STAUFF Pressure Transmitter & Reader

STAUFF present a new series of innovative wireless RFID (Radio Frequency Identification) pressure testing equipment for fluid technology applications. The PT-RF series of pressure transmitters are an alternative solution for universal pressure measurements that provide benefits for system operators, maintenance personnel, repair technicians and original equipment manufacturers, as it requires neither internal nor external power supply, is completely maintenance free, and the recording process is automated therefore minimising the possibilities of human error.

Function

The STAUFF PT-RF wireless pressure tester has been developed to be integrated into fluid technology plants (permanently or temporarily) to measure and record pressure and temperature data using appropriate tube connection adaptors. The energy required for a measurement is transferred to the pressure transmitter via the antenna of the PT-RF reading device using wireless RFID technology. A minimum distance of only 1.5 cm is required from the antenna to the tip of the PT-RF transmitter for the duration of the measurement. The PT-RF transmitter is activated by the press of a button (the measured value is determined within only 0.5 seconds), and then the data is transmitted immediately to the PT-RF reader (together with additional relevant information), displayed on the screen and recorded. The software included with the unit allows subsequent evaluation and further processing of the measurement results previously transmitted to the PC or notebook via the USB interface. This substantially facilitates and speeds up the process of determining pressure values without any risk of introducing contamination into the hydraulic system.

Pressure Transmitter

PT-RF pressure transmitters are available in five different versions and cover the common measuring ranges between 0 ... 16 bar and 0 ... 600 bar (relative), depending on requirements, with a precision of max ±0.5 per cent full scale. Temperature readings are from -40 °C ... +85 °C measuring units can also be displayed in PSI and °F. Due to the stainless steel housing and the fully enclosed internal parts, pressure transmitters from the PT-RF series are hermetically sealed (IP69 protection rating) and can also be used under extreme conditions.

The pressure transmitters are available with 1/4" BSP male (with FPM profile sealing rings) screw-in thread ensuring easy integration at the design stage or in existing machinery or systems. Using suitable adaptors based on straight 24° cutting ring fittings as per ISO 8434-1 and DIN 2353, the transmitters can also be easily installed in metric pipes with outer diameters between 6 and 42 mm which are commonly used in hydraulic applications.

The corresponding connection pieces are available for the temporary or permanent use of existing test couplings with adaptor thread M16x2 (e.g. STAUFF Test 20 series).

Features

- More than 15,000 measurement sets can be stored on the internal memory
- LED backlit display
- By the press of a button, a current measured value is determined within only 0.5 seconds
- Direct transmission of the measured values and output on the illuminated display
- Suitable for liquid or gaseous media
- Process connection 1/4" BSP male
- Pressure range: 16, 60, 160, 400, 600 bar
- Identifiable serial number
- Industry Accreditation - CE certified

Advantages

- For permanent or temporary use in hydraulic systems
- No battery or extensive cabling required
- Maintenance-free
- Compact and portable
- No moving parts
- Completely potted
- IP69 protection rating (transmitter) i.e. Dust tight and protected against splashing water
- Multiple sensing using one reader
- Stainless steel body and ceramic tipped transmitters

PT-RF Complete System

STAUFF PT-RF series is also available in a complete system tailored to customer requirements. All complete systems are supplied in a handy carrying case containing individually shaped foam inserts for a maximum of 10 pressure transmitters and 10 process connection adaptors, and contain the following: PT-RF reader, PT-RF pressure transmitters, process adaptors, manual and software, quick guide, USB cable and power supply including country specific adaptors.

Please contact your local STAUFF office for more information.

Australia
+61 2 4271 9000

New Zealand
+64 9 271 4812

www.stauff.com
The Druck DPI 612 Flex series is the fifth generation in the DPI 600 family, which was first introduced in 1984. The DPI 600 family revolutionised test and calibration by providing all the tools for pressure generation and signal measurement in self-contained portable packages, becoming the industry workhorse. Today it is simply known as the ‘Druck’.

Building on more than three decades of experience in pressure sensor development and calibration, the DPI 612 Flex series provides all the convenience and reliability of a true ‘Druck’, yet offers interchangeable pressure modules, higher accuracy and significantly improved pressure generation.

Three model choices provide the capability to generate from 95% vacuum to 20 bar/300 psi or 100 bar/1500 psi and 0-1000 bar/15,000 psi. Flexible pressure ranging means users can hot swap without tools and seals so users always have the right range for the job — with 31 interchangeable pressure modules from 25 mbar/10 inH₂O to 1000 bar/15,000 psi.

For convenience and to protect your budget, the pressure modules are fully interchangeable between the DPI 612 Flex series and the DPI 620 Genii multifunction calibrator/communicator series. Simple touch screen operation offers fast, three-touch set-up for any application and with built-in documenting capabilities the DPI 612 calculates PASS/FAIL errors, stores results and interfaces with GE’s calibration management software.

For more information on the DPI612 Flex Series or other Druck calibrators, contact Thermo Fisher Scientific Australia on 1300 735 295 or email infoIndustrialAU@thermofisher.com.

Thermo Fisher Scientific
www.thermofisher.com.au
JOINING AND FASTENING

FOOD-GRADE CONVEYOR BELTS
There comes a time when the ends of a conveyor belt must be joined. Whether a first-time installation, replacement or repair, the question is: what methods are available to fasten the two ends, and which one is best for your application.

Shutting down a conveyor system to install a new belt, or repair an old one, involves downtime — and downtime means lost productivity. Even if the belt is replaced during scheduled maintenance, care must be taken to ensure that the splice meets certain operating criteria. For raw food processing in particular, the belt splice must meet strict hygiene standards.

Other key considerations include belt installation know-how and cost. Maintenance crews in food manufacturing plants are probably familiar with mechanical splicing equipment and techniques. Mechanical splices are easier to make and less costly than vulcanised or welded splices; however, they may compromise belt integrity and pose a food safety hazard.

**Food-grade conveyor belts**

Not long ago, fabric-ply rubber belting was the prevalent technology for a wide range of conveying applications, including food processing.

