WNI

PT

WHAT'S NEW IN PROCESS TECHNOLOGY
AUTOMATION + CONTROL + INSTRUMENTATION

GateManager
secomea

SiteManager
secomea

ACIconnect

AUTOMATION | CONTROL | INSTRUMENTATION

OPTIMISING YOUR INDUSTRY

12-13 AUGUST 2015 | Hall 5, Southee Complex, Sydney Showground

Australia's dedicated Automation + Control + Instrumentation conference and exhibition

CONFERENCE HIGHLIGHTS

Keynotes:

Transforming Australian manufacturing — it's all about the customer
John McGuire, Global Industry Director, Aurecon

Smarter analytics — predictive asset optimisation and your industry
Joanna Batstone, VP and Lab Director, IBM Research-Australia + CTO, IBM ANZ

IoT and Industry — perfect match or perfect storm?
Michael Freyny, Executive General Manager - Digital Factory/Process Industries and Drives, Siemens

Future Networks Forum:

What does the future hold for industrial communications in the era of IoT, big data, cybersecurity and the cloud? Featuring experts from:

- PROFINET & Profibus Australia
- EtherCAT Technology Group
- FieldComm Group
- ODVA

Engineers Australia - FutureTech Forum:

A series of technical presentations from EA members on key topics including Process Safety | Risk Management | Asset Management | Data Analytics

Tech MiniLabs:

- Lightning and surge protection
- Process control loop tuning
- PLC ladder logic
- Troubleshooting Industrial Ethernet networks
- Nuts and bolts of AS/NZS 3000 wiring standards
- Troubleshooting Modbus protocol messages
- Investment planning and considerations for ACI projects
- Intrinsic safety considerations for ACI operations
- Harnessing IoT

EARN VALUABLE CPD HOURS
Full conference attendance worth up to **10.5 hours**

Exhibiting Sponsors

Platinum

SIEMENS

Gold

Weidmüller · AMS Looking Forward · VEGA

Silver

TURCK Industrial Automation · Schneider Electric · DAANET Control Information Connectivity · pilz · PENTAIR · ADVANTECH Enabling an Intelligent Planet

Exhibitors

ifm efector · ADM · MEP instruments · +GF+ · KabEx · SCOTT · DELTA · PROCON ELECTRONICS

Association Partners

IICA Institute of Instrumentation Control and Automation · ENGINEERS AUSTRALIA · PI · EtherCAT Technology Group · FieldComm Group · ODVA · IChemE ·

Training Partner

IDC TECHNOLOGIES

Media Partner

WNIPT www.processonline.com.au

0615

**WHAT'S NEW IN
PROCESS TECHNOLOGY
JUNE 2015**

CONTENTS

INDUSTRIAL WIRELESS NETWORKS –

COMPARING THE STANDARDS

PART 1 *Glenn Johnson, Editor*

Today wireless instrumentation is becoming more commonplace in process plants and is a more specialised implementation of wireless sensor network (WSN) technology. In this two-part article we look at the predominant industrial wireless standards.

Wireless sensor networks (WSNs) are a relatively new technology and can be defined as a collection of distributed sensor devices, communicating wirelessly, which can be used to measure and monitor physical or environmental phenomena such as temperature, pressure, corrosion, vibration, noise and environmental emissions.

History

The development of standards for WSNs began in the 1990s, when the Institute of Electrical and Electronics Engineers (IEEE) began work on a specification for low-rate wireless personal area networks (LR-WPANs). This work was finalised in 2003, when the IEEE 802.15.4 specification[1] was released, defining the physical layer (PHY) and medium access control layer (MAC) for LR-WPANs. The specification offers low power consumption, low complexity and low cost. With a growing number of systems based on the IEEE 802.15.4 appearing since its release, it has become the de facto standard for WSNs.

The ZigBee specification[2] released in 2004 was the first full standard to appear based on IEEE 802.15.4 and defined the Network Layer and Application Layer on top of the IEEE 802.15.4 PHY and MAC layers.

A newer version of the standard was released in 2006 - IEEE 802.15.4-2006 - which addressed shortcomings in relation to information security and some bugs in the original. The ZigBee Alliance released a new version of the ZigBee standard, ZigBee-2006, which included scalability improvements but was still based on the original IEEE 802.15.4-2003 standard, and therefore the security issues had not been addressed.

In 2007, the HART Communication Foundation (now known as the FieldComm Group after its merger with the Fieldbus Foundation) released the HART Field Communication Protocol Specification, Revision 7.0[3], which included a definition of a wireless interface to field devices, referred to as WirelessHART - the first specification to be released specifically designed for process automation applications. WirelessHART offers a viable wireless alternative for the traditionally wired industrial field instrumentation by providing the ability to create self-healing and self-configuring multihop mesh networks. WirelessHART was approved by the IEC as IEC 62591 Ed. 1.0 for wireless communication in process automation[4] in March 2010.

Parallel to the development of WirelessHART, the International Society of Automation (ISA) initiated work on its own set of standards for wireless systems for industrial automation. The ISA100.11a standard was ratified in September 2009[5]. Like WirelessHART, ISA100.11a aims to provide secure and reliable wireless communication for monitoring and control applications in industrial process automation applications. An updated version was released in 2011 [11].

A third specification for wireless communication for the process automation industries, WIA-PA, was developed by the Chinese Industrial Wireless Alliance (CIWA) and accepted by the IEC in 2009 as IEC 62601[6]. The scope of WIA-PA is to provide an architecture and protocols for use in industrial monitoring, measurement and control applications; however, discussion of this standard is beyond the scope of this article, and is only mentioned for completeness.

Wireless sensor nodes

A wireless sensor device consists of a sensor that measures a physical phenomenon such as temperature or pressure, an analog-to-digital converter, a processing unit to analyse the sensor data and encapsulate it in data packets for wireless transmission. Given that the purpose of a WSN is to be 'wireless', the power unit is usually a battery. A long battery lifetime is therefore a requirement and so will normally preclude the driving of a load such as an actuator in most cases.

Wireless instrumentation

Wireless instrumentation is the result of the merging of WSN technologies with
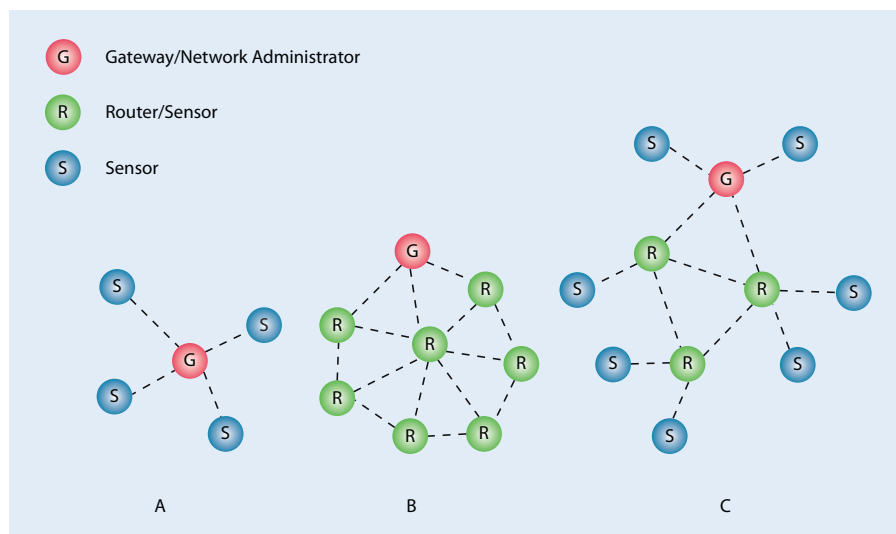
Figure 1: Examples of network topologies - A: star, B: mesh, C: hybrid star-mesh.
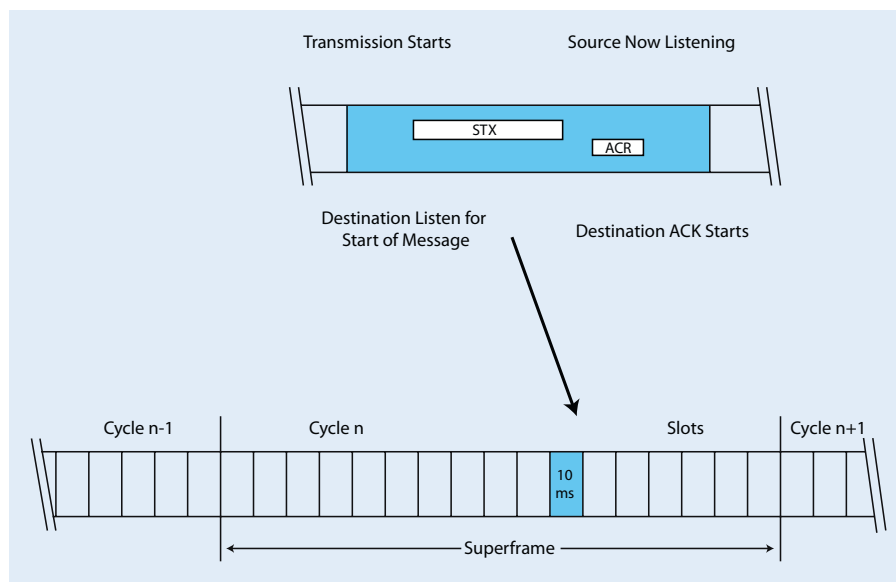

Figure 2: TDMA timeslots and superframes.

the more complex process instrumentation technology. A wireless field instrument is typically a traditional process instrument with the addition of a radio transmitter, antenna and battery. The components of the main part of the instrument itself are the same as for a wired instrument.

The performance requirements of an industrial field instrument depend on the nature and criticality of the application it is serving. This will therefore have some bearing on whether a wireless instrument is suitable in a particular application.

Network topologies
Depending on the particular implementation of the IEEE 802.15.4 network, and the

capabilities of the network devices, network topologies in a WSN may range from star to a full mesh topology. In a star topology, all devices communicate with a central coordinator, as shown in Figure 1a. In this topology, the sensor devices are not capable of communicating with each other. In a mesh topology, on the other hand, all devices are capable of communicating with all other devices within radio range, creating the topology shown in Figure 1b. It is also possible to have a topology called star-mesh, in which there is a mesh network created by router devices, and an outer network of sensors connecting to the routers. An example of a star-mesh topology is shown in Figure 1c.

Routing
Routing is the process of selecting the best communication paths to deliver the data packets from source to destination, often through one or more intermediate nodes. There are two different routing algorithms which are used for routing data packets within WSNs: graph and source routing.

A graph route is a list of possible paths that connect network end nodes. A network may have multiple, overlapping graphs, offering multiple possible alternatives, and an intermediate node device may have multiple graphs going through it. The best possible route can be chosen dynamically as network conditions change.

A source route is a single directed route between source and destination nodes, defining the specific path a packet must take when travelling from its source to its destination. If any of the links in a source route fail, the packet is lost.

The routes in a network are configured by a node operating as a 'network manager', which bases its decisions based on periodic health reports from devices indicating the quality of the wireless connectivity with their neighbours.

TDMA and frequency hopping
While routing governs which radio hops are used between nodes and controls the topology dynamically, individual radio links between nodes must reliably transmit the data.

There are, of course, many factors to take into consideration in industrial environments when it comes to radio transmission. The nature of industrial environments means that there will be higher-than-average levels of interference to reliable communication, in the form of multipath fading (caused by radio reflections), electromagnetic interference and electrostatic discharge, as well as potential interference from other radio sources such as the commonly used IEEE 802.11 Wi-Fi technology. Due to the low power requirements of WSNs, these issues, as well as the security of the communication, need to be well addressed by the WSN technology. The technology also needs to provide a communication channel with at least some measure of determinacy in relation to the latency of communication. This is achieved by a combination of frequency hopping and time division multiple access (TDMA).

Time slots
With TDMA the communication is divided into distinct timeslots with a typical du-

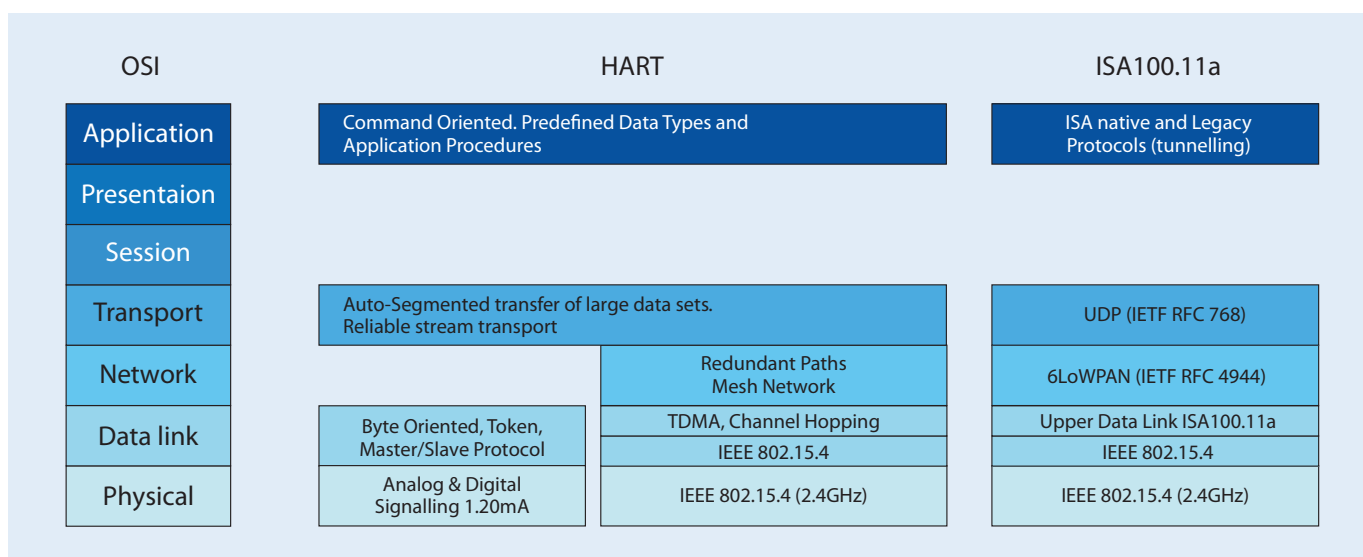| OSI	HART	ISA100.11a
Application	Command Oriented. Predefined Data Types and Application Procedures	ISA native and Legacy Protocols (tunnelling)
Presentaion		
Session		
Transport	Auto-Segmented transfer of large data sets. Reliable stream transport	UDP (IETF RFC 768)
Network	Redundant Paths Mesh Network	6LoWPAN (IETF RFC 4944)
Data link	Byte Oriented, Token, Master/Slave Protocol	TDMA, Channel Hopping	Upper Data Link ISA100.11a
		IEEE 802.15.4	IEEE 802.15.4
Physical	Analog & Digital Signalling 1.20mA	IEEE 802.15.4 (2.4GHz)	IEEE 802.15.4 (2.4GHz)

Figure 3: Industrial wireless protocol stacks.

ration of 10 ms. A collection of timeslots forms a repeating superframe. One superframe must always be enabled, although multiple superframes of variable lengths can coexist in a network.

