US public criticism succeeded in preventing taxpayer stimulus funds being used to buy 240 Chinese-made turbines for a new wind farm in west Texas. The world's pursuit of low-carbon sources of energy collided with the national need to create jobs: in the end, the public demanded that turbines be produced in the US, not China.

Local production centres

Probably to spread their green investments geographically, ABB has just announced its fourth global wind power generator factory, in Vadodara, India. The factory is intended to supply wind power generators, a crucial component in wind turbines, for the growing Indian and global markets. The new factory, employing 150 people, will produce up to 100 units per month with a rating of up to 2.5 megawatts.

Europe also has high renewable energy ambitions. Germany already gets 16 percent of its electricity from renewable sources such as solar and wind. A new McKinsey & Co. study concludes that "By 2050, Europe could achieve an economy-wide reduction of [greenhouse gas] emissions of at least 80 percent compared to 1990 levels." McKinsey expects the cost of energy per unit of GDP in 2050 could actually be reduced by 30 percent in Europe, boosting competitiveness. Production of renewable technology could create tens of thousands of new jobs.

Photo-voltaic panels for solar power stations

In 2008, China also emerged as the largest producer of solar panels in the world, accounting for roughly one-third of total solar shipments. Beijing hopes to increase domestic generation of electricity from solar panels from 3GW in 2010 to 20GW by 2020. But so far growth in Chinese production of solar panels has outstripped the growth of the installed solar capacity in China. The vast majority of solar panels

Short-lived spikes in demand on the UK national grid are common after major televised sporting events, during TV commercial breaks and in the morning hours. Energy companies typically use gas-fired turbines to feed these peaks, which are notoriously inefficient, expensive to run and sit idle for long periods of time.

The University of Leeds, in co-operation with the Chinese Academy of Sciences, are proposing a more environmentally friendly system that could halve the amount of fuel needed to meet this demand.

Crucially, the system would store excess energy made by a plant supplying the 'base' demand and use this store to supply the 'peaks' in demand - as and when they happen.

The key idea is to use excess electricity to produce liquid nitrogen and oxygen.

At times of peak demand, the nitrogen would be boiled - using heat from the environment and waste heat from the power plant, and used to drive a turbine. Meanwhile, the oxygen would be mixed with natural gas fuel and burned: this makes the combustion process more efficient, and a concentrated stream of carbon dioxide is produced as the flue gas, that can be relatively easily trapped and retained in solid form, as dry ice.



Al-Sadoun: - Multi-billion dollar investments in chemical plants

Designed and manufactured by quietrevolution in the UK, the QR5 wind turbine for urban environments is a vertical axis helical wind turbine designed to harness wind energy in environments near people and buildings, where changes in wind speed and direction can be rapid and unpredictable. To overcome these problems, the designers approached ABB at an early stage in the development, for advice and guidance on an electrical solution. This involved a standard industrial regenerative drive using ABB Direct Torque Control technology, generating the maximum amount of energy at all times, even in rapidly changing wind speeds. The simple communications protocols of the drive provide a cost effective way for quietrevolution to control and report on the performance of the system via a web interface. The turbine is five meters high and three meters in diameter, virtually silent and vibration-free, and can produce up to 7,500 kilowatt-hours of electric power a year, enough to meet the electricity requirements for an office of 10 people. The QR5 is only five meters high and three meters in diameter.

produced in China are exported. Between 2007 and 2008, for example, the value of Chinese exports of solar panels to Europe more than doubled. Sales to the US in 2009 were two-thirds higher than the previous year.

As nations vie for global leadership in the wind, solar and other renewable energy fields, trade disputes are inevitable. In August 2009, two major German solar-technology firms filed a complaint with both the German government and the EU about government subsidies allegedly given to Chinese competitors.

Optimism about larger plants

IMS Research advises a degree of optimism from First Solar: the thin film supplier recently announced that it planned to construct 500-700 MW of systems in 2011 and boasted a 'captive pipeline' of utility-scale business that would buffer any fluctuations in demand. Following its acquisition of project developer NextLight, First Solar plans to begin the construction of a massive 290 MW power plant before the end of 2010 and install modules there throughout 2011. Possibly they have been in discussions with another power plant equipment supplier for this project?

- ABB reports it has won an order worth \$50m from Actelios SpA in Italy to supply three photovoltaic (PV) solar power plants in western Sicily with a total power capacity of over 13MW. "Renewable energies like solar play an increasingly important role in adding power capacity with minimal environmental impact, and ABB has a significant technology portfolio to harness and integrate these energies into the grid," said Peter Leupp, head of ABB's Power Systems division.