For food-handling operations, the ends of PVC-coated fabric belts were usually joined on conveying equipment by vulcanisation (heat welding). The two ends were cut in opposing zigzag patterns, called a finger splice, and then placed into a heated press that melted the vinyl ends together. Using the equipment to make these splices took skill and craftsmanship. Maintenance departments were trained in the use of the machinery and had the know-how to complete the operation successfully, and many distributors also had the necessary equipment and skill.

When a fabric-ply belt needed to be replaced due to wear or damage, mechanical splices were generally used. In comparison to the vulcanisation process, mechanical splices were easy to accomplish in the field and only required simple, inexpensive tools.

**Modular plastic belting**

Over time, modular plastic belting began to replace fabric-ply rubber belting. Modular plastic belting is also referred to as tabletop chain or modular chain, and this type of belting is formed by a series of interlocking hinges and pins. Because it is strong and durable, it has gained popularity for a wide range of conveying applications, including food manufacturing.

Since replacing hinges and pins is a relatively simple matter, belt ends could be joined easily to any length in the plant. The need for expensive vulcanising equipment went by the wayside, along with the skill of vulcanising belts. Today, vulcanising operations are primarily performed by belt manufacturers and specialised fabricators.

Despite its popularity, modular belting has a major drawback in relation to sanitisation, as the hinges and crevices can harbour bacteria.

**Polyurethane belting**

The newest technology in conveyor belting is extruded polyurethane, which offers many benefits over modular plastic chain in food-convoying operations. Polyurethane belts are available in a wide range of profiles, materials and covers. They can be reinforced with tensile cords to add load capacity and resist stretch, and they offer high resistance to the harsh detergents and chemicals used in washdown.

Having smooth surfaces and sealed edges, there is no place for microbes to take hold, so polyurethane belts can be easily sanitised using clean-in-place (CIP) practices and there is no risk of contamination by broken hinges or pins.

Joining or fastening a polyurethane belt offers the same challenges as did splicing the fabric-ply rubber belting of the past.

**Vulcanising or welding**

Heat welding the two ends of a polyurethane belt can be done in the factory, in a specialised belt shop or in the field. The belt ends are typically joined using either a finger splice or a butt splice.

**Finger splice — factory weld**

At the factory or in a fabricator’s shop, an endless belt is formed using a long finger splice. The ends of the belt are precisely cut in an interlocking pattern and, using specialised equipment, the long fingers are joined together and subjected to heat and pressure — the result is a heat-welded bond that is virtually indistinguishable from the rest of the belt. A factory finger splice
produces the highest-strength bond possible. This heat-welding process completely seals any exposed tensile cords or fibres in reinforced belts, eliminating any places for microbes to hide.

Producing a factory finger weld requires a large, water-cooled press and needs to be performed in a controlled environment with respect to temperature, moisture and contaminants. Factory splicing equipment costs typically more than $10,000, so given the time and cost considerations, factory splices are impractical for many end-user operations.

**Finger splice — field weld**

In the field, you can form an endless belt by joining the two ends using a short finger splice. This splice is similar to a factory weld, but the fingers are shorter and therefore easier to weld. Like the factory weld, a field finger weld produces a strong, smooth bond that maintains the integrity of the belt profile and provides a sanitary surface for ease of cleaning.

However, the equipment and operator skill needed to produce a field finger splice is similar to that required for the factory splice.

**Field butt splice**

A butt splice involves making a straight cut perpendicular to the belt centreline, and then joining the two ends using a hot vulcanisation process.

Different belt manufacturers have different methods of heat welding the straight belt ends together. One method uses a ‘hot plate’ to melt the ends of the belt while the ends are pushed together. Another method involves cutting a ‘V trough’ into the end of each belt and the ends are melted together using a plastic electrode. Another butt splice method uses a heat wand placed between the clamped ends of the belt. A fixture drives the two belt ends together against the heat wand, melting the urethane. The heat wand is removed and the ends cooled and trimmed to complete the splice.

Making butt welds in the field involves smaller, more user-friendly and less expensive equipment than that used for finger welds. The equipment applies pressure to the belt ends from top and bottom and operates on an eight-minute heat cycle. At roughly $5000, it costs half as much as finger welding equipment.

While easier to use in the field, butt welds do not produce the strength of finger welds — a butt weld is more likely to come apart as it stresses over the pulleys. When there are reinforcing tensile cords, some methods are unsuitable because they push the cords to the top of the belt, destroying the integrity of the reinforcement.

**Mechanical fastening**

Mechanical fastening is the process of joining belt ends by means of metal or plastic hinges or plates. Many fasteners used today were born in the era of fabric ply belts and are now being applied to the newer polyurethane belts.

Food-grade polyurethane belting is typically joined using hinged fasteners, including wire hooks, lacing, staples and rivets. The fasteners are attached to each end of the belt and then joined by means of a hinge pin.

**Operational considerations**

Belt working tension is rated in pounds per inch of belt width (PIW) or N/mm. Factors that affect belt tensioning include the load to be carried, gravity, acceleration and coefficient of friction. When deciding which splicing method to use, one must consider the weakening effect of the splice on belt working tension.

Before deciding which fastener system to use, determine the belt tension rating (in PIW), measure the thickness of the belt and measure the smallest diameter pulley in the

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**Table 1: Joining and fastening food grade conveyor belts**

<table>
<thead>
<tr>
<th>Gates Mectrol food grade belt</th>
<th>PC20</th>
<th>PC10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Max allowable tension (lbs per inch width)¹</td>
<td></td>
</tr>
<tr>
<td>Factory weld (PC20 finger length 80 mm) (PC10 finger length 78 mm)</td>
<td>50 64</td>
<td>46 35</td>
</tr>
<tr>
<td>Field finger weld (finger length 25 mm)</td>
<td>40 52</td>
<td>37 31</td>
</tr>
<tr>
<td>Field weld straight cut</td>
<td>40 52</td>
<td>37 31</td>
</tr>
<tr>
<td>PosiLace</td>
<td>21 21</td>
<td>21 N/A</td>
</tr>
<tr>
<td>Flexco UX115 Clipper wire hooks</td>
<td>31 41</td>
<td>37 31</td>
</tr>
<tr>
<td>Flexco APF150 Alligator plastic rivet</td>
<td>25 25</td>
<td>23 N/A</td>
</tr>
<tr>
<td>Flexco APF 100 Alligator plastic rivet</td>
<td>N/A N/A</td>
<td>N/A 25</td>
</tr>
<tr>
<td>Flexco RS125 Alligator Ready Set staple</td>
<td>26 26</td>
<td>23 N/A</td>
</tr>
<tr>
<td>Flexco RS62 Alligator Ready Set staple</td>
<td>N/A N/A</td>
<td>N/A 25</td>
</tr>
</tbody>
</table>

¹ Max allowable set as the lower of the 25% yield strength or 2% stretch of weld or splice.
system. Based on these criteria, choose the appropriate fastener size and then choose the material suited to the application. Hinge pins and fasteners are available in a wide range of metallic and non-metallic materials, including stainless steel and plastic.