Two devices are typically assigned to a timeslot, one as a source and the other as the destination. Broadcast messages are handled by assigning multiple devices as receivers in the same timeslot. Within a timeslot, the source device may transmit a data packet to the destination device, and on successful reception of a data packet, the destination device will transmit an acknowledgment packet (ACK) to the source device, as shown in Figure 2. If the source device fails to receive an ACK, the data packet will be retransmitted in the next available timeslot. Assigning devices to specific timeslots in a fixed length frame means that there is normally some level of fixed latency or delay between transmissions between pairs of nodes (not taking into account retransmissions).

Frequency hopping
IEEE 802.15.4 takes advantage of the licence-free 2.4 GHz ISM band, and as such may share spectrum with other licence-free radio technologies such as Wi-Fi. Like Wi-Fi, the radio band used by WSNs is divided into multiple channels. Depending on the implementation, networks may be able to switch between channels and transmit frames over different channels at different times, and also to transmit multiple frames simultaneously on different channels. The communication is therefore divided into a two-dimensional matrix consisting of TDMA timeslots and frequency channels.

A link is thus specified by a superframe, a timeslot offset (relative to the first timeslot of the superframe) and a channel offset. In consecutive superframes, a link will always have the same timeslot offset, while the communication channel will change according to a pseudo-random hop sequence.

Depending on the implementation of the network, the channel selection may be fixed or may also be dependent on changing congestion or interference, choosing the appropriate channels for the most reliable communication in any given moment, much as the routing nodes can change hops as circumstances demand.

Security issues
Since WSNs have limited resources in terms of processing power and memory capacity, there are various types of security considerations and threats that need to be taken into account, such as accidental or malicious association in which a foreign device enters the network; node impersonation; man-in-the-middle attacks; denial-of-service attacks; and network injection. These issues are beyond the scope of this article, but WSN technologies need to be able to provide mitigating factors to eliminate or limit the likelihood of these events occurring, by ensuring secure communication between devices, and by providing message authenticity and data confidentiality.

International standards
As with all communication protocol standards, WSN protocol stacks can be described

in terms of layers corresponding to the well-known seven-layered OSI model. Figure 3 shows HART and ISA100.11a protocol stacks in comparison. For WSNs, a simplified version of the OSI model is used, where the Presentation Layer and the Session Layer are not defined.

ZigBee
The ZigBee specification is primarily targeting smart grid, home automation and consumer electronics applications. A ZigBee network operates only on the same, user-defined channel until manually reconfigured, making it susceptible both to interference from other networks operating on the same frequency and to noise from other sources in the environment. In response to this issue, the ZigBee Alliance released the ZigBee PRO specification in 2007. ZigBee PRO is aimed at the industrial market, having enhanced security features and frequency agility so that the entire network may change its operating channel when faced with large amounts of noise or interference. Despite these improvements ZigBee has not yet been fully adopted by industry.

Another aspect of the ZigBee specification is the channel access method, CSMA (carrier sense multiple access), in which each node listens to the channel to see if it is active before sending. If a node starts sending and detects a collision, it sends a collision signal and waits a random amount of time before trying to send again. If the channel is busy, it continues to wait for an opening. Excessive traffic from a particular node, or too many nodes communicating at once, can

eventually lead to an unpredictable latency and sometimes to network unavailability. This limits the scalability of ZigBee when compared to the TDMA methods used by WirelessHART and ISA100.11.a.

6LoWPAN

6LoWPAN (IPv6 over low power wireless personal area networks) is a specification that defines the transmission of IPv6 packets on IEEE 802.15.4 networks. It is described by the IETF in RFC4919[7] and RFC4944. The 6LoWPAN definition may be used as a standalone specification for WSNs, but it is often found as an integrated part of the network layer of other specifications, such as ISA100.11a.

WirelessHART

WirelessHART enables the wireless transmission of HART messages and is based on the IEEE 802.15.4 PHY and MAC layers, although the MAC has been modified to allow for frequency hopping. TDMA with frequency hopping is used as a channel access method, and with a full mesh network topology, WirelessHART offers self-configuring and self-healing multihop communication.

ISA100.11a

In the ISA100.11a specification, TDMA with frequency hopping is also used as the channel access mechanism. ISA100.11a supports both routing and non-routing devices, so network topologies can be either star, star-mesh or full mesh depending on the configuration and capabilities of the devices in the network. It also utilises IPv6

addressing by implementing 6LoWPAN at the Network Layer.

An ISA100.11a network is able to carry multiple fieldbus protocols, such as Foundation Fieldbus and Profibus, as well as HART. There is also integrated support for IPv6 traffic and routing in the network layer.

In Part 2

In Part 2 of this article we will focus on the technical differences mainly between the two industrial wireless standards most commonly used in process automation - WirelessHART and ISA100.11a.

References

1. Institution of Electrical and Electronics Engineers, 2003, *IEEE Standard for Information Technology - Telecommunications and information exchange between systems - Local and Metropolitan networks - Specific requirements - Part 15.4: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low Rate Wireless Personal Area Networks (LR-WPANs)*, IEEE Computer Society.
2. ZigBee Alliance, 2004, *ZigBee Specification Version 1.0*.
3. HART Communication Foundation, 2007, *HART Field Communication Protocol Specification, Revision 7.0*.
4. International Electrotechnical Commission (IEC), 2010, *Industrial Communication Networks - Wireless Communication Network and Communication Profiles - WirelessHART*, IEC 62591.
5. International Society of Automation, 2009, *Wireless Systems for Industrial Automation: Process Control and Related Applications*, ISA100.11a-2009.
6. International Electrotechnical Commission (IEC), 2009, *Industrial Communication Networks - Fieldbus Specifications - WIA-PA Communication Network and Communication Profile*, IEC 62601.
7. Internet Engineering Task Force (IETF), 2007, *Request For Comments (RFC) 4911 - IPv6 over Low-Power Wireless Personal Area Networks (6LoWPANs): Overview, Assumptions, Problem Statement, and Goals*.

HOT PRODUCTS
ON WWW.PROCESSONLINE.COM.AU THIS MONTH

LONG-RANGE PHOTOELECTRIC SENSORS

The WT100-2 photoelectric proximity sensors feature long sensing ranges of up to 1.2 m.

SICK Pty Ltd
http://bit.ly/1JOCcqn
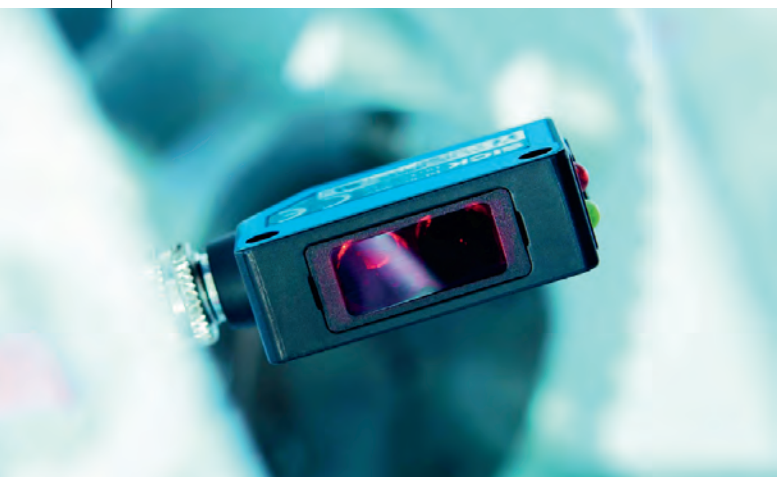
CORIOLIS METERS FOR HIGH-PRESSURE APPLICATIONS

The Micro Motion F100P and HPC010P Coriolis flowmeters are designed to measure accurate flow rates for wellbore chemicals injected at high-pressure conditions.

Emerson Process Management
http://bit.ly/1HE7aSF

FLUE DUCT FLOWMETER

The FCI MT91 combines thermal dispersion flow element design with up to 16 flow sensing points while operating over a wide temperature range up to 454°C.

AMS Instrumentation & Calibration Pty Ltd
http://bit.ly/1Hrsp4F

INDUCTIVE SENSORS

The uprox3 inductive proximity sensors offer switching distances increased by as much as 50% over previous generations.

Turck Australia Pty Ltd
http://bit.ly/1GxTPto

IECEx certified
momentous!

hazardous area HMI panels

red l**i**on

-20° to 60°C
operating temp.

high shock &
vibration proof

outdoor models
available

IECEx
certified

IEC.   IECEx

Red Lion's Award-Winning Graphite HMI platform is now IECEx certified for hazardous area installations.

The Graphite series provides a rugged HMI solution to combine a range of versatile plug-in I/O & communication modules with drag-and-drop protocol conversion, data logging and web-based monitoring and control.

Sizes range from 7 to 15 inches on your choice of standard or widescreen displays. Sunlight-visible UV-resistant displays are available on the 7 and 10 inch models for outdoor use if required.

CONNECT, MONITOR & CONTROL

for more information call 1800 557 705 or email sales@control-logic.com.au
www.control-logic.com.au

control logic

industrial.
electrical.
automation.

PANEL PC

IEI Integration's PPC-5152-D525-E flat-bezel industrial fanless panel PC, based on the Intel Atom D525 1.8 GHz dual-core processor, can support up to 4 GB DDR3 SO-DIMM. It features a robust, ultraslim, aluminium front bezel and a 5-wire resistive touch screen.

The product provides a flexible expansion interface with two PCI slots or one PCI slot and one PCIe slot. The full function LCD panel PC features a 15″ LED-backlit screen and multiple I/O ports including two RJ-45 gigabit LAN ports, two USB 3.0 ports, two USB 2.0 ports, two RS-232 ports, an RS-232/RS-422/485 port and two RS-422/485 ports with RJ-45 connectors.

The product meets the IP64 environmental rating providing resistance to dust and liquid ingress. It also supports one 2.5″ SATA HDD/SSD and a CF Type II socket for data storage. The robust panel PC features a wide operating temperature from -20°C to +50°C.

ICP Electronics Australia Pty Ltd
www.icp-australia.com.au

SINGLE LOOP CONTROLLER

West Control Solutions has introduced the Pro-16 1/16 DIN single loop controller. The Pro-16 is a compact (45 x 45 mm), fully featured controller for demanding applications.

The West Pro-16 is 45 x 45 mm in size and features up to six outputs, two digital inputs, a remote set point input and an optional fully configurable analog output.

The Pro-16 offers many integrated features such as two PID sets and separate PID for heat and cool strategies. Flexibility is offered with a universal input, optional heater current input and an built-in profiler with 16 profiles x 16 segments.

A highly visible display is offered with a single-line, 7-segment LED display combined with a single line of text display.

Automated Control Pty Ltd
www.automatedcontrol.com.au

COMPACT SAFETY SYSTEM

Schneider Electric has released its Tricon CX compact system for safety and critical control applications in the oil and gas, power, refining, chemicals, pharmaceutical and biotech industries, where safe operations are critical and reliable operation is paramount. A certified ISA Secure EDSA Level 1 system, the high-integrity and highly available Tricon CX ensures operational integrity, protecting against inherent risk and hazards, as well as external threats such as cyber attack.

The latest addition to Schneider Electric's Triconex line of safety-instrumented systems, the Tricon CX is smaller (form factor reduced by 50%), faster, lighter (67%) and more powerful than previous safety solutions. Its advanced functionality enables online upgrades without operational interruption. Additionally, the compact design allows for a number of new features including lower power consumption.

Advanced monitoring and control capabilities include: supervised DI/DO with advanced line-performance diagnostics; fast analog inputs with integrated HART; a 1 ms SOE digital input; a choice of direct termination or external termination panel; a 300% increase in controller tag capacity; a 5-times increase in peer-to-peer performance; and new automated test and verification of safety logic.

Based on Triple Modular Redundancy technology, Triconex solutions are also claimed to be easy to operate and maintain. Triconex solutions enable safer operations by maximising compliance to mandated safety regulations and minimising both unscheduled downtime and the likelihood of business interruptions.

Schneider Electric Industry Business
www.schneider-electric.com

UNIVERSAL TRANSDUCER

The Camille Bauer V604s is a rail-mounting, AC- or DC-powered transducer, measuring voltage, current, resistance and temperature. The V604s offers a Modbus interface and provides features such as redundant inputs (in case of sensor function failure), sensor failure alarms and programmable alarm outputs.

The V604s transducer is equipped with two analog outputs providing ±20 mA and ±10 V. A digital output (open collector) and single-pole relay are also provided. The Camille Bauer V604s is provided with two inputs that can be used independently or in various combinations: input 1 ± input 2; input 2 ± input 1; or input 1 multiplied by input 2. In addition to DC voltage inputs (-1000 mV to +1000 mV; -600 V to + 600 V), thermocouples (B, E, J, K, L, N, R, S, T and U; W5Re - W26Re; W3Re - W25Re) and RTDs can be measured - covering a total temperature range of -270 to 2315°C.

Power Parameters Pty Ltd
www.parameters.com.au

Qenos control system optimisation exceeds expectations

The challenge for the Qenos operators has been to ensure a constant supply of high-consistency ethylene to their customers while managing a fluctuating ethane feed.

Also, as the plant ages, the technical personnel need to continuously update the control system model (the heart of model-based control) without activating a plant retest and incurring unnecessary costs.

It follows that optimising the control system models requires an intelligent and reliable solution. The Qenos Olefins ethane to ethylene conversion plant at Altona recently upgraded its advanced process control (APC) system to adaptive process control. The decision has had a positive impact, beyond their expectations, on efficiency, throughput and operator engagement.
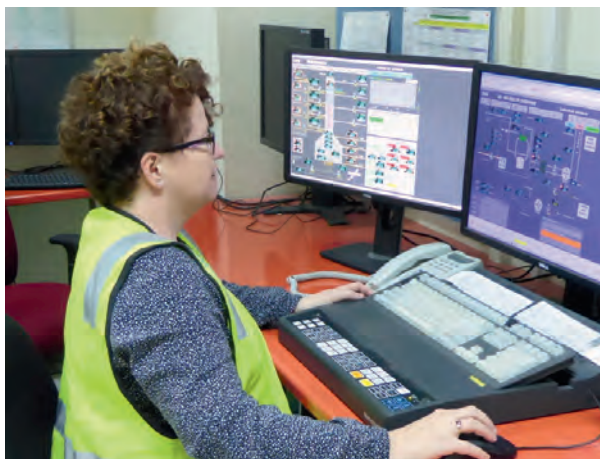
Jenny Clemow, senior process controls engineer at Qenos, said: "The ethane to ethylene conversion process can be simplified into four steps - crack it, compress it, chill it and separate it - with product 'cleaning' taking place at each step."