*Peter Leupp:
"Renewable energies like solar play an increasingly important role"*

Harting challenges Chinese copies in Court

Patent infringements and plagiarism are often quoted to represent major problems in China, especially for the manufacturers of branded consumer products. Recently the Harting Technology Group took resolute action against a Chinese company that had copied some of its electrical connector products, despite these being covered by Chinese registered patents. With a particularly strong position in Asian markets, Harting has filed patents in China since the beginning of the nineties, although their actual enforceability has been doubtful to date.

Following in-depth investigations, Harting took recourse to the Shanghai Second Intermediate Court and initiated legal proceedings for damages and an injunction over the patent infringements. After proceedings of only four months the Shanghai court passed a judgment confirming the patent infringement and sentencing the respective manufacturer to discontinue the production and sales of the counterfeit products, as well as imposing the payment of damages.

This court judgment is an important positive signal – not only for Harting, but for other suppliers of patented technology to China – as it issues a warning to current and future patent infringers. It also demonstrates that properly protected intellectual property will be protected by the Courts in China. Congratulations to Harting for taking such resolute action, and achieving a landmark victory!

Rota launches third generation Coriolis

Rota Yokogawa, the European-based flow centre of excellence for Yokogawa, celebrates its 100th anniversary this year. At the same time, the Rotamass Coriolis mass flowmeter enters its third generation, with an improved specification for density accuracy of $\pm 0.0005 \text{ g/cm}^3$, which is quoted as achieved and substantiated by a density calibration procedure using three dif-

ferent liquids, and tests at different temperatures. This results in accurate density measurement over a wide operating temperature range, up to 350°C, putting this Rotamass unit on the same specification as the Micro Motion Elite high temperature Coriolis meter from Emerson.

One of the indirect benefits of accurate density measurement is more accurate concentration measurement of mixtures and solutions, such as oil and water mixes or sugar solutions. The corresponding concentration values are displayed by the Rotamass unit as a percentage, or in °API, °Brix or °Baume units, and can be integrated into the process control system via analogue or digital signals.

Traditionally the mass flow output from Coriolis meters responds in a highly sensitive manner to gas bubbles in liquids. Yokogawa Rota claims that this Rotamass has a special sensor design which can tolerate a relatively high proportion of gas in the medium. Diagnostic functions also enable the detection of gas bubbles contained in the liquid, so that an appropriate response can be initiated.

UK Robots grow in Food and Pharmaceuticals

BARA, the British Automation and Robotics Association, reports that in the first two quarters of 2010 UK robot sales have grown substantially, by 55% on 2009 figures, the first growth since 2006.

Significantly, there have been major changes in the sectors buying robots and the application areas. In 2010, compared to 2006, sales of robots to automotive component suppliers showed a large fall (66%) also reflected in sales of robots for arc welding applications (down by 82%). There are two large



Mike Wilson: "The UK's robot sales are still well behind other countries,"

growth areas: food and drink (a 172% growth since 2006); and pharmaceutical, medical and healthcare (194% growth since 2006). These are now the major sectors for robot applications in the UK.

Although the figures have injected some optimism into the industry, Mike Wilson, President of BARA, has one note of caution: "The growth both overall and in the newer sectors is very encouraging, but the UK's robot sales are still well behind other countries, who are also achieving significant growth rates in 2010."

PACMotion 1.5 controls up to 40 axes of motion

GE Intelligent Platforms have announced the latest version of the PACMotion advanced motion controller, with firmware version 1.5. PACMotion is designed to control up to 40 axes of synchronized motion all at the exact same servo update loop rate of 1ms, independent of the number of motion axes. PACMotion is designed for use in packaging, material handling, and automated assembly.

Firmware version 1.5 features two axis analog servo control allowing control of one or two third-party amplifiers using a 10 VDC analog speed or torque command. A PACMotion module controls four axes, and each module can use two of those axes for third-party servos through this upgrade. Mixing of FANUC and analog axes on the same PACMotion module is also supported.

"This new version will allow users to connect a much broader range of devices to the exceptional functionality of PACMotion," said Paul Derstine, Product Manager for GE Intelligent Platforms' Control and Communications Systems. "There are times when a custom motor, linear actuator or linear hydraulic servo valve is required in an application. At other times in a machine retrofit, the servos are already in place and do not need to be replaced. This new firmware will open options for PACMotion to be used in many different areas to control machines enabling cost saving for the OEM on new machines by using lower cost servos and

Already this year, instrumentation specialist Quantitech has supplied hydrogen specific gas monitors from H2scan of the USA for use at 14 different back-up power facilities in the UK that utilize lead acid battery supported uninterruptible power supply (UPS) systems.

These are often preferred to diesel generators, to eliminate the use of fossil fuels and any associated exhaust related issues. However, if there is any damage or leakage, such battery systems have the potential to emit hydrogen, a dangerous and flammable gas.