**Pros and cons of mechanical fastening systems**

Mechanical splicing is quick and economical compared to vulcanising or heat welding. Splicing materials and installation tools cost relatively little, and splices can be made in minutes versus hours.

While some skill is needed to make a field mechanical splice, nearly anyone can do so. Some mechanical splices can be installed with nothing more than a straight edge, a knife and a hammer. A mechanical splice also wastes less belt material — just the amount needed to square both ends of the belt.

The ability to make quick splices on the plant floor helps reduce downtime. Splices are safe to install — since there is no exposure to heat and chemicals — and they are easy to inspect for damage, because the splice is plainly visible. Mechanical splices are compatible with almost any type of belt.

In food operations, the biggest disadvantage to mechanical splices is sanitation. Unlike vulcanised splices, mechanical splices penetrate the belt, leaving holes where bacteria can accumulate. Also, with reinforced polyurethane belts, mechanical splices leave the tensile cords on the belt ends exposed, providing another area for microbes to grow.

Some mechanical fastening systems are also prone to breakage. The broken pieces can potentially contaminate the food being conveyed and, in cases where food streams must pass through metal detectors, fastening systems should not have metal parts.

Mechanical splices are also not as strong as vulcanised finger splices, so tensile strength is compromised to a greater degree. Mechanical splices also require a larger pulley diameter because the splice components lack flexibility. Some mechanical splice styles also raise the belt profile, so they don’t pass as easily over pulleys and cleaners. If not properly installed they can snag and tear, leaving pieces that can contaminate the food stream.

**Common hinged mechanical fastening systems**

**Wire hooks**

Wire hooks date back to the days of flat, fabric belts. The hooks were designed to penetrate and grab onto the fabric plies of the belt carcass and they offer a low-profile fastening system that is relatively simple to install. The tooling is inexpensive, and hooks are available in a wide variety of sizes and materials such as stainless steel. There are various methods of installation, including a rolling device and a hydraulic device.

The key benefit to this fastening system is ease of installation and the ability to take the belt on and off. However, the risk of the hooks breaking and contaminating the food stream is a factor to consider before employing this fastening method.

**Metal staples**

Metal staples are suitable for light- and medium-duty fastener applications on synthetic carcass belts. The staples can be pre-inserted into a one-piece fastener strip which is placed over the ends of the belt and installed using a lightweight tool. The staples are then driven into place with a hammer. They are available in stainless steel alloys for food-grade applications and can be used to repair a belt for temporary use or as a permanent splice.

**Metal lacing**

Metal lacing gives the appearance of a piano hinge. The laces are provided in a continuous strip to match the width of the belt, they are placed over the ends of the belt, and the teeth are embedded into the belt carcass with a hammer. Metal lacing creates a low-profile splice that is economical to install. It can operate over pulleys as small as 1” in diameter.

Both fasteners and hinge pins are available in stainless steel for food-grade applications. The hinge pins are removable so the belt can be separated for cleaning.

**Plastic rivets**

Plastic rivets are a non-metallic fastener that can pass through metal detectors. This non-scratching, non-magnetic fastening system has rivets with bevelled front edges that are moulded into the carcass to present a flat surface, and they travel over conveyor components more easily and quietly than metal systems.

Plastic-rivet fasteners have hinge pins that can be removed for belt disassembly and cleaning. This fastening system requires a special tool for assembly and offers a low-cost alternative to vulcanisation.

**Hybrid joining systems**

There are joining systems that combine both vulcanisation and mechanical fastening, such as the Gates Mectrol PosiLace joining system. Designed for light to medium-weight loads using fibre-reinforced polyurethane belts, the fastening system has no metal parts to set off metal detectors.

In this case, the vulcanisation process takes place at the factory, where urethane is welded to the belt in the pin area. An end cap is welded to the belt ends to seal off the tensile cords and maintain the integrity of the reinforcement. This process also prevents exposing the cords to bacteria. A plastic pin is inserted through the splice to join the belt ends in the field. No special tooling or equipment is needed. The splice is easy to clean and sanitise.

**Conclusion**

There are many factors to consider when choosing a belt-joining or fastening system. For food-grade polyurethane belts, vulcanisation is a superior method for creating a splice that meets the highest sanitisation standards. In raw food processing operations especially, hygienic considerations may outweigh the lower cost and ease of installation that characterise most mechanical fastening systems.

Gates Australia Pty Ltd
www.gates.com/australia
MODBUS GATEWAY
The MESR400 series Modbus gateways bridge devices on Modbus serial networks (RS-232, RS-422 or RS-485) with those on Modbus TCP networks, enabling seamless integration. The serial ports can be accessed over a LAN or WAN using direct IP-mode connections. Supporting up to 16 masters and 32 slaves, the gateways feature auto-detecting 10/100 Mbps copper and fibre optic options.

The easy-to-use software is designed for Windows XP, Windows Vista, Windows 7 and Windows 2003/2008 Server, features Modbus messaging priority control, and allows management through multiple TCP/IP client sessions. Serial data rates up to 230 Kbps ensure maximum network flexibility. The Class 1/Division 2 MESR gateways are built for industrial environments, featuring a slim IP30 DIN rail mountable case. They operate from a range of DC power supply voltages and have pluggable terminal block connectors.