Ethane enters the furnaces where the gas is 'cracked' into simpler molecules, the by-products are then quenched and compressed, chilled by the refrigeration circuit, separated in the fractionators and finally distributed to the customers as ethylene.

Ensuring a reliable supply of ethylene to their clients, with a varying ethane feed from natural gas suppliers in Bass Straight, has been the biggest challenge since inception.

To help manage this complex supply and demand situation, Qenos implemented AspenTech's DMCplus Advanced Process Control (APC) system, with subsequent updates and revisions, some 20 years ago. Since that time, they have fine-tuned their APC control models as far as is possible and they consistently perform at a service factor (time spent with APC as a percentage of total time) better than 90%.

As time passes, however, the APC model becomes less and less reflective of the current plant dynamics, and as a consequence the control system becomes progressively less effective.

As the plant ages and undergoes wear and tear and fouling, problems such as fouling exchangers, rewheeling of compressors, valve replacement, measurement instrumentation recalibration, etc, can cause the plant to run outside the constraints of the model. Over time the plant-model mismatch can increase significantly.

Another factor that can result in the plant-model mismatch is the fact that the process is non-linear, and the need to change the operating conditions to meet new production specifications, as dictated by management, can move the plant to an operating position where the process dynamics are noticeably different from the model.

To overcome the limitations of traditional APC, Qenos implemented AspenTech's DMC3 Adaptive Process Control solution in 2014. In the background, Adaptive Control continuously runs small step changes to critical process variables, monitoring the impact on other dependent variables, and then suggests a revised model when the results have converged. Simultaneously, DMC3 actively controls the unit and drives it towards an optimal operating point.

Effectively, adaptive process control is continuously fine-tuning the model as the plant ages, allowing the service ratio to head towards 100%, and ensuring that the plant is running at its optimum performance. The adaptive functionality can very easily be deactivated by the operators when they anticipate major process changes.

According to Clemow, "Adaptive control has allowed us to optimise the plant performance holistically, but a major benefit has been the ease of upgrading parts of the model as areas of the plant age, or we make our own changes to certain processes."

The Qenos operators did not require a lot of training because the system and display panels appeared the same as before the upgrade. Unless they had looked super closely, they would not have detected the step-tests the adaptive process control was running in the background. Clemow did spend some time with them at the operator panels, and then she monitored the test remotely.

The DMC3 adaptive process control upgrade has reduced much of the tedious workflow by automating the mundane control tasks, and that frees up the engineers and operators to manage the higher level challenges. Traditional plant testing is very disruptive and adaptive control has significantly reduced the need for plant retesting, which is beneficial for everyone.

A longer and more detailed version of this article can be read online at: http://bit.ly/1KdJFiW

Aspen Technology Australia Pty Ltd
www.aspentech.com

THERE IS NOTHING IN THE AIR TONIGHT.

THIS IS **SICK**

Sensor Intelligence.

From power generation and cement production to waste treatment and the distribution of natural gas – the more complex a plant, the greater the demands on systems engineering and services. When it comes to monitoring emissions, evaluating gases for optimal process control and ascertaining custody transfer measurements for pipelines, SICK is a step ahead in every segment of the industry. With complete solutions for gas analysis, dust measurement and flow measurement that are perfectly tailored for each process environment. With superior equipment availability, easy operation, certified explosion protection and robust measurement technology with long maintenance cycles. When it comes to finding a clean solution, the whole world takes measurements with SICK. We think that's intelligent. For more information please visit www.sick.com.au or call 1800 334 802 (Tollfree).

UPDATED ASSET MANAGEMENT SOFTWARE

Rockwell Automation has added a custom-device plug-in capability to its FactoryTalk AssetCentre v6.0 asset management software. System integrators can now develop re-usable plug-ins to connect the software to unlimited third-party devices. For manufacturers, this connectivity expands monitoring, backup and recovery capabilities for their critical automation-related assets.

The software archives asset configurations on a regularly scheduled basis, tracking changes and providing a point of return for faster recovery following an unscheduled downtime event. Archived asset configurations can also be saved and used as a 'golden copy' configuration, allowing users to pinpoint exactly what should be running in their automation layer and compare it with what is actually running.

The software also archives user actions and changes. This allows operators or technicians to audit any changes that have been made to more easily identify a problem's root cause, such as when a temporary code fix to keep a line running leads to an unanticipated downstream issue. Regular comparison reports can also inform operators of any discrepancies that might be occurring between an asset's last saved configuration and its current parameters.

The software provides configurable levels of security. Administrators can establish role-based data access and activity limitations, and monitor individual user activities.

In addition to the custom device, plug-in capability included in the v6.0 software release, independent agent group functionality has also been added. It allows users to place interrelated programs or agents into groups and then independently configure each agent group as needed.

Rockwell Automation Australia
www.rockwellautomation.com.au

REMOTE VISUAL INSPECTION SYSTEM

The GE Everest Ca-Zoom 6.2 remote visual inspection system provides still image and motion video capture, with high-intensity lighting and an integrated temperature warning system. It is available to rent from TechRentals.

The included PTZ-140 camera module fits 140 mm openings and, when used with the supplied telescopic mounting pole, cable and strain relief mechanism, can be lowered or extended into a void, tank, tower, pipe or other body of water for remote inspection.

The PTZ-140 camera has 36x optical zoom and 12x digital zoom, and an optional PTZ-70 camera small enough for 76 mm openings is available. The equipment is waterproof to 45 m or 4.5 bar, and the telescopic mounting pole can be extended between 1.8 m and 3.6 m. A 30 m cable is also provided.

TechRentals
www.techrentals.com.au

DUAL-PURPOSE ROUTER

Belden has announced a solution from GarrettCom that combines routing with network security - the Magnum 5RX Fixed Configuration Security Router. This integrated router offers high network performance, while addressing the escalating security concerns associated with industrial applications in highly distributed environments.

Designed for mid-level industrial applications where hardened and industrial-grade solutions are required, the Magnum 5RX Security Router offers features essential for success in the field. These features provide maximum protection for power transmission and distribution settings and make the router suitable for deployments at the edge of the network where modular solutions are either too expensive or not required.

The two-in-one router is equipped with legacy network protocol and interface support, as well as EtherNet/IP presence, offering a migration path to the new generation of network backbones.

The router's advanced software features offer best-in-class firewall protection and virtual private network (VPN) security along with advanced Layer 3 routing capabilities.

Belden Australia Pty Ltd
www.belden.com

Event response can't be left to chance. My operators need the confidence that they are taking the right action – every time.

YOU CAN DO THAT

SYNCADE **Make every operator your best operator.** Emerson helps operators meet production goals by ensuring work is done accurately and consistently. Syncade Suite combines document, equipment, and materials management into electronic work procedures to create an optimised manufacturing environment. By implementing Syncade as your MES, you integrate plant-floor data with procedural processes to help your operators do their best work. Visit **www.emersonprocess.com/syncade** to learn more.

EMERSON
Process Management

EMERSON. CONSIDER IT SOLVED.

CMMS VS EAM:

WHAT IS THE DIFFERENCE?

PART 2 *Dave Bertolini and Anders Lif**

Computerised maintenance management systems (CMMS) and enterprise asset management (EAM) applications can both be used in the industrial maintenance space. In Part 1 of this article we discussed the similarities and differences between a CMMS and EAM. Now it is time to look at the more advanced features of EAM, including asset lifecycle management and project management.

As mentioned in Part 1, EAM must deliver the core requirements not just of maintenance management, but asset management. Those requirements are spelled out in ISO 55000, ISO 55001 and ISO 55002. ISO 55000 includes an overview of asset management. ISO 55001 is a requirements specification for an integrated asset management system and ISO 5502 offers guidance for implementation.

While ISO 55000 does not specifically address software, it does require that all asset data, across the lifecycle of the asset and across organisational boundaries, be contained in the same database and, therefore, the same system. What does that mean? It means EAM must support the planning and engineering stage of the asset, including plant design. It must encompass the construction of the asset - so powerful project, document and contract management functionality is required. And it must support operation of the asset and even eventual decommissioning and replacement.

This is a demanding requirement that a CMMS alone cannot likely meet, and frankly, neither can most EAM applications that may not address the entire asset lifecycle. And whether or not a company considers adopting the ISO standard, if they are committed to complete visibility and control over their assets, they still need that full lifecycle support.

Only a single system like EAM can deliver an accurate and consistent view of all asset information - one version of the truth - insuring policies, plans and actions are based on an accurate understanding of the history and current status of the asset infrastructure. In order to accomplish this, an EAM software product must actually address all phases of the asset lifecycle, and not many do. It must also provide portals or other methods for outside parties like engineering firms and maintenance contractors to use the system so that everyone touching that asset data is interacting with a single database in real time.
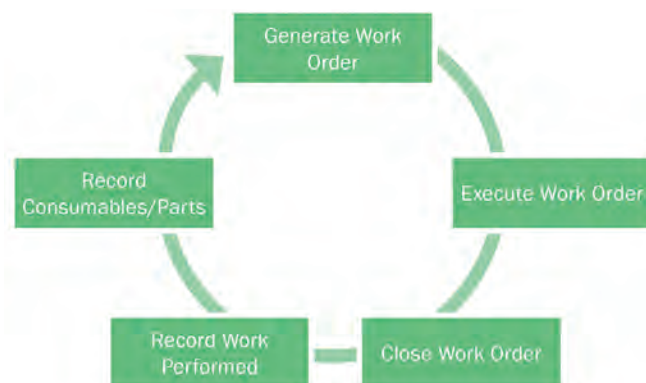
Figure 1: A CMMS tends to focus on maintenance management. It can also extend into inventory management and other disciplines, but is most often implemented for and used by maintenance personnel.

And by everyone, we mean people inside and outside the company. An EAM application must offer the ability to open portals to suppliers like engineering firms and maintenance contractors. As maintenance work is planned for the weeks ahead, if contractors have visibility of the plans through the EAM system, they can be informed of the upcoming work, schedule their people and ensure that they have the right tools and materials available. If they are seeing that rolling schedule, they can be more responsive to your organisation's needs. This also reduces the amount of time necessary to manage those outside contractors by phone and email.

Additionally, if the contractor can report their work activities directly into the system, real-time updates of work are available. That eliminates the delay that results when the contractor enters the data in their own system, and the data flows through reporting mechanisms within that contractor environment and back to the manufacturing maintenance team, which then has to enter that record of work back into the EAM, enterprises resources planning (ERP) or computerised maintenance management (CMMS) software. That repeated entry is wasteful and increases the likelihood of errors. Real-time data can also allow for tighter coordination between the contractor and internal maintenance staff or with other contractors working on that asset. Moreover, that real-time data could allow

for more efficient use of the asset, as in the resumption of a production schedule immediately after a contractor finishes work.

Advanced project management

Project management is of interest not just to the maintenance or plant manager who may want to manage a plant shutdown, but the CEO, CFO, board or other stakeholders who may want to manage the lifecycle of an asset as one long project - a project that might last for as long as 20 or more years. The asset lifecycle is really just a project that starts with engineering and construction processes. The project then comes to include the cost to maintain, operate and refit, and culminates with a well-informed decision to decommission and replace the asset. In the absence of fully functional, flexible and integrated EAM and ALM systems, managing the lifecycle of the asset from cradle to grave is a challenge.

What this means to a software selection process is that the ability of an EAM package to support plant design and engineering ought to be a major factor. Even in the vast majority of instances when an outside engineering group is responsible for design, their activities ought to be encompassed by the EAM platform to be used during the asset lifecycle so that design data flows naturally into the maintenance and operations systems that will sustain the asset during its productive life.

Tight integration between ALM, project management and core EAM functionality is also necessary. Consider for a moment the situation faced by the chief executive and maintenance director at a coal-fired power plant that has one stop per year for major overhauls. There is a pressing need to meet the project timeline because each day of downtime is worth millions of dollars, and there is a significant degree of project complexity as outside contractors are hired, equipment is rented and perhaps additional maintenance shifts are added. Robust project management functionality that is integrated on a very granular level with a powerful EAM application can help manage the resources necessary to complete the required tasks in the time allotted. While the ability to manage to meet the deadline is one strong argument for integrated project and EAM functionality, even greater benefits can be realised if project and EAM functionality are tied into an overarching asset lifecycle management (ALM) system and the general ledger. The ability to look at a plant shutdown from an ALM and financial perspective can help determine if it makes sense to bring in additional outside
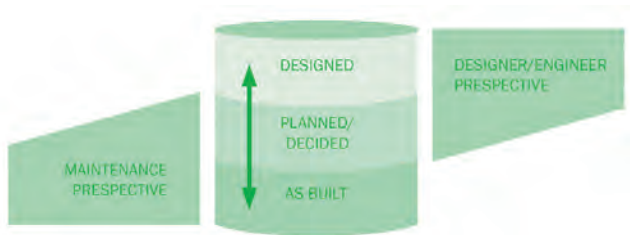
Figure 2: EAM must address the entire asset lifecycle, extending from design through decommissioning. All of the asset data - as designed, as built and as maintained - must be held in EAM as a central repository.

resources in order to shorten the amount of downtime. To what extent will the outside cost of hiring contractors and equipment increase total return on the asset in the intermediate to longer term?

Many asset-intensive companies do not have in place the proper tools to efficiently optimise the activities associated with a plant shutdown, and certainly do not have the right tools to proactively reduce planned downtime.

But this effort to track the cost of operating and maintaining the asset is dependent on effective cost tracking on thousands of smaller projects. On this micro level, integrated project, finance and EAM functionality is critical. When working in a properly integrated enterprise application, it is much easier to structure a maintenance project to collect all of the cost, including procurement and work orders that are used to collect technicians' time. Integrated functionality will also allow analysis of project cost by different breakdown structures, and each activity can be assigned a different funding line.

So it becomes that the difference between EAM and CMMS has to do not only with the breadth of functionality, but the degree to which that broader functionality is designed to work together to deliver a unified asset management platform.

The desired future state

While a CMMS is designed to meet immediate maintenance management needs, EAM is designed to manage the future state of the asset, providing visibility into the past and driving predictability into the future.