The Hy-Alerta 600 version of the H2scan monitoring technology provides hydrogen-specific leak detection and measurement of hydrogen concentrations from 4000 ppm up to 5% by volume, even in mixtures of other gases.

The monitor has no cross sensitivity to other combustible gases, eliminating false alarms. Keith Golding, Managing Director at Quantitech, commented:

"UPS systems are becoming more common in applications stretching from shopping centres to factory and process control rooms, including data centres and computer rooms, so we are delighted that reliable hydrogen specific technology is now available to monitor at the LEL (Lower Explosive Limit), to provide an alarm in the event of a leak."

Industrial Automation INSIDER

Editor
Nick Denbow,
7, Carisbrooke Close,
Aldersford,
Hants, SO24 9PQ, UK.
Tel +44 (0)1962 734824
Email editorial@iainsider.com
Websites:
www.iainsider.co.uk
www.iainsider.com

Editorial Consultant
Andrew Bond,
Vine House,
Church Road,
Harrietsham,
Maidstone,
Kent, ME17 1HJ, UK.
Tel +44 (0)1622 858251
Email editorial@iainsider.co.uk

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Aldersford,
Hants, SO24 9PQ, UK.
Tel +44 (0)1962 734824
Email
subscriptions@iainsider.co.uk

on field retrofits by enabling the reuse of existing servos.”

Several enhancements to PACMotion’s powerful cam functionality allow for tighter synchronization of axes. The Cam Load-Data feature allows exact positioning of all slave axes relative to the current position of the master prior to machine start-up rather than having to ramp slave axes to synchronize with the master. Ensuring precise synchronization can reduce product scrap at the beginning of a production run improving production yield. The new Cam Exit Distance feature enhances the flexibility of the cam feature by allowing for controlled exiting of a cam profile at a predetermined master position along the profile path. Exiting a cam before the end of the profile provides greater dynamic control flexibility to respond to machine or line events such as a jam or product changeover preventing additional product loss of production down time.

Evaluation kit offers machine vision testing

Scorpion Vision have launched a new entry level machine vision kit for those who are curious about machine vision, and who believe they may be able to use such a system in their manufacturing environment, but don’t have the confidence to invest significant amounts of money into such a venture.

The starter kit, which includes everything needed to build a system (just supply a PC) costs £830, or 995 Euros. “This kind of automation solution is achievable on a limited budget” said Wilson. The Unibrain Scorpion Starter kit contains a full suite of vision tools that will enable the user to automatically identify objects, read bar codes, write scripts, find angles and lines, measure edges and identify colours. No programming is required and users can expect to have a camera connected and the software identifying and measuring within 30 minutes.

Industrial Process Control market recovers

The IMS Research quarterly market tracker of Industrial PC sales shows that in Q2/2010, the EMEA and Americas revenues were up 28% and 40% respectively year-on-year; in Asia they were up over 60%.

After the downturn of the end of 2008 and early 2009, the market continues to

recover in 2010. Growth in the second quarter of 2010 is greater than in the first, showing the recovery has strengthened into the middle part of the year, as machine-builder and industrial end-user confidence has increased.

Leading IPC suppliers believe that sales in Q3/10 and Q4/10 are likely to remain strong, although growth will probably stabilise towards the end of the year. An associated research report forecasts world IPC revenues in 2010 will be 12% up on 2009, with Asia leading the way at 20% growth: but the total market is not expected to exceed the 2008 levels until 2012.

OSHA is to increase enforcement presence

In the USA, The Department of Labor has published the testimony given to a US Senate Committee by Jordan Barab, deputy assistant secretary for the Occupational Safety and Health Administration (OSHA) this Summer. Barab summarised that in the past four months alone, at least 58 US workers had died in explosions, fires and collapses at refineries, coal mines, an oil drilling rig and a power plant construction site. In the last five years 20 serious incidents occurred in refineries. Each incident repeated a lesson that should already have been learned by the industry. Essential safety lessons are not being communicated .

OSHA, in the wake of the disastrous chemical release in Bhopal, India, and several other significant chemical accidents, issued its Process Safety Management of Highly Hazardous Chemicals standard nearly 20 years ago. This standard has not prevented OSHA seeing similar violations in too many of the refineries they inspect.

Where does OSHA go from here? Efforts will include both a strong and credible enforcement presence. Barab closed with a plea to the Senate to pass the Protecting America’s Workers Act (PAWA): “Finally, we need to pass the PAWA, which would significantly increase OSHA’s ability to protect workers, and specifically workers in refineries and chemical plants.” He continued “Workers need to feel that they are protected when reporting these events [close calls and near misses] and exercising other health and safety rights. The enhanced whistleblower protections that are included in PAWA would go far toward ensuring that workers are protected for speaking out.”