The gateways can be powered via a barrel connector or a terminal block. An additional ethernet port functions much like an ethernet switch, allowing pass-through connectivity for other ethernet devices. This port can also be used to ‘daisy chain’ multiple gateways.

Interworld Electronics and Computer Industries
www.ieci.com.au

INTELLIGENT ENCODERS
A range of intelligent encoders has been released by ifm efector. They can be used as incremental encoders, with a resolution of between 2 and 10,000 pulses/revolution that can be freely set. The units can also be used as counters, with the direction of counting (up/down) and the switch points selectable.

The third operating mode is used for rotational speed monitoring — the user sets a rotational speed range and the outputs switch when the current value is above or below the limit values. The encoders can therefore operate automatically as rotational speed or standstill monitoring systems.

All functions and parameters can be set on the unit via push-buttons and the LED display. During operation the current pulse, count or rotational speed values are displayed according to the set mode. Two LED colours (red and green) immediately indicate if the machine is in the acceptable range or if limit values have been exceeded. Additionally, the display can be rotated electronically by 180°, giving flexible installation positions. The parameters can also be set via IO-Link.

High shock and vibration resistance enables use for applications in harsh environments. The cable entry or the rotatable M12 connection for connector units can be used both radially and axially. In the end the selection of the suitable encoder is reduced to the matching flange and the shaft — everything else can be freely configured by the user.

ifm efector pty ltd
www.ifmefector.com

TEMPERATURE CALIBRATION SOFTWARE
Fluke Calibration has introduced an upgrade to its MET/TEMP II temperature calibration software, a calibration solution for testing batches of sensors, calculating characterisation of coefficients and generating calibration reports. Version 5.0 adds compatibility with the Microsoft Windows 7 and 8 operating systems and support for Fluke Calibration’s most recent temperature calibration sources: the 9190A Ultra-Cool field metrology well and 9118A thermocouple calibration furnace.

MET/TEMP II automates batch calibrations of platinum resistance thermometers (PRTs), liquid-in-glass (LIG) and bimetallic thermometers, thermistors and a wide range of thermocouple sensors to standardise testing for consistent results no matter who performs the calibration. Virtually any sensor with a resistance or voltage output can be tested, up to 100 sensors at a time.

Manual calibration of temperature sensors can be expensive, time-consuming and error prone. With MET/TEMP II, calibration technicians simply place test sensors in a heat source, connect them to a temperature readout, enter the set-up information and start the test. Hours of testing are performed while the technician is free to do other work. After the test is complete, the technician prints and signs the report and ships the sensors and report to the customer, helping to improve productivity and saving hours.

The intuitive interface guides the user through configuring and running calibration tests and reporting, making it easy to learn and use.

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**PRESSURE MODULE**

The Fluke 700PD3 dual-pressure module will measure positive and negative pressure in any one of 10 different units.

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**SUSPENDED SOLIDS MEASUREMENT**

The Triton TR86 sensor is designed for the continuous measurement of suspended solids in various ranges from 0–1000 to 0–5000 mg/L.

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VIDEOSCOPE

The Olympus iPLEX UltraLite is designed to simplify industrial visual inspections where portability and access are an issue. The UltraLite is suitable for thorough examinations of various equipment, including heat exchangers, welded pipes, gas and wind turbines, and a range of automotive equipment. It is available to rent from TechRentals.

This videoscope facilitates one-handed user operation, with the LCD monitor and control unit integrated together, and at 900 g is both portable and lightweight. The unit is also shock resistant, and the insertion tube is operable underwater at depths up to 3.5 m (excluding the stereo tip adapters).

The UltraLite 3.5 m insertion tube is 6 mm in diameter and is capable of 120° articulation (up, down, right and left). Both still image and video recording (JPEG 300 kB and MPEG-4 600 kbps) are available, and the unit is IP55 rain and dust proof.

For more information, click here.

TechRentals Pty Ltd
www.trcorporation.com

INDUCTIVE SENSORS

With a one-piece metal housing, the MFH/M9H series sensors are very robust. They offer a protection rating of IP65/68/69K for harsh environments and temperature stability from -25°C to 120°C.

The technology relies on an MR measuring cell biased with a permanent magnet in one housing, so only ferrous metals, like tool steel, are detected and an external magnet is not necessary. Other metals, such as aluminium or stainless steel, do not have any effect on the sensor. The units can not only be used as limit switches in hydraulic cylinders but also on other hydraulic components, like valves or pumps, in mechanical engineering or in the process industry. The MFH design offers a bursting pressure exceeding 2000 bar.

The full-metal housing is made from a single piece and ensures permanent mechanical resistance to pressure fluctuations, shock and vibration. The high-temperature stability allows the unit to maintain its full functionality both in very hot machines and in outdoor applications in direct sunlight. The easy-to-mount sensors come with an M12 or M14 housing.

Ifm efector Pty Ltd
www.ifmefector.com

DATA LOGGER FOR WATER MONITORING

The STS DL.OCS/N/RS485 data logger is designed for use in the water industry and can measure water level, media temperature and conductivity.

Housing a piezo-resistive sensor, the logger is accurate to 0.03% FS and can store up to 1.5 million measurements. Battery life of up to 10 years has been achieved by the use of internal depassivation circuitry and the reliability of electronic componentry has been further enhanced by the use of an integrated desiccator.

The data logger is suitable for a wide range of applications, including the monitoring of ground and surface water, civil construction foundation surveillance and the monitoring of saltwater intrusion into aquifers.

The product has a robust design that can withstand operating temperatures from -5°C to 80°C and includes 16 MB of flash storage for up to 500,000 measurements per parameter. Manufactured from stainless steel or titanium, it has an ingress protection class of IP68.

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POLYCARBONATE ENCLOSURES

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With no requirement for complicated tools due to an easy-to-use DIN rail frame set design and lockable inner door, customisation is easily achieved either on-site or in the factory.

The low-profile stages are designed for a wide range of applications from highly dynamic two-sided LED wafer processing to quasi-static optical metrology. There are nine models in the series to accommodate user requirements for travel and accuracy.

Aerotech’s proprietary direct-drive technology offers high speed and accurate positioning coupled with maintenance-free operation and long service life. The stages are available with one or two motors per axis allowing optimisation of each axis for the specific application and process.