It is this ability to look into the future state of the asset that is affecting everything from lifecycle extensions to plant location decisions. In Brazil, there is tremendous growth in the paper and pulp industry. Why is this? Because executives can see that the productivity of an asset in that location is much higher at lower cost than one in a more northern climate. In Brazil, there are entire valleys that are completely empty of trees after a thorough harvesting. But just seven years later, that valley is home to a full-grown forest - a forest growing in flat fields so when they come in with harvesters, there are no natural barriers. That seven-year harvesting cycle versus the 150-year harvesting cycle common to a more northern climate has real asset lifecycle implications.

The future state a company implementing EAM can aspire to can be a lot simpler than this however. They may aspire to lower cost by truly managing an extensive maintenance inventory in an intelligent way.

Inventory management requires a unique master ID for part identification. This ID must be standardised, and IFS has been on the forefront of identifying a universal standard for parts. Why is this important from an EAM standpoint? Because it allows management

to reduce the ongoing investment required to manage the asset. If you look at a multisite, asset-intensive industry, there might be 100,000 different parts or objects in that asset environment. There might be 50,000 different spare parts in the inventory and all of these are named in a localised way. That is because the part naming convention was likely developed site by site over the decades, and the problem may be a lot worse if the company has grown by acquisition. Therefore, it is impossible to know that a motor in company A, called Alpha, is the same motor as company B is storing under the name Beta. With enterprise part standardisation, organisations can suddenly start to treat stock levels at different sites with a higher degree of transparency because it is suddenly understood that this motor is stored in all of the five sites in the group. And the expected level that is needed on the shelf is maybe 0.2 of this motor, which means at least one needs to be stored. But if these five sites are treated as one common unit with different inventory locations for this motor, it would be possible in theory to be able to store just one motor to service all five sites and still be able to ensure coverage.

Mobility

The futurist William Gibson was right: the future is here, but it is just not evenly distributed. Some companies have achieved part standardisation. The technology is there, but the will to implement is not yet universal. This is also the case with enterprise mobility, which a modern enterprise asset management application can also facilitate.

Mobility comes through EAM in different ways to different people in the enterprise. For the executive, an EAM system will be able to notify them on their smartphone or other mobile device when urgent documents need to be approved. Those working in an office or managerial environment will have full access to their EAM suite on touchscreen devices like tablets. And technicians will be able to use consumer-grade smartphones and other mobile devices to access and complete work orders.

The technology is here, and forward-looking companies are taking advantage of it.

Conclusion

EAM and CMMS are related, with a CMMS being used to address immediate maintenance management needs and EAM extending across other enterprise functions. Companies operating large, expensive or mission-critical assets with many maintenance technicians will do well by selecting and implementing EAM. A company with more immediate needs may want to implement a CMMS, but perhaps opt for an application that can grow with them, expending in a modular and flexible way to deliver full-blown EAM.

*Dave Bertolini is Managing Principal with People and Processes. Certified as a Master Instructor and seminar leader, he has been involved with over 300 improvement initiatives and CMMS implementations, utilising 38 different software packages. He is the author of the book 'CMMS Explained'.

Anders Lif is Global Director, Product & Industry Marketing, IFS World Operations. He is responsible for the successful roll out of all IFS products to the market and coordinates IFS global industry directors. He has held senior positions within IFS since 1998.

IFS Australia
www.ifsworld.com/au

AGITATOR DRIVES FOR MINERALS

The X Series agitator range from SEW-Eurodrive is purpose-built for agitating and mixing applications within the mining and minerals processing industries. It is desirable for situations where high bending moments combined with high levels of torque are required.

The range is suitable for extreme conditions, such as high ambient temperatures or ATEX. In addition to the torque that has to be transmitted, high radial or axial forces are often brought to bear on the output shaft. With a flexible product design, SEW-Eurodrive offers a standardised solution with load-specific bearing and output shaft combinations.

Depending on the load criteria, there are different options available within the agitator range.

For light loads, a model with a universal housing for helical gear units and bevel-helical gear units (two- to four-stage) is available for the torque range between 6.8 and 475 kNm. It is based on the combination of a universal housing with reinforced bearing design.

For medium and heavy loads, two models are available in the 22 to 90 kNm torque range. These feature a roller bearing design with increased bearing distances. All drives are suitable for use in ATEX scenarios and can be combined with the standard options of 'dry well' seal, pressure lubrication/oil bath lubrication, rigid flange coupling, fan cooling and foot- or flange-mounting. This solution is available as a three-stage helical gear unit. The thermal rating of this model has been increased due to the use of an optimised vertical housing with cooling fins, axial fans, etc.

SEW-Eurodrive Pty Ltd

www.sew-eurodrive.com.au

HMI CONTROLLERS

The iCube (i3) controllers from IMO Precision Controls integrate PLC and HMI functionality, complete with digital and analog I/O, in a single module that saves panel space, makes system builders' lives easier and is simple to use. The i3B, i3C Mini and i3E ranges offer a choice of features, screen sizes and I/O. All models feature RS-232/485; optional or built-in ethernet; and an optional GSM/GPRS modem interface.

The i3B family has a 3.5″ 160 x 128 monochrome display with touch control and five function keys. Built-in features that are common to i3B and other families include a CAN port, high-speed counter, stepper-motor controller, alarm handling and multiple PID loops.

i3C Mini controllers come with a 3.5″ QVGA colour touch display and five function keys, a built-in ethernet port, a USB A port for attaching flash drives and a USB Mini-B port for programming and data access.

Completing the range of controllers, the i3E has a 7″ WVGA colour TFT touch screen, six function keys, two CAN ports, two ethernet ports and two USB ports.

RS Components Pty Ltd

www.rsaustralia.com

CLOUD-BASED COMPRESSOR MONITORING

Sullair Australia has released a cloud-based remote monitoring program designed for Sullair's Champion compressor users to monitor compressor performance 24 hours a day.
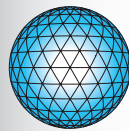
The AirLinx remote monitoring program addresses the problems faced by facilities due to compressor failure or delayed compressor service, resulting in expensive production downtime. It alerts users to breakdowns and unscheduled interruptions in their compressors, improving system reliability. It is also an essential tool for monitoring compressor performance.

An AirLinx controller mounted in the compressor records system parameters in real time and sends information to the cloud. The compressor's performance data can be viewed and analysed by the user on a simple dashboard accessible on a mobile device or computer. Receiving this information in real time helps the user significantly limit machine downtime through timely action.

The remote monitoring program is offered with a choice of two plans. The AirLinx basic plan monitors all fundamental parameters, including pressure, service and machine running hours. The AirLinx Plus provides all of the features of AirLinx plus a number of benefits, such as ambient temperature monitoring and motor speed/utilisation on VSD machines.

Sullair

www.sullair.com.au

TUBE CONNECTION TECHNOLOGY

Parker Hannifin has released a high-integrity tube connection technology offering instrumentation system designers and installers performance and time-saving advantages. Designed for working pressures as high as 1550 bar, the 'flared cone' technology advances the performance of compression-style tube connections. It provides users with a simple and reliable means of speeding the assembly of instrument tubing systems for use in higher pressure applications in the oil and gas industries.

The flared cone connections are much simpler to make up. Installers can typically complete the task in less than four minutes, after only minimal training. Flared cone connections are also especially cost effective in applications where leaks caused by vibration are an issue.

Parker's FCC technology is based on a single sleeve compression-style system. However, unlike conventional designs, the tube end is flared to prevent any possibility of ejection - and also provides the connection's primary metal-to-metal seal. When the gland nut is tightened, the inside surface of the anti-ejection flare mates with a cone in the fitting or valve. The compression sleeve then mates with the body of the component to form a second, redundant, metal-to-metal seal. This dual seal approach has a major reliability benefit: in the unlikely event that the primary seal fails, the secondary seal preserves the integrity of the connection. Installing a flared cone connection is simply a matter of screwing the gland nut into the fitting or valve and tightening it to the prescribed torque.

Parker Hannifin (Aust) Pty Ltd
www.parker.com

INVERTERS WITH INTEGRATED PLC

Featuring an integrated PLC, frequency inverters from NORD Drivesystems combined with geared motors become a fully fledged intelligent system solution. All distributed SK 180E and SK 200E controllers and the cabinet inverters SK 520E and above now offer an integrated PLC.

The PLC enables straightforward programming of drive-related functions according to IEC 61131-3 in Structured Text and Instruction List using the NORD CON programming and parameterisation tool.

The intelligent inverters can manage sophisticated tasks such as autonomous process monitoring or dynamic operation without an external controller, allowing for more economically priced solutions.

The new-generation inverters control a wider range of motors: support for IE4 synchronous motors is currently being tested in the field. In addition to their functional versatility, including position control, the distributed SK 200E units also provide high overload tolerance and are available for a wide power range of up to 22 kW. The highly compact control cabinet inverters from the SK 500E line will be available up to size 11, with a 160 kW rating, later this year.

NORD Drivesystems (Aust) Pty Ltd
www.nord.com

CHEMICAL-FREE DISINFECTION SYSTEMS

Disinfection using ultraviolet (UV) light is a chemical-free, environmentally friendly and sustainable method for killing pathogens and food-spoiling microorganisms in potable water, recycled water and other liquids. bestUV specialises in providing solutions for tough water disinfection challenges in the food and beverage and pharmaceutical industries.

Designed and built in the Netherlands, bestUV carefully considers the application, target organisms and site-specific properties of the application to provide the right solution. This can include compact L-shape UV systems with high-UV-density, low-pressure (LP) long-life lamps or strong medium-pressure (MP) UV lamps. Either solution comes with automatic UV intensity control.

All systems are designed using computational fluid dynamics (CFD) and validated with biodosimetric tests, so users will have confidence that the system works and the water is safe. To minimise maintenance, bestUV systems can be equipped with integrated cleaning devices, operated either automatically or by hand.

B-R Controls Pty Ltd
www.brcontrols.com.au

BUTTERFLY VALVE

The Fisher 8590 high-performance butterfly valve provides a selection of disk seals, actuator designs and material combinations to meeting plant-wide throttling and on-off requirements.

Several dynamic disk seals are available to meet temperature conditions that range from low to moderate up to 538°C. Severe service and cryogenic applications can be met as well with the appropriate metal-polymeric or rugged stainless steel seal construction.

Utilising a lugged body design across the CL600 size range of NPS3-NPS24, the 8590 can incorporate a splined shaft that accepts either a spring-and-diaphragm or pneumatic piston actuator. It is also available with either a square or keyed shaft that combines with handlevers, handwheels or pneumatic piston actuators.

The pressure-assisted design of the 8590 disk seals provides tight shutoff and permits the use of smaller, less expensive actuators in meeting full ASME B16.34 shutoff capabilities. It also offers true bidirectional shutoff, which means that torque necessary to open and close the valve remains constant regardless of the differential pressure across the disk.

Besides shutoff given by the choice of elastomer and metal disk seals, the optional ENVIRO-SEAL packing system combines with the valve's micro-smooth shaft surface to keep emissions below 100 parts per million (ppm). For use with sour liquids and gases, trim and bolting materials are available to comply with NACE MR0175-2002, NACE MR0175-2002-2003, MR0103, and MR0175/ISO 15156.

With a CL600 rating per ASME B16.34, the valve's face-to-face dimensions meet EN558, API609, MSS-SP68, and ASME B16.10 standards.

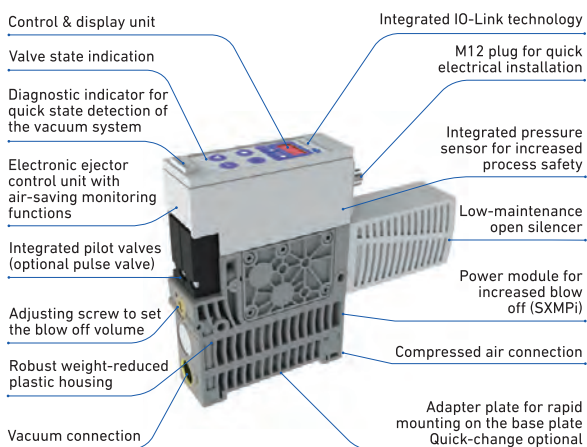**Emerson Process Management**
www.emersonprocess.com.au
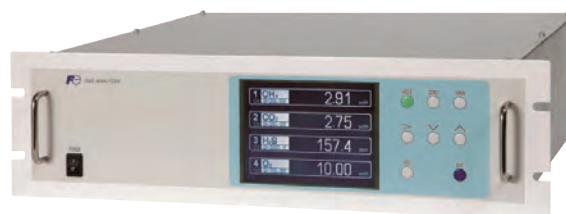
BIOMASS MULTIGAS ANALYSER

Designed to be an integral part of current biomass gasification processes, the Fuji Electric Model ZPAF analyser can provide continuous analysis of important gases produced by biomass fermentation from a wide range of waste products.

Using the time-tested methods of non-dispersive infrared, electrolytic and galvanic measurement principles, the analyser has dual ranges for the gases methane, carbon dioxide, hydrogen sulfide and oxygen.

Ranges for methane and carbon dioxide are 0-20% and 0-100% with a resolution of 0.1% by volume; hydrogen sulfide ranges are 0-500 ppm and 0-2000 ppm, with a resolution of 10 ppm; and oxygen is measured in the ranges of 0-10% and 0-25%, with a resolution of 0.1% by volume. Repeatability is ±0.5% full scale.

The analyser also features automatic zero/span calibration; Modbus and 4-20 mA communication; and many contact outputs.

Australian Dynamic Technologies Company Pty Ltd
www.austdynatech.com.au

COMBINED DEWPOINT AND MOISTURE ANALYSER

Michell Instruments' Condumax II hydrocarbon dewpoint analyser and the recently launched OptiPEAK TDL600 tuneable diode laser spectroscopy moisture analyser are now available in a single package to help gas companies ensure the quality of their pipeline transmission gas. Moisture and hydrocarbon dew point are the key parameters in gas quality standards for custody transfer of transmission pipeline gas and reliable measurements are vital for pipeline operators.

The OptiPEAK TDL600 is said to represent the latest developments in spectroscopy, with improved sensitivity and accuracy along with the ability to automatically cope with changing background gas compositions. The combined system provides users with the benefits of both systems in an easy-to-install package. It has a smaller footprint than two analyser systems, reducing costs and saving on space.

The package includes both analysers and a combined sample conditioning system to ensure a steady sample flow which at a uniform pressure and temperature. It is fully certified for installation in hazardous areas worldwide, with certifications from ATEX, $_{c}CSA_{US}$ and IECEx.