XY LINEAR MOTOR STAGES

Aerotech has introduced a series of integrated open-frame stages with precise geometric performance and micrometre-level straightness. The PlanarDLA stages include high-precision roller bearings, precision-machined surfaces and non-contact linear motors that drive through the axes’ centre of stiffness. These features result in straightness to ±0.5µm and flatness to ±1.25µm.

The PlanarDLA enables high throughput and high accuracy processing with 2 m/s velocities and 2g acceleration. It achieves high servo bandwidths while maximising the clear aperture available and keeping the overall height to a minimum.

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**PNEUMATIC PINCH VALVES**

Pneumatic pinch valves are a clean and technically straightforward solution for controlling and shutting off a wide range of media. Whether dealing with liquid, fibrous, particulate or granular substances, they bring durability to all kinds of production processes. The VZQA product series from Festo offers modularity, flexibility, durability, ease of cleaning and straightforward servicing.

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The pinch valves can be actuated with low operating pressures. Depending on the medium and media pressure, an operating pressure of just 0.3–1 bar is sufficient in filling and metering applications to tightly shut off the media flow.

The pinch valves come with different connection caps, housing materials and sealing components for a variety of configuration options. This makes them useful for optimising pneumatic delivery and metering systems, powder coating systems and suction and compressed air control units. At the same time, their compact design saves valuable installation space.

The valve’s sealing cartridge can be quickly changed in just a few simple steps and without any special tools. The product can be cleaned quickly and easily.

**Festo Pty Ltd**
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**WIRELESS TOWER LIGHT**

Banner Engineering has introduced the TL70 wireless tower light. Combining the company’s light range with its Sure Cross wireless technology, the TL70 wireless tower light provides monitoring and visual status indication for remote applications, general and machine status, mobile call for parts, mobile workstations, threshold sensing and other applications where wired solutions are not cost-effective, practical or possible.

With a Banner Sure Cross wireless node built into the tower base, the TL70 offers two-way wireless communication to eliminate costly and time-consuming wiring requirements. The TL70 is available in 900 MHz or 2.4 GHz configurations, allowing them to be used with matching, standard Banner wireless gateways.

The bright 70 mm light tower can display up to five colours plus an audible alarm module in one tower. The loud 92 dB adjustable alarm features four user-selectable tones, including pulsed, chirp, siren or continuous. Each light segment can be selected solid on or flashing, and appears grey when off to eliminate false indication from ambient light.

Banner’s TL70 wireless tower light can be used with a variety of applications and environments, including harsh environments. The housing is available in black or grey, which allows users to match the device to their application.

**Turck Australia Pty Ltd**
www.turck.com.au

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**OPC SERVER FOR WONDERWARE HISTORIAN**

Matrikon has announced the release of its Matrikon OPC Server for Wonderware Historian. Previously known as the Matrikon OPC Server for InSQL, the latest version adds support for the current version of the Wonderware Historian, as well as support for current Microsoft Windows operating systems including Windows 7 (32- and 64-bit versions), Windows Server 2008 and Windows Server 2012 (64-bit).

The Matrikon OPC Server for Wonderware Historian now also includes support for performing real-time (OPC DA) and historical (OPC HDA) writes to the Wonderware Historian in addition to its original read capabilities. This allows users with OPC-enabled client applications like HMI (SCADA) software or other applications to send data to the Wonderware Historian directly through this OPC Server. Tag-level security for OPC HDA was also added to ensure data is protected at the granular level.

**MatrikonOPC**
www.matrikonopc.com

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- Schneider Modicon Series
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*Valid till the 31st October 2015
Gold mine eliminates processing emissions

The Kalgoorlie Consolidated Gold Mines (KCGM) Fimiston Open Pit is a massive operation, popularly known as the Super Pit. At 3.5 km long, 15 km wide and over 600 m deep, it is so large that it can be seen from space and, despite its remote location, is a popular tourist attraction.

The ore from the pit is crushed down to nominal 300 mm-sized rocks and then ground down to 0.2 mm-sized particles before it is mixed with flotation reagents. This produces a gold-rich froth, which is dewatered in filters to produce a sulphide gold concentrate. A common practice is to roast this concentrate at 650°C, which vapourises sulfur dioxide and other impurities like mercury.

The roasting process is the most efficient and cost-effective way to maximise the recovery of gold from the ore, but the downside of roasting is the presence of sulfur dioxide (SO₂) and mercury in the off-gas emissions. As part of its Air Quality Management Plan, the company would stop the roasting process whenever prevailing winds could blow roasting emissions towards the town and residential areas. This resulted in unplanned stoppages and the sacrifice of up to one third of available production time. This year, as part of KCGM’s $98 million Emissions Reduction Project, a new, larger ultrafine grinding (UFG) mill was installed at Gidji to replace roasting.

UFG reduces ore down to 12 μm particles; it is then subjected to a cyanidation process, followed by adsorption onto activated carbon in a process called carbon-in-leach (CIL). Next, the carbon is recovered from the CIL process and transferred to the elution circuit. The elution process uses caustic soda and cyanide in a pressurised column at 110°C to strip the gold off the carbon. Once this step is complete, only the spent carbon is left behind. The carbon is then rinsed in water and sent for regeneration via the carbon regeneration kilns.

The UFG process does not remove the sulfur or mercury as the roaster did, however. As a result the mercury carries over into the CIL process, where it adsorbs onto the activated carbon, reducing its capacity for gold adsorption. The carbon therefore must be eluted more frequently to achieve the same result. Carbon can be ‘reactivated’ by treating it in carbon regeneration kilns which heat it up to 700°C, vapourising the impurities. Because of the increased frequency of elution, an additional carbon regeneration kiln had to be installed.