AMS Instrumentation & Calibration Pty Ltd
www.ams-ic.com.au

ENTRY-LEVEL VISION SENSORS

The Festo SBSI vision sensors provide a simple, entry-level vision system solution that is easy to use even without expert knowledge due to their intuitive operation. There are two series available: code readers (SBSI-B) for 1D/2D codes and object sensors (SBSI-Q) for simple quality inspection tasks.

The all-in-one SBSI features an integrated lens and lighting system. Depending on the model, it comes in different focal lengths and lighting colours. Its spectrum makes it suitable for the automotive industry and electronics manufacturing, as well as for packaging in the food and beverage industry or the pharmaceutical industry.

The product offers 360° position tracking, with no need for precise part alignment. Robust code reader tools are also available for directly marked dot-matrix and laser-printed codes.

Festo Pty Ltd
www.festo.com.au

PETROLEUM PIPELINES

© Hydro Tasmania 2011

Working with academia and industry, the Australasian Corrosion Association (ACA) supports research into all aspects of corrosion in order to provide an extensive knowledge base of the latest technologies and best practices in corrosion management.

As the global economy continues to grow, the markets for petroleum products continue to expand. To meet increasing demand, more and more oil and gas infrastructure is being built. Corrosion poses a threat to all infrastructure and the economic impact of all types of corrosion and its degradation of infrastructure, such as pipelines, oil rigs and towers, represents an annual cost of many millions of dollars to the industry.

Pipelines vary from simple steel tubes to state-of-the-art spiral-wound, flexible lines, with diameters ranging from 50 mm to 2 m. Pipelines are integral to the oil and gas industry, where they form the gathering systems joining wells to process facilities and the distribution system delivering product to refineries and markets. While non-ferrous materials such as fibreglass and polypropylene can be used in non-critical, low-pressure applications, the overwhelming majority of petroleum pipelines are constructed from metal. Whether buried or on the surface, all metal pipelines are exposed to a range of physical, climatic and chemical environments that can cause corrosion.

Ageing or damaged infrastructure presents many challenges to the oil and gas industry and regulators worldwide. There are thousands of kilometres of pipelines associated with the oil and gas wells and platforms operating in more than 50 countries around the world. These facilities vary in size, shape and degree of complexity.

Much of this infrastructure was built in the 1950s and designed in accordance with lower standards than are currently prescribed. Some facilities are operating well beyond their intended service life and others have suffered damage as a result of storms or accidents or, because of the lack of active maintenance programs, have deteriorated to the extent that there is now doubt as to their continued structural integrity.

©Hydro Tasmania 2011

External protection

Oil and gas pipelines are often coated with several layers of protective material and fitted with cathodic protection devices that inhibit corrosion. Internal pipe maintenance and cleaning is usually conducted by sending a scrubbing device or 'pig' (originally named because of the squealing noise early versions made as they traversed the line) through the pipeline at regular intervals. Other, more sophisticated pigs, fitted with cameras and sensors, are able to inspect the integrity of welds and the internal condition of the pipe as they move along.

Achieving the most effective corrosion control strategies is likely to require changes in industry management and government policies. Industry must take advantage of future developments in protective coatings technology in order to reduce the overall cost of corrosion. Advances in corrosion protection will include coatings that are both physical barriers and contain corrosion inhibitors that are released when a coating becomes damaged or in the presence of a corrosive environment.

Working with academia and industry, the Australasian Corrosion Association (ACA) supports research into all aspects of corrosion in order to provide an extensive knowledge base of the latest technologies and best practices in corrosion management. The organisation aims to ensure all impacts of corrosion are responsibly managed, the environment is protected, public safety is enhanced and economies are improved.

Historically, metallic zinc and primers containing chromate have provided excellent corrosion protection. These materials have properties that allow coatings containing them to actively respond to a corrosive environment while maintaining a barrier to that environment.

Advances in coating technology can offer significant cost savings if developed and successfully demonstrated. Zinc, polyurethane and powder-coating technologies make them a superior alternative to epoxy resin technology for longer-term service life. Zinc gives a very basic cathodic protection effect as a thin coating; polyurethane is effective and aesthetically appealing; and powder coatings can meet the environmental and regulatory challenges.

All companies are striving to reduce maintenance budgets for their infrastructure while optimising performance, so new corrosion protection materials must be cost effective and non-hazardous. Some of the latest advances in coating technology have included the development of protective coatings that can respond to damage and changes in the external environment. However, such coatings must not be a threat to the environment and maintenance personnel and ideally must be applied using conventional methods currently used to coat structures for environmental protection. New materials, such as nanostructured materials and organic metals, may be appropriate as the basis for developing damage-responsive coatings and structures.

Internal protection

Internal corrosion controls for gas pipelines includes reducing the water content of the gas and adding corrosion inhibitors to the fluid flow. For oil pipelines, internal corrosion is mitigated by reducing the water content then adding corrosion inhibitors, scale inhibitors and biological controls. Pipeline operators must continually monitor the effectiveness of their chosen corrosion controls. Erosion in the internal pipeline wall can be controlled by removing solids from the

stream and by the mechanical design of the layout, while corrosion caused by moisture in a gas stream can be controlled by decreasing the dew point of the gas to a temperature below the lowest operating temperature likely to be encountered in the pipeline.

One way to allow for corrosion is to make the pipe wall thicker to provide additional metal for corrosion loss. The corrosion allowance should anticipate the maximum metal loss over the life of the pipeline and ensure that sufficient wall thickness remains to enable the pipeline to operate safely. A corrosion allowance should not be a substitute for other corrosion protection measures, however, since actual corrosion rates in practice can be much higher than those used in the estimation of the corrosion allowance.

Pipeline supports

The oil and gas industry invests large sums of money in the design, laying and protection of pipelines. In comparison, far less attention is paid to the mounting and bracing structures that support and guide a pipeline.

One of the most common support methods is to lay the pipe onto a standard structural element such as an I-beam or metal channel and secure it in place with a stabilising U-bolt. A similar method is to use a saddle clamp, where the pipe is clamped between two rolled plates, with one of the plates welded to a structural element. These two categories account for more than 95% of support points on a typical structure.

One alternative is to weld a part of the pipe, which is usually free to move, directly to the support structure. This is a common approach for insulated piping systems. There are a number of other alternative pipe supports, such as flange bolt supports, various type of pipe hangers and other specialty-type supports.

Not surprisingly, it is the beam supports and the saddle clamps that cause the majority of problems. Visual inspection and other non-destructive testing is often difficult and it is virtually impos-

sible to paint or otherwise maintain some areas of the pipe at the support. Some of these support types may even develop bimetallic contact. Despite both the pipe and support being steel, the metallurgical differences can still provide a small potential difference to create a corrosion cell.

The shape of a cylindrical pipe on a flat surface also forms a crevice where moisture gathers and evaporation is restricted. The moisture softens the paint, which fails and exposes bare metal which is then in constant contact with water. Once corrosion starts, there can be rapid wall loss leading to eventual failure of the pipe.

An effective way to reduce corrosion risk is to minimise the contact point between the support and pipe so that no crevice is formed. Water cannot be trapped, so corrosion no longer occurs. With minimal contact, air can also circulate and evaporate moisture beneath pipes, and it's far easier to inspect the contact area. If the material of the support is non-metallic, the pipe can be electrically isolated so there is no contact between dissimilar metals.

About the ACA

The ACA is a not-for-profit industry association established in 1955 to service the needs of Australian and New Zealand companies, organisations and individuals involved in the fight against corrosion. The vision of the organisation is to reduce the impact of corrosion.

Throughout the year, the ACA also conducts educational activities such as seminars and training courses across Australia and New Zealand to inform and guide organisations and practitioners about corrosion topics. Corrosion specialists certified by the ACA and other organisations have the experience and understanding of corrosion causes and solutions that allow them to recommend mechanisms and procedures to consultants and asset owners.

Australasian Corrosion Association
www.corrosion.com.au

HYGIENIC LEVEL SENSOR

For sanitary applications, WIKA has developed a magnetostrictive level sensor in hygienic design. The model FLM-H sensor, certified in accordance with 3A Sanitary Standards, measures level in tanks and vessels with an accuracy of better than 0.5 mm. The level is detected continuously and regardless of any physicochemical changes of state in the media, such as foaming or boiling effects.

The measuring instrument, based on the float principle, even operates reliably with CIP/SIP processes - cleaning liquids and elevated temperatures do not have any negative influence. The guide tube is directly welded to the process connection. This leads to a crevice-free joint between the connection and the measuring cell, without the need for additional seals.

The 4-20 mA output of the sensor, also available with HART protocol, transmits the signal even over long distances. The level is displayed proportional to volume or height. No calibration is required following installation. The sensor is suitable for SIL 2 (IEC 61508).

WIKA Australia
www.wika.com.au

STORAGE WATER INSTRUMENT

The Rittmeyer RIPRESS premium provides accurate calculation of storage water volume (resolution <1 mm). It has an integrated data logger with remote access and SMS alarm available via an external GSM/GPRS modem.

The product is suitable for deep reservoirs that require level and volume management with high accuracy (<0.01% FS) and long-term stability. The controller functions include programmable conversion tables (eg, for lake measurement), trend function and limit-value monitoring.

The controller features 100% thermal compensation with a quartz crystal temperature signal and transmitters for hydrostatic or pneumatic pressure measurement. It also has a built-in web server for easy configuration and offers IEC 60870-5-104 and Modbus RTU/TCP communication. No recalibration is required.

Automated Control Pty Ltd
www.automatedcontrol.com.au

New robotic palletising solution for VIP Packaging

Palletising in any manufacturing plant presents many operational challenges: from production efficiencies to safety considerations. This is particularly applicable to a company like VIP Packaging, a leading plastic and steel packaging company in Australia and New Zealand, which manufactures packaging solutions for the food and beverage, personal care, household consumer and industrial chemical industries.

Among their products, VIP Packaging manufactures extrusion blow-moulded and injection stretch blow-moulded high-density polyethylene (HDPE), polyethylene terephthalate (PET) and low-density polyethylene (LDPE) bottles.

To minimise manual handling and gain production efficiencies, VIP Packaging called on Machinery Automation & Robotics (MAR) to deliver a solution to automate their palletising production line.

There were three main palletising lines that would benefit from automation. These include the packaging handling, the pallet handling and the stretch wrapping. The challenge was to design a system that could automate the entire palletising line and deliver not only the cost savings, but also improve quality control and safety.

After studying the operation of the VIP system, MAR presented a fully automated system - including three robots, a pallet dispenser, a twin shuttle, a three-vision system, a fully automated HMI, an automated pallet strapping system and a pallet stretching machine - which were all controlled by one central motor control centre from Rockwell Automation.

PowerFlex 4M drives, used to provide effective motor control for the conveyors and the entire robotic palletising system, were controlled by CompactLogix.

The operator workstation features a PanelView Plus 1000 touch screen that, in addition to the primary control for the system start and stop function, also includes programming for the manual control of conveyors, manual control of the robot gripper, shift production data, error reporting, robot control and access control for maintenance and cleaning.

"The programming of the system is simple and straightforward and it caters for a wide range of bottle-design shapes and sizes. The control platform also includes integrated safety systems which deliver improved operator safety," said Geoff Biscaya, rigid containers general manager at VIP Packaging.

When moving to an automated system, operator safety was a key priority. With this in mind, the system was designed with six separate safety zones that require no supervision. Parts of the plant were required to operate 24 hours a day, seven days a week, which is why reliability and minimising downtime was very important to VIP Packaging. This was addressed by designing and building the line to allow access to specific components that wear over time in a particular machine, without having to shut down the whole plant during routine maintenance.

"We are continuing to realise the many benefits that the new automated system is providing. It has met all of our key requirements by allowing us to reduce labour costs, while also improving quality control and safety. In addition, the solution has established a low base cost to run the plant over time, which helps to improve our productivity and competitiveness."

The automation of the palletising line has resulted in significant labour savings, quality control and reduced running costs. The return on investment is approximately two years, which will allow VIP Packaging to reap the rewards from the solution for many years to come.

A longer and more detailed version of this article can be read online at: http://bit.ly/1ddelnr

Rockwell Automation Australia
www.rockwellautomation.com.au

LASER SENSOR

Banner Engineering has announced that its Q3X laser contrast sensor is now available with fixed background suppression. Featuring contrast detection plus fixed background suppression, the Q3X LD50 detects targets within the desired sensing range while ignoring objects in the background.

Out of the box, the product operates like a fixed-field laser sensor and detects targets within its 50 mm sensing range. However, the sensor can be programmed for low-contrast sensing within this range while ignoring objects at least 60 mm away. This allows the sensor to accurately detect its target without background objects affecting its performance.

Featuring high-speed part detection as fast as 250 μs, the laser contrast sensor can capture up to 2000 events per second.

A typical application is label detection on a bottle, where contrast differences between the label and bottle provide reliable detection but the sensor must ignore a shiny metal rail in the background. The shiny metal background could cause a false trigger for standard diffuse-mode sensors.

The product is designed with an angled, three-digit display of signal intensity, which provides high visibility of operating conditions from multiple angles. For intuitive user set-up, the sensor has two tactile buttons located below the display.
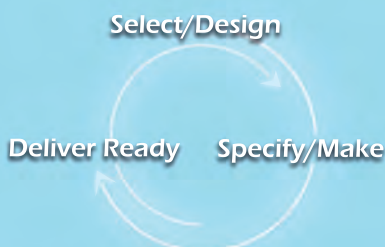
The unit's robust nickel-plated zinc die-cast housing ensures reliable performance even in environments with exposure to cutting fluids and oils. Sensors are also rated to IP67, IP68 and IP69K for enhanced protection to water immersion and high-pressure washdown.

Micromax Pty Ltd
www.micromaxsa.com.au

AC DRIVE

The Allen-Bradley PowerFlex 527 is an AC drive designed to work exclusively with a Logix-based programmable automation controller (PAC). The drive leverages the benefits of the controller capabilities and uses a single software package - Rockwell Software Studio 5000 Logix Designer - to help simplify machine development and operation.

The drive complements machines using Allen-Bradley CompactLogix, ControlLogix or GuardLogix PACs and Allen-Bradley Kinetix servo drives. It uses embedded instructions shared with Kinetix servo drives, providing the same user experience for configuration, programming and control of both types of drives, helping save valuable engineering time.

The drive also offers a solution for machine applications - such as pumps, fans and in-feed and out-feed conveyors - that need simple speed control for induction motors. The servo drive handles the more precise motor control operations involving speed, torque and position control.

The drive uses an EtherNet/IP infrastructure and features built-in, dual-port EtherNet/IP functionality. The infrastructure enables networked safety, which helps reduce the hardware, wiring and labour costs associated with implementing a SIL 3/PLe safety solution.