The carbon regeneration kiln is a rotating horizontal cylinder which agitates and gradually transports the red hot carbon down the length of the horizontal drum, while three large burners indirectly heat the carbon up to 700°C. With the carbon at 700°C, great care has to be taken to ensure safe interactions between the kiln and the upstream and downstream processes — particularly in the event of a process malfunction. This means the kiln needs a safety shutdown system which operates independently of any external systems or power. A momentary loss of control by the DCS or a power outage could have catastrophic results. The drum which carries the carbon runs at temperatures of between 850°C and 1000°C. Stopping the kiln drum from rotating, even for a short period of time, will cause the drum to sag under its own weight, making it unusable. Hratch Loussikian, Metso’s national product manager — Pyro Systems, explains, “Our design takes care of this problem with a special shutdown operation that is driven by a battery backup system in case of power failure. It keeps the kiln rotating until all the carbon is safely out of the kiln and the drum has cooled down sufficiently to safely stop.”

With the roasters no longer in operation, atmospheric emissions have been eliminated from the Gidji processing plant. Everybody wins — the environment and community are safe; and the process can run 24/7, without the need to halt operations due to prevailing wind conditions.

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

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Management at turnkey automation systems providers are always seeking ways to improve production efficiencies on the manufacturing floor. The challenge is to keep up with sales growth and deliver systems on time, while maintaining the same amount of resources.

Machine turns or simply ‘turns’ is a very powerful measure of productivity for turnkey automation systems providers. Simply put, turns measure how many machines can be built in a year in the same space with the same amount of resources. For example, if a 10,000 m² facility can produce five machines simultaneously, then in other words, production of one machine takes up 2000 m². If each machine takes four weeks of production time, then the same 2000 m² could produce about 13 machines in a year (assuming 365 days of operations for simplicity of calculation). Therefore, the machine turns of this space is 13. The total production capacity of the manufacturing floor would be 65 machines a year. Now, if the machine builder decides to increase production to keep up with growing sales, there are two options: add facilities in multiples of 2000 m², maintaining the same turns on the floor, or increase turns with existing resources. If this machine builder can save four days per machine it would improve turns from 13 to 15, making the facility 15% more productive, compared to investing more capital and resources for an additional 2000 m² to achieve 20% more productivity. The relationship between turns and efficiency can be seen in Figure 1.

The concept of turns is not new and neither is the concept of process improvement. There is a plethora of knowledge on improving manufacturing efficiencies — from adopting newer technologies and improving internal processes through lean manufacturing initiatives like six-sigma to building sustainable supplier relations for just-in-time production. But what is often overlooked or ignored as an area of efficiency improvement is the controls architecture.

Controls architectures, being the integral part of the system or machine, are usually not thought to be an area for process improvement. Of course, as with any process improvement initiative, cross-functional teams are necessary. In this case, engineering and production play an important role.

Cabinet-mount philosophy versus machine-mount philosophy

The traditional (and most prevalent) approach to managing low-voltage sensors and actuators on a machine is based on a centralised control strategy — also known as cabinet-mount philosophy. In this approach, while sensors, valves and other electromechanical devices are out on the machine, the wires controlling their actions...
are routed back to the controls cabinet, a long distance away, where the PLC or controller for the system resides. Once the wires are routed through the maze of wire-ways or cable trays, the wire ends are stripped, crimped, labelled and then screwed into the terminal blocks located on the panel of the control cabinet.

Based on the complexity of the machine, one machine could have 50–200 wires or more, of all different colours and characteristics. This requires a significant amount of detailed engineering and planning, not only for the I/O, but also for the routing and wiring diagrams for inside the cabinet. Furthermore, exhaustive debugging follows the electrician’s work of wiring the cabinet. With this approach, I/O mapping and programming become sequential activities.

This centralised I/O strategy is a labour-intensive and therefore time-consuming activity, costing valuable machine build time. Alternatively, a distributed or machine-mount control strategy eliminates several of these steps to simplify the overall machine design and build process. At the foundation of the distributed architecture is the network or the fieldbus system that allows for exchange of I/O as messages amongst networked nodes. Today, almost every machine has adopted some level of distributed controls architecture. A good example of this partial adoption is in robotics. Robot controllers and end-effectors usually have fieldbus or network nodes. The information about hundreds of I/O is communicated amongst the robot, the end-effector and the machine controller over a single fieldbus cable. This tremendously reduces the complexity of the system.

Today’s distributed modular architecture eliminates wiring and extremely simplifies the control cabinet. Additionally, enhanced versions of network I/O blocks today, offered by some vendors, have onboard diagnostics for connectivity, short-circuit protection, and overcurrent protection. This diagnostic functionality saves valuable time during the commissioning of the system. Machine-mount IP67 versions offered by some vendors have an added advantage for deployment in harsh industrial environments.

**Benefits of IO-Link**

The distributed architecture becomes even more attractive when it is combined with IO-Link technology. IO-Link is a vendor-neutral and fieldbus-neutral communications protocol for point-to-point communication. This protocol is specified by the IO-Link consortium and published in the IEC 61131-9 standard. There are three major benefits offered by IO-Link technology with a distributed controls strategy:

1. **Modular machine design with increased I/O and reduced cost:** In the most primitive form of the full distributed architecture, each network node can host up to 16–32 I/O points. The IO-Link enabled network blocks could go anywhere from 136 up to 480 I/O per network node. For some machines this can be a lot more I/O than required and offers the benefit of built-in flexibility for the future and the ability to handle any last-minute change requirements with much less effort compared to the traditional cabinet mount case.

2. **Labour savings by simplifying complex connections:** Valve connections, such as SMC or Festo valve banks, typically require 16–25 conductors to handle expandable 16–24 electromechanical pneumatic valves. With the traditional cabinet mount strategy, installing a single pneumatic valve bank could take 3–4 hours of labour. Conversely, with IO-Link valve connectors, the install time takes only minutes.

3. **Reduce engineering and design time with smart sensor integration:** Smart measurement sensors such as pressure, temperature, distance or inclination measurement, vision or colour sensors, and even RFID read/write heads are increasingly being used in today’s automation. No matter which vendor supplies these devices, as long as they are IO-Link capable, they can be easily integrated in the distributed controls architecture schema.

**Implementing a machine-mount control strategy**

A machine-mount strategy for the controls architecture is not only a huge timesaver during the machine build phase, but also reduces time in tear-down, transport, rebuild and commissioning.
Machine builders that adopt the distributed machine-mount strategy often find opportunities for further improvements in the machine. For example, standardising a machine design with a distributed architecture means that programming and configuration tools, along with engineering designs, are easy to replicate on the next machine, thereby reducing design engineering time on the recurring machines to about 50%.