The use of networked safety also reduces panel space and allows access to more diagnostic data on machine safety faults and causes, without requiring contactors or relays. The drive also offers a safe torque off function option for hardwired safety.

The drive is available in five frame sizes, with power ratings from 0.4 to 22 kW and global voltage ratings of 100-600 V.

Rockwell Automation Australia
www.rockwellautomation.com.au

COMPACT DIGITAL I/O

Turck has released the first ultracompact, digital block-I/O modules of the TBEN-S (small) series. The fully potted IP67 modules are only 3.2 x 14.2 cm and allow assembly directly on the machine. With their extended temperature range from -40°C to +70°C, the devices are highly versatile.

Every module can be operated without additional gateways in each of the three ethernet systems: Profinet, Modbus TCP or EtherNet/IP. The devices recognise the used protocol automatically by listening to the communication during the start-up phase. An integrated switch allows the use of the devices in a line topology.

The modules are available in five variants: four digital inputs and outputs; eight digital inputs with module diagnostics; eight digital inputs with channel diagnostics; eight digital outputs; and eight universal digital inputs and outputs. The outputs switch a current of up to 2 A. Each output channel is continuously monitored by an integrated diagnostic system that records all events in the device's event log. This simplifies troubleshooting and reduces downtime.

The internal web server, which can be used to display diagnostics in plain text, also contributes to this. The webpage has been set up following the concept of 'responsive design' so that a smartphone can also be used for easy diagnosis.

Turck Australia Pty Ltd
www.turck.com.au

HIGH-POWER BRUSHLESS DC MOTOR

A 14-pole, high-torque, 40 mm brushless DC inner rotor motor has been released by maxon motor.

It can produce continuous torque levels of 232 mNm at over 7000 rpm. The 100 W version brings the line of multipole brushless motors a third power option, along with the existing 50 and 70 W versions.

There are 9, 18, 36 and 48 V nominal DC windings available. The 50 and 70 W motors have a maximum speed of 10,000 rpm and the 100 W motor has a maximum speed of 8000 rpm. It is possible to use the speed constant of the motor (commonly known as Kv) to configure the motor for the speed requirement of the motor's application. For example, using the 18 V winding of the 70 W motor and a system voltage of 24 V, the motor will have a no-load running speed of just over 10,000 rpm. This speed can then be controlled with one of maxon's brushless DC servo amplifiers.

The motors are available with tiny high-resolution encoders and compact planetary gears. Services from maxon motor Australia are available to help with the configuration of motor, gearhead, encoder and control units to suit the specific needs of the application.

maxon motor Australia Pty Ltd
www.maxonmotor.com.au

HYGIENIC-DESIGN ELECTRIC ACTUATOR

The ERD22 electric rod cylinder from Tolomatic is a suitable replacement for pneumatic cylinders and an alternative to manual processes. With force capabilities up to 7 kN, the all-300 series stainless steel ERD22 features hygienic design and an IP69k rating. Suitable for medium-force washdown applications, the cylinder is USDA approved for meat, poultry and dairy applications such as pumping, fluid dispensing, volumetric filling, slicing, cutting and chopping.

In combination with Tolomatic's ACS actuator control solution, the product creates a complete, single-axis linear motion system. The ACS servo controller and servo driver simplify linear motion with easy set-up and infinite positioning with EtherNet/IP CIP I/O commands. The ACS is ODVA conformant.

The range of electric cylinders is now available in seven body sizes with stroke lengths up to 1 m, speeds up to 1.4 m/s and forces up to 20 kN, depending on the size and screw choice. The product family is available with ball screws, roller screws and acme screws for a variety of force, speed and life options to fit most applications. In addition to food and beverage processing, the electric actuators are suitable for a variety of motion control applications including product changeovers, gating/sorting/diverting, pick-and-place and heat staking/sonic welding.

Pneumatic Products
www.pneumatics.com.au
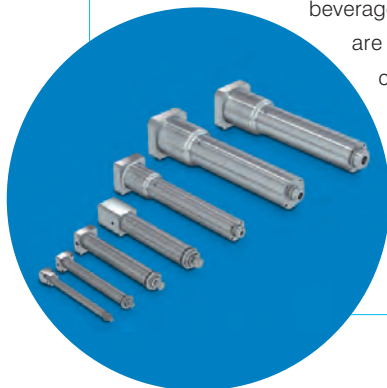
COMPRESSED AIR EFFICIENCY MODULE

The MS6-E2M energy-efficiency module can actively intervene in the air supply, particularly during standby operation, reducing the consumption of compressed air. At the same time, the automatic monitoring of important operating parameters such as flow and pressure ensures a reliable production process. The module is suitable for new energy-efficient machines and, with the simple connection of the sensors to a PLC, it can also be used as an easy retrofit on older installations which need to operate more energy efficiently.

The energy-efficiency module can be adapted by the user by means of a manual input device (MMI) or Profibus to the requirements of a particular installation. The user can quickly and easily specify parameters on the basis of which the E2M detects whether the machine in question is currently in production operation or not. During downtime the compressed air supply to the machine is shut off, thus preventing any air from escaping through leakages in the machine. This works in a similar way to the automatic stop/start system in a modern car so that no more energy is wasted.

When the product is in shut-off mode, it checks the installation for leaks. If the energy-efficiency module detects a pressure drop equal to a value predefined by the user, it signals this to the plant control system. The E2M automatically detects leaks in a piping system, enabling the user to carry out maintenance as and when needed.

Festo Pty Ltd
www.festo.com.au

MINIATURE STEPPER MOTORS

RS Components has announced availability of 42 and 56 mm stepper motors in the SANMOTION range of high-torque, low-vibration hybrid stepper motors from Sanyo Denki.

Targeting machine builders and manufacturers of scientific and medical instruments, the two-phase stepper motors are available with unipolar or bipolar windings together with a range of matching microstepping DC drivers.

Typically used to precisely control moving parts in the x- and y-axes within a machine, Sanyo Denki stepper motors are widely used in many motion control applications - from the control of industrial inkjet printers and labelling machinery through to use in scientific measuring instruments and medical instrumentation for blood and DNA testing.

Key devices in the range include the slim SS2421-5041 42 mm stepper motor, which is aimed at space-critical applications and offers a highly compact stepping system in a package that is only 11.6 mm deep; and the 14 mm frame-size SH2141-5541, which is a miniature frame motor that is only 30 mm deep. The IP65-rated 56 mm motors - such as the SP2566-5160 - are suitable for harsh environments that are subject to dust and water, such as food processing machinery and equipment that is designed for operation outside.

RS Components Pty Ltd
www.rsaustralia.com

Sensorless vector drives prove the difference for machine builder

It's not that often that we hear a good news story of an Australian-owned machinery manufacturer producing machines almost exclusively for export. But this is exactly what one Melbourne-based company has been doing for more than 40 years!

The machines they produce are large carousel screen printers, used primarily for the textile industry. They print images directly onto fabric substrates, which are typically T-shirts, tea towels or larger articles like umbrellas and beach towels. A variety of machines are made, depending on the article size and printing capacity required.

Each machine has between 8 and 22 arms that extend radially from a central rotating mechanism, which is indexed by a variable speed drive (VSD). Each arm has a horizontal plate mounted on it, with a print head that prints a single colour by wiping an ink squeegee over a screen mask. A 0.4 kW VSD makes this movement. An ink flood bar applies a reverse wiping action to prepare for the next print. The machine then indexes so that the next head can apply another colour. Printing is finished once an article has traversed all the heads and all the colours have thus been applied.

The company is highly successful and has established a reputation for building robust and reliable machines that are easy to use. However, like so many OEMs, it found its customers were demanding ever faster throughput for greater yields and less waste.

While little could be done about the printing process, a significant improvement in performance could be achieved if the indexation time could be reduced. However, the motor/gearbox combination was already running at capacity and both the physical space available and extra costs precluded anything larger and jeopardised the machine's viability in the marketplace.

The first attempt was to drive the motor harder during indexing. Unfortunately, with the mechanical system already at capacity, this resulted in a dramatic increase in drive errors and the shortening of the drive's life! Clearly, a better drive system was needed.

It was at this point that Chris Probst, Omron's product manager for drive products, analysed the load requirements for the largest machine, which had 22 arms, an 8760 mm-diameter footprint and a weight of 4700 kg. A gearbox was needed due to the very high inertia of the 1500 kg rotating mass that needed to be indexed.

Standard induction motors, as used here, exhibit non-linear torque and speed characteristics as their load changes. Also, VSDs have traditionally had difficulty producing sufficient torque at low frequencies due to the nature of their operation. However, both limitations can be improved considerably by using a VSD in sensorless vector control mode.

Probst decided to change out the standard VSD in favour of a 4 kW Omron 3G3MX2, running in its sensorless vector control mode. As Probst explained: "Vector control drives enable greater and more dynamic control over motor torque/power because the VSD independently controls motor speed and torque. This results in ordinary induction motors operating more smoothly and with faster acceleration and deceleration when compared to typical VSD voltage/frequency control." Furthermore, this model VSD can also produce 200% of its rated torque at 0.5 Hz output frequency.

But there was another feature in the 3G3MX2 that proved vital for this application: drive programming. Using the inputs and outputs built into the drive, sensors in the field can be connected directly to the drive and acted upon by its internal program. It was found that the starting and stopping of the machine during indexing could be controlled more quickly and precisely by the built-in program, giving a competitive advantage.

One consequence of the improved indexing times was additional regeneration resulting from faster stopping, adding energy to the VSD's DC bus. With some simple analysis by Omron's CX-Drive diagnostic software, the required regeneration braking resistor capacity was calculated and applied to the machine.

The end result of the faster indexing is that yield has improved by 25%, to around 1000 articles per hour. Nearly all of the 100 machines produced each year are exported and, ironically, most of the most countries buying them have thriving rag trades!

Omron Electronics Pty Ltd
www.omron.com.au

MODBUS GATEWAY

ORing has developed the IDS-M311 Modbus gateway to facilitate integration of serial devices on the edge of industrial networks with the ethernet network.

The IDS-M311 enables communications between the RTU, ASCII and TCP protocols used in factories. Higher management and operating efficiency allows different Modbus equipment with non IP-based interfaces such as DCS, PLC, HMI, electric power load measurement systems and other sensors or measuring devices to communicate and exchange data over ethernet.

The IDS-M311 is a 1-port Modbus gateway, which supports RS232/422/485. In addition to communications between Modbus TCP and Modbus RTU/ASCII, the IDS-M311 is able to support up to 16 TCP masters and 32 requests simultaneously.

With support for up to 31 RTU/ASCII devices, the IDS-M311 can effectively connect a high density of Modbus nodes on the same network. It is a suitable solution to secure serial-to-ethernet data communications in harsh operating industrial environments. It has dual power supplies for redundancy and a light, compact enclosure with DIN rail design.

Ethernet Australia
www.ethernetaustralia.com.au

ANTIVIBRATION THERMOWELL

For applications in processes with high flow rates, WIKA is now offering thermowells in the ScrutonWell design. This variant is designed to damp the excitation that leads to vibrations, which in turn can cause failures.

The ScrutonWell design is applicable to all solid-machined, bar stock thermowells from WIKA. The helical form of the stem is available in two versions: manufactured in a single piece or with helices welded onto it. Installation and removal are just as easy as with a standard thermowell.

ScrutonWell thermowells are recommended when a thermowell fails the strength calculation, according to ASME PTC 19.3 TW-2010, and where other optimisations (shorter or stronger stem or support collar) are not desirable. In comparison with the conventional stem form, the design is said to reduce the excitations causing vibration by more than 90%.

WIKA Australia
www.wika.com.au

SANITARY TUBULAR CABLE CONVEYOR

The FLEXI-DISC sanitary tubular cable conveyor, for fragile bulk foods and non-foods, allows rapid washdown of the system between production runs.

The sanitary conveyor moves bulk material using high-strength, one-piece polymer discs - affixed to polymer-coated 304 or 316 stainless steel cable - that slide within smooth stainless steel tubing, moving fragile products gently, quietly and dust-free.

The discs evacuate the conveyor tubing of material at the conclusion of a conveying cycle, virtually eliminating wasted product. Any material clinging to the cable and disc assembly can be continually removed during operation by the stiff bristles of a brush box or by a residual return chute equipped with a disc ramp that dislodges material and returns it to the product stream.

All material outlets, inlets and tubing are made of 304 or 316 stainless steel, with quick-disconnect covers and continuous welds ground smooth and flush with contiguous polished walls.

Wet or dry cleaning accessories can be quickly attached to the FLEXI-DISC cable to allow rapid, thorough sanitising of the system, minimising downtime between changeovers. Optional clean-in-place systems provide automated sanitising of the system and clear inspection tubing can be located in any straight run.

Modular system components - including 304 or 316 stainless steel tubing, drive wheel housings, tension wheel housings, metered and non-metered inlets and discharges with and without valves - can be combined in unlimited configurations to move materials horizontally, vertically or at any angle through small holes in walls or ceilings.

Flexicon Corporation (Australia) Pty Limited
www.flexicon.com.au
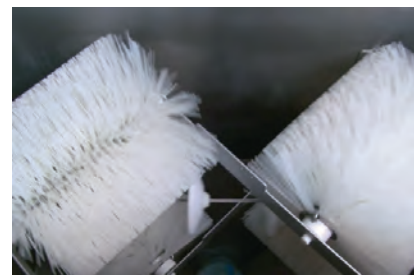
HEAT EXCHANGERS

From both economic and environmental standpoints, gasketed-plate heat exchangers are suitable choices for heating and cooling in hygienic applications. Optimised gasketed-plate heat exchangers enable reliable production, easy cleaning and energy-efficient operation and are vital to supplying safe and competitive products.

Alfa Laval FrontLine gasketed-plate heat exchangers can be supplied with stainless steel frames and clip plates especially suited to the application. A herringbone plate pattern with optimised pressing depths and plate material provides gentle, uniform heat transfer of sensitive hygienic products - including products with viscosities up to 5000 cPs, with small particles and limited fibre lengths or products that require pressure of up to 21 bar.

The optimised geometries of FrontLine plates provide gentle and uniform heat transfer and feature relatively few contact points, which prolong operating times. In addition, the distribution area ensures a uniform flow over the entire plate surface, with no stagnant flow zones and less risk of fouling build-up. With increased clean-in-place efficiency and less fouling, the plates are easy to clean and provide a longer time between cleaning cycles, ensuring more production output.

Alfa Laval Pty Ltd
www.alfalaval.com.au

OPTICAL SENSORS

Measurement of extremely small components in the micron range often pushes optical sensors beyond their limits. The Wenglor PNBC range offers a maximum resolution of 0.06 μm with only 0.05% linearity error. This precision is supported by high reproducibility and thermal stability at output rates of up to 30 kHz.