**Identify the need**
As pointed out earlier, there may already be some level of distributed architecture in your system. To determine whether your system needs a full distributed strategy, look for these signs:

- **Inspect the machine build and rebuild schedule**: If your machine build schedule includes more than 25% of the time for building control panel and wiring, there is a good chance you can significantly reduce that time to about 1/3 by switching to a distributed controls strategy. It is also ideal to look at the total labour hours for electrical technicians.
- **Review the control cabinet**: In some cases, especially in building standard machines, the control cabinet build is outsourced, but the final wiring might be completed in-house. This might appear like a good idea because the activities can be done in parallel. However, if you can save approximately 80% on cabinet space and 50–70% on labour time, does that activity still make sense?
- **Discuss with controls engineers**: Controls engineers are the most affected by changing over to a distributed strategy. Two important questions to ask your controls engineers are: “How often during the machine programming do you refer to the electrical wiring diagrams and perform testing and debugging for the wiring?” and “If you had Add-On-Instructions (in case of Rockwell controllers) or function blocks (for most other brands of PLCs) for all the network blocks and connected devices, would this reduce any installation time?”

Answers to these questions will provide a good understanding of where the time is spent with the current controls strategy.

**Get your team on board**
As with any improvement initiative, a team’s buy-in on the decision goes a long way in the implementation stage. Design engineering, controls engineering and production teams are primary stakeholders in this decision-making process. The highest amount of resistance may come from design engineering as changing over the control strategy involves significant upfront work. When implementing a distributed modular architecture strategy for the first time, it may take a little longer for the engineering side of things, as it is a paradigm shift, but the savings on recurring machines could offset the cost at a rapid pace. Allocating more time for the first system can work in everyone’s favour in the long run. The significant benefit for the design engineering team is that future customer-driven changes can now be handled with minimal effort.

**Find the right supplier partner**
Finding the right supplier is an essential step to your implementation success. It is often unclear whether the step of finding the right supplier should be done before or after getting your team on board. The right supplier may help demonstrate the value of the distributed modular architecture to your team or, if the team is already on board, they may ask the right questions to help identify the right supplier. Three important things to look for in a supplier when adopting the distributed modular strategy are:

- **Open architecture portfolio**: Support for an open architecture offers the flexibility to use the same components on any major network with fewer changes to the bill of materials or the configuration, regardless of network/fieldbus or device vendor choices.
- **Strength of technical support or expertise**: The best way to understand technical support expertise is to request the supplier’s local technical experts to demonstrate the configuring components on your choice of network, possibly on your existing machine. Or even asking the experts to demonstrate the technology by walking through the configurations with your controls engineers could validate the strength of technical expertise.
- **Breadth and depth of product line**: Understanding the breadth of product support for different networks, industries or applications might provide better insight into the supplier’s ability to respond to market needs.

**Tracking time savings**
Distributed modular architecture offers several benefits to end users and machine builders in terms of modularity, flexibility and scalability of the system. However, this article strictly focuses attention on
the significant time savings potential that eventually results in a more efficient manufacturing floor, without adding more resources.

There are three major areas for time savings potential:

- Labour time in wiring and building the cabinet.
- Controls engineering time in programming and commissioning.
- Design engineering time on recurring machines with minimal changeovers.

The time savings on design changes may be realised over a period of time. The controls engineering time changes are challenging to track and validate — primarily because the requirements are sometimes fluid and their extra time can be utilised to improve or enhance machine functionality. The labour time savings, however, are easy to track and quickly evident from the project timelines.

Example calculations
Let’s review the hypothetical example presented at the beginning of the article. In this scenario with the traditional cabinet-mount strategy for the controls architecture, each machine took 28 days to build. Let’s assume that 30% of the build time or 8.4 days are allocated to the electrical wiring of the cabinet. Changing over to a distributed modular architecture could save between 50–70% of the electrical wiring time. So, 50% would be 4.2 days of savings or 70% would be 6 days of savings per machine. This implies improved turns between 15.3 and 16.5. In other words, the same floor with the same resources can now build 76 to 82 machines instead of the original estimate of 65 machines a year.

Figure 3: Comparing labour and component cost

A MACHINE-MOUNT STRATEGY FOR THE CONTROLS ARCHITECTURE IS NOT ONLY A HUGE TIMESAVER DURING THE MACHINE BUILD PHASE, BUT ALSO REDUCES TIME IN TEAR-DOWN, TRANSPORT, REBUILD AND COMMISSIONING.

*Shishir Rege is Marketing Manager for Networking and Safety for Balluff Inc. and works out of the Balluff headquarters in Florence, KY. He has over 15 years of experience in robotics and automation in diverse industries including automotive, packaging, aerospace and medical.

Balluff Pty Ltd
www.balluff.com.au
3D PRINTER

The Airwolf AXIOM 3D printer combines the versatility of printing in over 40 thermoplastic materials and a build volume of 16,387 cm³ to offer a high-performance desktop 3D printer for manufacturing high-precision prototypes and custom functional parts.

AXIOM’s fully enclosed chamber and heated bed ensure a consistent heat environment and minimal warpage when printing very large parts and enable a high-resolution output with layer heights as low as 40 µm. The product’s 315°C hot end supports over 40 thermoplastics — from low-temperature materials like TPU and PLA through to high-temperature materials like nylon and polycarbonate.

Ease of use has been paramount in the design, with features such as print bed auto-levelling, an ‘Easy Feed’ filament system and CoreXY motion control system. Prior to every 3D print, the four-point print bed auto-levelling system automatically calibrates the print bed, ensuring the proper initial layer height and orientation, and then actively maintains that levelling throughout the entire print process. The Easy Feed filament system automatically draws filament into its print head, reducing jamming and blockages. The CoreXY motion control system is said to allow faster movement than gantry systems, providing a print speed of 250 mm/s and precise control of the print head.

Emona Instruments Pty Ltd
www.emona.com.au

M2M GSM ETHERNET ROUTER/MODEM

Providing high-end features specifically for industrial protocols, Red Lion SN/RAM 3G/4G modems are built tough to withstand any industrial environment.