The PNBC sensors work with a high-resolution CMOS line array and determine distance to the object by means of angular measurement. High-quality optics make measured values possible, which can be read out with 16-bit resolution and can thus go all the way down to 0.06 μm.

Built-in algorithms allow stable measured values to be obtained even for difficult-to-measure surfaces, such as sheet metal with a speckle effect, and can be reliably evaluated. Minimised temperature drift makes use of the sensor possible immediately after switching it on without a long warm-up phase, and the sensor can get down to work without delay.

The measured value is read out simultaneously via the analog output and an ethernet interface. This provides users with the opportunity of forwarding data to higher-level system participants directly via network integration. The sensors are also equipped with up to four switching outputs, which can also be used as incremental encoder inputs or for switching emitted light on and off.

Treotham Automation Pty Ltd
www.treotham.com.au

LTE CELLULAR GATEWAY

The OnCell G3470A-LTE is an LTE cellular gateway with built-in power and antenna isolation to mitigate electromagnetic interference; a wide operating temperature of between -30°C and 70°C; and GuaranLink technology for reliable connectivity.

LTE technology enables larger bandwidth and lower latency for remote monitoring systems. With video data transmission demand increasing in industrial automation, LTE devices will be a solution to fulfil the demand.

To take advantage of the high speed and performance that LTE offers, the OnCell G3470A-LTE includes hardware and software features to ensure seamless transmission. It is suitable for remote video surveillance applications that require wireless transmission rates of up to 100 Mbps and wired gigabit connections.

The OnCell Central Manager V2.0 software is available to manage and monitor up to 2000 OnCell devices simultaneously.

Madison Technologies
www.madisontech.com

VARIABLE-AREA FLOW METERS

The AW-Lake family of variable-area flow meters offer a large range of customisation options.

Available in different pipe sizes (½-2″) and thread standards (BSPP, NPT or SAE), the flow meters come in a choice of aluminium, brass or stainless steel bodies with standard flow scales ranging from 0.25 to 550 L/min, calibrated to water, oils, air or gas. Their rugged design offers full customisation of flow indicators, switches (one or two SPDT relays) and transmitters (analog mA, voltage or pulse output).

All units will have 2% FS or better accuracy over the full flow range, while automated calibration software with high-res vision will ensure the flow profile of each meter is accounted for individually. After individual calibration data is created, each meter is precisely marked with a laser engraving system.

Unlike rotameters or other variable-area flow sensors, the Lake construction ensures fluid is always contained within a robust metal pipe section (up to 6000 psi at 315°C) with a spring/magnet system that allows the sensor to be installed in any orientation, without the need for flow conditioning and without the media ever contacting the flow scale.

Control Components Pty Ltd
www.controlcomponents.com.au

CABLES FOR COLD ENVIRONMENTS

Turck's extremelife-60 cables are designed with a specially engineered proprietary cable jacket material, allowing them to remain flexible enough to work at -40°C and carry UL -60°C cold bend and UL/CSA -40°C cold impact listings as well as an FT4 flame rating.

The extremelife-60 cables are available in a wide variety of AWG sizes, constructions, conductor counts and cable jacket colours.

In addition to their cold bend, cold impact and flame ratings, the extremelife-60 cables also have ITC and PLTC approval from UL, as well as CIC approval from CSA, which makes these cables code compliant for NEC and CEC Class 1 Division 2 hazardous location applications. They also carry Oil Res I and Oil Res II approvals and are UL listed for exposed run and direct burial. This means the cables pass the exact crush and impact tests as metal clad cable, but without metal cladding.

With the rugged construction, combination of approvals and flexible cable jacket that will not break or crack even when pulled or bent in extreme cold, these cables are a logical fit for cold weather oil and gas installations where flexibility in the cold along with a UL/CSA listed and hazardous location rated jacket has always been a challenge. All of these attributes combine to bring a fully compliant cable that will result in less downtime and more cost savings.

Turck Australia Pty Ltd
www.turck.com.au

At $3.52 billion

do you want
a piece of this pie?

By 2019 the global field service market is forecast to be worth $3.52 billion *

Field Service Business delivers the latest breaking news, product innovations & industry expertise to Australian service professionals managing, resourcing & enabling mobile workers.

Register now for your free email newsletter, print magazine or eMag: **www.fieldservicebusiness.com.au/subscribe**

* Feb 2015 research by Markets and Markets

FSB **FIELD SERVICE** BUSINESS
managing, resourcing & enabling your team in the field

NEW PRODUCTS

AP ROUTER

The Antaira Technologies APR-3100N router offers VPN tunnelling as well as IEEE 802.11 a/b/g/n wireless connectivity. It can handle WAN connection types such as dynamic/static IP, PPPoE, PPTP and L2TP. For wireless, the user can set up on a 2.4 or 5 GHz wireless network and employ WEP/WPA/WPA-PSK/WPA2-PSK/WPA Enterprise or WPA2 Enterprise security features. The series has a maximum data rate of 300 Mbps and can also support IEEE 802.11i / 802.1x authentication.

The product incorporates a router and wireless access point within a single industrial-grade enclosure. The wireless network routing features of the series include VPN settings IPsec, Open VPN, PPTP and L2TP. The unit also provides administrative tools such as wireless status connection monitoring, event monitoring by syslog, IP address access table and blockage to websites with either a URL or keyword.

The unit's connection interface has two RJ45 10/100BaseTx ports per radio. It comes with two omnidirectional antennas that utilise MIMO technology to improve the communication performance of the wireless access point. The device has a wide voltage input range of 12-48 VDC, making it suitable for both mobile and stationary applications.

The product features a hardened industrial-grade IP30 metal enclosure and compact dimensions measuring 46 x 155 x 115 mm. The unit also has options for either a standard temperature range (-10°C to 60°C) or an extended temperature range (-35°C to 70°C).

Antaira Technologies
www.antaira.com.tw

ROTARY INDUCTIVE SENSOR

Turck has released the QR24 rotary inductive sensor to expand programmability for industrial applications and improve rotary position feedback for the mobile equipment market. The QR24 for mobile equipment features a low operating voltage of 8-30 VDC with 0.5-4.5 V output. This technology is immune to vibrations and interference, ensuring accuracy and longevity to avoid replacement downtime, and comes in IP68/IP69K rated housing to protect against moisture and dust in demanding environments.

All QR24 sensors use resistance inductive capacitance (RLC) measuring technology to process and communicate position. Each sensor is manufactured with printed emitter and receiver coil systems fully potted within the housing. When the emitter coils are activated with a high-frequency AC field, they produce an inductive RLC circuit with the positioning element. The position of that element is processed based on the induced signal to the receiver coils in the sensors.

For mobile equipment and industrial applications, this wear-free technology is suitable when applied directly to the shaft of a motor to provide accuracy for position feedback. In conjunction with RLC technology, Turck's QR24 rotary inductive sensors provide high resolution and 16-bit noiseless operation. The double resonator system offers increased distance capability and high-end signal processing with a multicore microprocessor for enhanced speed.

Turck Australia Pty Ltd
www.turck.com.au

PRESSURE SENSORS

The PU type pressure transmitters from ifm efector are easy and quick to connect and have a short response time of 2 ms. In addition, the units feature a resistant welded stainless steel housing, a measurement accuracy of <±0.8% and a repeatability of <±0.05%.

These pressure transmitters with DEUTSCH or AMP connectors enable a quick and simple installation especially in mobile machines. Additionally, the compact units in their robust stainless steel housings only need a width across flats of 19 mm. The thin-film measuring cell directly welded with the process connection is the technological basis for a high measurement accuracy and repeatability.

The PU type sensors are suitable for hydraulic and pneumatic applications with a high operating pressure. With a protection rating IP67/IP69K, high vibration and shock resistance, good EMC compatibility and E1 conformity, this series particularly supports use in mobile machines.

ifm efector pty ltd
www.ifmefector.com

THERMOCOUPLE INPUT MODULE

The Artila Electronics RIO-2018 is a web-enabled thermocouple input module. Powered by an ARM Cortex M3 processor and FreeRTOS operating system, the product features three thermocouple input channels, one 10/100 Mbps ethernet port, two isolated digital input channels and one relay output.

The unit is equipped with a MAXIM MAX31855 cold-junction compensation thermocouple converter, while an industrial-grade OMEGA connector is utilised to ensure a seamless signal connection. The converter resolves temperature to 0.25°C and allows readings as high as +1800°C and as low as -270°C. Open thermocouple fault detection is also built in the converter. The isolated digital input and relay output can be assigned to monitor external events and trigger alarms.

In addition to the web interface, the product also supports the Modbus TCP industrial protocol. The AIOLib Linux library is available, featuring a programmer-friendly API.

Micromax Pty Ltd
www.micromaxsa.com.au

TRIO POWER SUPPLIES

Standard functions combined with high quality & reliability

☑ High system availability due to robust design
☑ Space savings in the control cabinet
☑ Reliable starting of heavy loads with dynamic boost
☑ Quick and easy installation due to push-in connection

PHŒNIX CONTACT
INSPIRING INNOVATIONS

www.phoenixcontact.com.au/trio | 1300 786 411

OPTIMISATION ALGORITHMS

Optimisation algorithms, which try to find the minimum values of mathematical functions, are everywhere in engineering. Among other things, they're used to evaluate design tradeoffs, to assess control systems and to find patterns in data.

One way to solve a difficult optimisation problem is to first reduce it to a related but much simpler problem, then gradually add complexity back in, solving each new problem in turn and using its solution as a guide to solving the next one. This approach seems to work well in practice, but it's never been characterised theoretically.

This month, at the International Conference on Energy Minimization Methods in Computer Vision and Pattern Recognition, Hossein Mobahi, a postdoctoral researcher at MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL), and John Fisher, a senior research scientist at CSAIL, describe a way to generate that sequence of simplified functions that guarantees the best approximation that the method can offer.

"There are some fundamental questions about this method that we answer for the first time," Mobahi says. "For example, I told you that you start from a simple problem, but I didn't tell you how

you choose that simple problem. There are infinitely many functions you can start with. Which one is good? Even if I tell you what function to start with, there are infinitely many ways to transform that to your actual problem. And that transformation affects what you get at the end."

Bottoming out

To get a sense of how optimisation works, suppose that you're a canned-food manufacturer trying to save money on steel, so you want a can design that minimises the ratio of surface area to volume. That ratio is a function of the can's height and radius, so if you can find the minimum value of the function, you'll know the can's optimal dimensions. If you're a car designer trying to balance the costs of components made from different materials with the car's weight and wind resistance, your function - known in optimisation as a 'cost function' - will be much more complex, but the principle is the same.
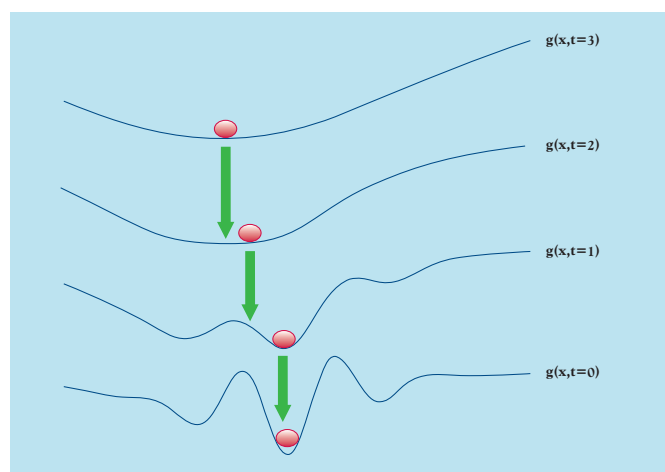
This sequence of graphs illustrates the application of the researchers' technique to a real-world computer vision problem. The solution to each successive problem (red balls) is used to initialise (green arrows) the search for a solution to the next. (Courtesy of the researchers.)

Machine learning algorithms frequently attempt to identify features of data sets that are useful for classification tasks - say, visual feature characteristics of cars. Finding the smallest such set of features with the greatest predictive value is also an optimisation problem.

"Most of the efficient algorithms that we have for solving optimisation tasks work based on local search, which means you initialise them with some guess about the solution and then try to see in which direction you can improve that, and then they take that step," Mobahi says. "Using this technique, they can converge to something called a local minimum, which means a point that compared to its neighbourhood is lower. But it may not be a global minimum. There could be a point that is much lower but farther away."

A local minimum is guaranteed to be a global minimum, however, if the function is convex, meaning that it slopes everywhere towards its minimum. The function $y = x^2$ is convex, since it describes a parabola centred at the origin. The function $y = \sin(x)$ is not, since it describes a sine wave that undulates up and down.

Smooth sailing

Mobahi and Fisher's method begins by trying to find a convex approximation of an optimisation problem, using a technique called Gaussian smoothing. Gaussian smoothing converts the cost function into a related function that gives not the value that the cost function would, but a weighted average of all the surrounding values. This has the effect of smoothing out any abrupt dips or ascents in the cost function's graph.

The weights assigned the surrounding values are determined by a Gaussian function, or normal distribution - the bell curve familiar from basic statistics. Nearby values count more towards the average than distant values do.

The width of a Gaussian function is determined by a single parameter. Mobahi and Fisher begin with a very wide Gaussian, which, under certain conditions, yields a convex function. Then they steadily contract the width of the Gaussian, generating a series of intermediary problems. At each stage, they use the solution to the last problem to initialise the search for a solution to the next one. By the time the width of the distribution has shrunk to zero, they've recovered the original cost function, since every value is simply the average of itself.

"The continuation method for optimisation is something that is really widely used in practice, widely used in computer vision, for solving alignment problems, for solving tracking problems - a bunch of different places, but it's not very well understood," said John Wright, an assistant professor of electrical engineering at Columbia University who was not involved in this work. "The interesting thing about Hossein's work in general, and this paper in particular, is that he's really digging into this continuation method and trying to see what we can say analytically about this.

"The practical utility of that is, there might be any number of different ways that you could go about doing smoothing or trying to do coarse-to-fine optimisation," Wright added. "If you know ahead of time that there's a right one, then you don't waste a lot of time pursuing the wrong ones. You have a recipe rather than having to look around."

Massachusetts Institute of Technology
www.mit.edu

EMBEDDED COMPUTER

The MXE-200/200i series is an ultracompact fanless embedded platform, based on Intel Atom SoC E3845/E3826 processors. Its aluminium housing is designed to withstand industrial-grade EMI/EMS (compliant with EN 61000-6-4, 61000-6-2) and is fully operable under harsh conditions. The MXE-200/200i series combines a controller and gateway function in one unit, significantly reducing space/wiring and device costs.

The series offers an operating temperature range of -20 to 70°C and a vibration/shock resistance of $5g_{RMS}$ and up to 100g.

Full support for the Intel IoT Gateway, integrated Wind River Intelligent Device Platform XT, and McAfee Embedded Control, and ADLINK's proprietary SEMA Cloud solution all maximise manageability and security for the MXE-200i.

Adlink's MXE-200/200i features two GbE LAN ports, two COM ports, two USB 2.0 ports and one USB 3.0 port, four optional isolated DI and four isolated DO with interrupt support, dual mini PCIe slots with one mSATA support and USIM socket supporting communication with connections such as Wi-Fi, BT, 3G and LTE.

For more information about the MXE-200/200i series visit the ADLINK Technology product page, or for more information on ADLINK's IoT solutions, click here.

ADLINK Technology Inc
www.adlinktech.com

WIRELESS SENSOR EQUIPMENT

The Oleumtech OT Series battery-powered wireless sensors, I/O and gateways have achieved formal IECex certification for use in hazardous installations. The sensors, I/O and gateways have a wide range of applications: they can be used for hydrostatic, ultrasonic or magnetostrictive level monitoring as well as pressure, temperature (RTD or thermocouple) and flow monitoring in hazardous areas previously not available with standard wireless products.

This opens up applications in areas such as automotive refuelling stations or petrol stations; oil refineries, rigs and processing plants; chemical processing plants; printing industries, paper and textiles; aircraft refuelling and hangars; surface-coating industries; underground coalmines; sewage treatment plants; gas pipelines and distribution centres; grain handling and storage; woodworking areas; and sugar refineries.

The sensors, I/O and gateways can be applied in point-to-point, point-to-multipoint and peer-to-peer to create or extend monitoring and control networks where there is limited access to powerlines. By enabling wireless connectivity for SCADA monitoring and control, the Oleumtech OT Series eliminates trenching, running conduit or wires. It enables organisations to reduce commissioning time and implementation cost (equipment, labour and maintenance). The OleumTech Wireless Network ties into virtually any backbone SCADA solutions and is compatible with most third-party RTU, PLC, DCS and HMI devices.

Automation Group
www.automationgroup.com.au

SAFETY CONTROLLER EXPANSION MODULE

The Flexi Soft Drive Monitor is an expansion module for the Flexi Soft modular safety controller, allowing drives without integrated safety functions to be used.

The Flexi Soft Drive Monitor also manages safety functions for drives in fixed machines as well as mobile applications. The SLS (safe limited speed), SSM (safe speed monitoring) and SOS (safe operating stop) functions ensure safe drive monitoring. The main advantage is that processes do not necessarily need to be stopped, which makes it quicker to carry out maintenance and adjustments as the machine can be operated at a reduced speed.

In the case of machine tools, mechanical partitions such as covers or protective doors can be used to protect hazardous points. To ensure that tool or work pieces can be changed quickly and safely, the Flexi Soft Drive Monitor module first brings the drive to a secure stop and prevents any possible restart. Immediately afterwards, it releases the opening of the mechanical physical guard.

The quick and safe operation are said to considerably improve the machine's productivity and availability without delay. In the event of an emergency, it is crucial that the machine stops right away: the SS1 and SS2 functions (safe stop) ensure that the machine is safely stopped in a controlled manner.

SICK Pty Ltd
www.sick.com.au

EXTENDED DRIVE RANGE

ABB has extended its general-purpose ACS580 variable speed drives range with drive modules for cabinet installation.

The ACS580 cabinet drive module range supplies 250-500 kW of power in a 380-480 V voltage range, while the wall-mounted power range is 0.75-250 kW and voltage range is 380-480 V. The wall-mounted drive with IP55, UL Type 12 protection class is designed for applications exposed to dust, moisture and vibration.

The ACS580 has features that improve energy efficiency and reduce operating wear without the need of additional external programmable logic controllers. In pumping applications, the drive can momentarily raise levels or pressure to extend energy-saving sleep mode. The pump and fan control (PFC) can operate auxiliary pumps in parallel to balance pumping duties between motors while meeting variable demand. This results in reduced stress on main equipment and systems as well as in lower maintenance and operation costs.

The ACS580 drives support connectivity to mobile applications. The drives can create a QR code on the control panel screen with information such as serial number, firmware version, user-modified parameters and fault history, as well as status and diagnostics data. By scanning the QR code with a smartphone, users receive error code descriptions and recommendations on how to troubleshoot the drive through the ABB Drivebase app.

Integrated Bluetooth technology between the drive and a mobile device allows the user to simultaneously connect to the drive and the internet via 3G/4G or Wi-Fi. This gives users access to cloud-based services through a touch-screen app.

ABB Australia Pty Ltd
www.abbaustralia.com.au

TURBIDITY SENSOR

Endress+Hauser has introduced the Turbimax CUS52D turbidity sensor for process water filtration and other industrial process turbidity conditions.

The sensor performs laboratory-quality turbidity measurements without the need for extensive bypass installations, avoiding product or water losses. The sensor measures turbidity from 0 to 4000 NTU in accordance with ISO 7027.

The sensor's surface minimises the build-up of biofilms and particulates. The ability to operate at high pressures (up to 145 psi) makes suppressing air bubbles possible. For bypass operation, an optional air bubble trap catches smaller air bubbles.

The sensor is available in immersion, flow cell and in-line versions. The device can be used at the raw water inlet of any plant and the outlet of process filtration and clarification, and is suited to filter monitoring, filter backwashing and all stages of industrial water purification. The sensor is suitable for hygienic food and beverage processes including brewing, spirits, soft drink and dairy. Its fast response time (<1 s) enables it to perform as a primary process variable in control applications.

A smart solid-state reference allows the sensor to be verified and calibrated before insertion into the process without the use of potentially harmful liquid standards. Matched to each sensor for maximum calibration accuracy, the solid-state references are simple to use and provide consistent, clear results.

Endress+Hauser Australia Pty Ltd
www.au.endress.com

SAFETY SWITCH FOR GATES, COVERS AND FLAPS

Pilz has released a Slimline version of its PSEN code safety switch which is suitable for assembly on gates, covers and flaps.

Coded safety switches PSEN-code are used to monitor the position of guards and also for general position monitoring. The PSENcode range has been extended by the addition of a version in slimline design. In comparison with the compact design it has very low profile housing (13 mm height) at the same width.

Thanks to RFID transponder technology, the coded safety switches PSENcode combine maximum manipulation protection with a very small space requirement.

The latest member of the PSENcode range also enables installation on gates, covers or flaps in up to four actuation and approach directions and two different operating distances each. Thanks to its versatility, PSENcode offers design engineers a high degree of freedom when designing the machine to Cat 4 or PL e. So it is also possible to implement applications that were previously only realised using magnetic safety switches.

The Slimline Safety switches also come with a range of options such as a variety of operating ranges, a magnetic latching system that has a residual holding force and ensures the doors close exactly as positioned every time as well a variety of indication and diagnostic functions.

Pilz Australia Industrial Automation LP
www.pilz.com.au

COMPACT MILITARY-GRADE SYSTEMS

The ADLINK Extreme Rugged HPERC-IBR-H Series are military-grade systems in sealed, IP67-rated enclosures featuring high-speed MIL-DTL-38999 connectors. At just 63.5/100 x 150/178 x 203 mm, the series features highly integrated, compact, VITA 75 compliant units.

The series follows on from ADLINK's HPERC-IBR-M Series and features two models: the HPERC-IBR-HC cold-plate mount system and the HPERC-IBR-HH finned-convection system. Both units offer dual- or quad-core Intel Core i7 processor technology and optional GPGPU parallel processing engines on a 16-lane, third-generation PCI Express interface, as well as DDR3L-1333 ECC soldered-down memory up to 16 GB.

The Extreme Rugged system also includes dual removable solid-state drives, as well as four USB 3.0 ports, two USB 2.0 ports, four GbE ports, seven serial (RS-232/422/485) ports and one VGA port, plus three digital video HDMI/DisplayPort/DVI interfaces. The series provides expansion options to support fast and easy integration of additional interface cards such as PCI/104-Express and Mini PCI Express.

To endure harsh environments, the series was developed using ADLINK's Rugged by Design methodology to withstand extreme shock, corrosion and galvanic oxidation. The HPERC-IBR offers flexible cooling options: the HPERC-IBR-HC (-40°C to +85°C) for cold-plate cooling; and the HPERC-IBR-HH (-40°C to +75°C) designed for natural convection cooling.

The series is compliant to VITA 75 20/21/22 small-form-factor mounting and provides a wide array of fast I/O via MIL-DTL-38999 connectors.

ADLINK Technology Inc
www.adlinktech.com

AS I SEE IT

THE DIGITAL REINVENTION OF THE AUSTRALIAN PROCESS INDUSTRY

The process industry faces continued pressure to be productive, profitable and efficient, while dealing with the challenges of rising capital and labour costs in Australia. As a result, operators are looking for new ways to reduce costs and increase efficiencies.

We believe the industry is reaching a tipping point, where in the near future many conventional methods and technologies will no longer be viable. Shifting realities mean that innovation is vital. The most successful operations will be embracing emerging technologies, creating digital ecosystems and preparing for new operational realities.

Honeywell knows data is the next major digital revolution - specifically the digitisation of manufacturing. The process industry has not been as quick to adopt IT as some other sectors due to a widely held belief that control systems and IT infrastructures need to operate independently. However, by embracing digitisation, process manufacturers can produce the products and energy we need more efficiently, and more safely, than ever before.

The role of hardware remains pivotal, but increasingly a plant's value is about much more than machinery, pipes and equipment. Digitisation shifts the source of competitive advantage away from physical infrastructure towards leveraging valuable data and information.

Real and sustainable productivity improvements require significant adjustments to traditional operational methods. These changes demand a transformation across all areas of the organisation, from the boardroom to the assembly line and beyond.

The key is not simply more information but better use of that information. By turning the bits and bytes of data into meaningful, actionable insights, operators will see a difference in site efficiencies.

Data is everywhere in the process industry. Every minute of a process - from warehousing to maintenance - is measured, tracked and stored. When information is integrated across the whole business, employees can see the business impact of the decisions they make, increasing the likelihood of those decisions being good ones.

One of the biggest threats to production is uncertainty. If employees doubt the information on their screens, operations can be interrupted. Delays of even a day can cost millions, which is why Honeywell designs all control systems with quality of information in mind, giving employees the confidence to run machinery to its limits for longer periods of time.

The resource crunch presents a clear threat to our global and local economies, introducing new challenges to doing business. At Honeywell, we believe the digital transformation of process manufacturing is the best response to answering these challenges, allowing plants to control the flow of meaningful information, from machine to machine and employee to employee.

The Australian process industry faces multiple challenges and trials in 2015 and beyond. Real productivity gains will only come from complete end-to-end transformation. By leveraging new technologies, organisations can consolidate data from dissimilar sources to streamline operations. There is no doubt that digital transformation will impact process manufacturing; however, it is up to us as an industry to decide how we embrace these developments.

Neil Wold is Pacific Sales Director for Honeywell Process Solutions (HPS). In this role he oversees HPS's sales teams in Australia and New Zealand. He was previously Regional Manager for HPS in Western Australia and the Northern Territory. Neil has over 35 years' experience in the process industry, with specific expertise in power and minerals processing.

WNIPT
WHAT'S NEW IN PROCESS TECHNOLOGY
AUTOMATION + CONTROL + INSTRUMENTATION

POWERFLO

Optimise your System's Performance and Attack Noise at its Source

REGISTER TODAY FOR YOUR

FREE SUBSCRIPTION

If you live in Australia or New Zealand and your job title matches those on this form, we will deliver you 11 complimentary issues a year!

THREE QUICK WAYS TO REGISTER

+ WWW.PROCESSONLINE.COM.AU/SUBSCRIBE

+ FAX THIS COMPLETED FORM TO (02) 9489 1265

+ MAIL THIS COMPLETED FORM TO LOCKED BAG 1289 WAHROONGA NSW 2076

Wrapper number:
(if known)

*All fields required to qualify for your FREE magazine

NAME*

JOB TITLE*

ORGANISATION NAME*

ADDRESS*

POSTCODE*   COUNTRY*

PHONE NUMBER*   MOBILE NUMBER*

EMAIL*

SIGNATURE*   DATE*

JOB FUNCTION* [   ] INDUSTRY* [   ] COMPANY SIZE* [   ]
[select one from lists to the right>]
PRIVACY POLICY AVAILABLE ONLINE AT WWW.WESTWICK-FARROW.COM.AU

OPTIONS

I WOULD LIKE TO RECEIVE THIS MAGAZINE   [   ]DIGITAL [   ]PRINT [   ]BOTH

I WOULD ALSO LIKE TO RECEIVE THE *PROCESS ONLINE* E-NEWSLETTER [   ]

JOB FUNCTION
(please choose one only)
1   Management - Director/C-level
2   Management - Specialist
18 Analyst/Researcher
20 Business Owner
21 Comms Tech/Engineer
13 Consultant
14 Contractor/Tradesperson
16 Education/Training
3   Engineer - Electrical
4   Engineer - Electronics
5   Engineer - Process
6   Engineer - Project
15 OHS/EHS
7   Purchasing/Procurement
19 Sales/Marketing
12 Scientific Officer - QA
11 Scientific Officer - R&D
17 Student - Undergrad/Apprentice
10 Technical Officer
9   Technician - IT
8   Technician - Maintenance/Service

INDUSTRY
(please choose one only)
1   Agriculture/Rural
47 Biotech
2   Building/Construction
3   Chemicals/Allied Products
4   Communications Systems
50 Consulting/Contracting
5   Defence/Military
6   Education/Training
41 Electrical
8   Engineering Services
9   Environmental Services
10 Finance/Banking/Insurance/Legal
11 Food - Bakery
12 Food - Beverages
13 Food - Confectionary
14 Food - Dairy
15 Food - Fruit & Vegetables
16 Food - Meat
17 Government
20 Health/Medical
43 Information Technology
21 Instrumentalities (eg CSIRO)
26 Laboratory - Analytical
27 Laboratory - Clinical/Medical
28 Laboratory - Life Sciences
29 Logistics/Transport/Warehouse
30 Manufacturing
31 Mining
32 Oil/Gas/Coal
33 Packaging
48 Pharma/BioPharma
34 Processing
35 Retail/Wholesale/Hire
36 Service/Maintenance
38 Testing/Certification (eg NATA)
39 Utilities

COMPANY SIZE
(please choose one only)
1   Under 100
2   100 – 250
3   251 – 500
4   Over 500

WNIPT