By offering self-managed VPN capabilities, Red Lion remove any need for third-party VPN solutions. Data encryption, stateful firewall configuration and other comprehensive router features are easily accessed and included.

With a robust DIN mount metal enclosure and the option of PoE power if required, the series can operate in extreme temperatures of -30°C to +75°C. The series has the option of one or five ethernet ports, including 3G/4G connectivity, and accommodates industrial protocols such as Modbus and DNP3 pass-through.

In the event of the 3G/4G network failing, the RAM series will store critical site data via DNP3 registers until the cellular network is restored, repopulating the missing data back into SCADA and thereby ensuring data integrity.

Red Lion modems are suitable for deployment in industrial M2M networks such as water/wastewater, transportation, energy utilities, logistics, manufacturing, mining and energy management.

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SEW-EURODRIVE - Driving Australian Industry
Nelson Pine combines control and safety to minimise downtime

The Nelson-Marlborough region is one of New Zealand’s major forestry areas, with 16% of the productive land area planted in production forests. Nelson Pine Industries has the capacity to process one million cubic metres per annum, or 40% of the region’s annual harvest.

The company produces GoldenEdge MDF (medium-density fibreboard) and Nelson Pine LVL (laminated veneer lumber) from radiata pine grown in the plantation forests of Nelson.

Nelson Pine is committed to maintaining compliance with evolving safety standards and utilising the latest control and safety technologies. As safety standards continued to advance, it was clear that an upgrade was required at the plant. Nelson Pine called on Rockwell Automation to develop a solution that integrated control and safety while minimising production downtime.

According to Ian Craw, automation engineer at Nelson Pine Industries, “The plant is ageing. To upgrade the chip mill, we decided to start at the whole backbone of control to take advantage of advancing technologies and meet current safety standards.” The chip mill is a large part of the site where logs are unloaded from trucks for processing. Two pivot cranes and a drum debarker handle 300 tonnes of logs per hour. Control and safety are critically important in the chip mill, so the first stage of the upgrade involved replacing the existing hardware platform with a GuardLogix Integrated Safety System.

According to Sean Doherty, account manager at Rockwell Automation, “The GuardLogix provides the benefits of the standard ControlLogix systems but also includes safety features that support Category 4/PLe safety applications. The GuardLogix also offers integrated safety, discrete motion, drive and process control.”

To allow for zone control, the chip mill building was split into two geographical safety zones, using some of the latest safety guard locking switches with RFID technology for controlling and monitoring zones.

The first safety zone incorporates a large drum debarker, which rotates the logs to remove bark before they enter the chipper. Outdated variable speed drives were replaced with eight 90 kW PowerFlex 753 drives in a master/slave configuration. They receive their speed/torque reference via the device-level ring (DLR) and achieve a Stop Category 0 (via safe torque off) to Cat3/PLd.

“The integrated safety provided by zone control allows the plant to shut down one zone while the other is still operating as usual, delivering improved production rates. The goal is zero harm but we also wanted to minimise impact to production schedules, so we suggested a solution that helps achieve this,” said Doherty.

The second safety zone incorporates safe speed monitoring of the main 1.8 MW chipper motor and safe position monitoring of the 11 kV motor breaker, in order to confirm lockout/tagout (LOTO) has been performed before access is granted into the hazard zone.

“When upgrading equipment it was a priority to meet current safety standards. We are well on the way to complying with the machine safety standard EN ISO 13849, with the goal to achieve PLd across most of the site in the coming years,” said Craw. As there are many hundreds of metres between different parts of the site, an EtherNet/IP network was used to reduce both the amount of cabling required and the installation times, with fibre running the longest legs. Utilising DLRs achieved complete integration of the control and safety system; the ring topology provides high availability of the safety network with high resilience.

“Machinery in the chip mill operates 24 hours a day, so once we had GuardLogix up and running we were able to add hardware and edit safety code on the fly, which gave us significant production advantages,” Craw said.

Nelson Pine Industries has adopted production processes that are both safe and environmentally sound. As a result of the success of the new control and safety solution in the chip mill, Nelson Pine is planning to roll out the solution across the entire plant.

“Rockwell Automation have really partnered with us in providing valuable support and application knowledge that has enabled us to retrofit safety into the working plant. We have not only achieved a suitable performance level relatively easily, but also minimised production downtime — which is of paramount importance to our plant,” said Craw.

A much longer and more detailed version of this article can be read online at: http://bit.ly/IKQuFH4

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Strategic developments in operational communications

DALE MCFEE
Deputy Minister of Corrections and Policing, Ministry of Justice, Government of Saskatchewan
The importance of information management in building a national community safety model

MICHAEL LAWREY
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TANK TOP ROOF BEARINGS
Steel, concrete and fibreglass tanks need secure roofs that can withstand the expansion and contraction caused by factors such as climatic and load variations.

Hercules Engineering offers a range of Herculon Type D Tank Top Bearings (HLD/TT), which are custom designed for easy installation under the roof beams of tank tops and other lighter structures including some building roofs. These low-friction easy-slip bearings are particularly useful where loads are relatively small but both lateral and uplift forces need to be accommodated.

HLD/TT bearings are part of a range of Hercules composite slip joints and structural bearings for a wide variety of structures and weights incorporating engineered combinations of engineered thermoplastics and metal facing surfaces.

HLD/TT bearings consist of a thin stainless steel slide plate with two stainless steel studs flash welded to the upper face. The lower face is highly polished and the plate is provided with two slotted holes for uplift through-bolts. This plate slides against a Herculon-coated Hercupad, which has two clearance holes drilled into it.

There are five stock sizes in working loads from 50-70 kN. Larger capacities and different dimensions can be custom-engineered. The coefficient of friction is 0.05 to 0.08, depending on stress, and the expansion capacity is up to ±20 mm, which can be custom designed for larger movements. Maximum rotation is up to 0.01 radians, with a maximum temperature of 80°C.

TURBIDITY METERS
SIGRIST turbidity meters measure turbidity and other parameters in water and liquids, including DOC levels, colour and oil concentration. The meters quickly and efficiently detect any impurities or flaws in the treatment process so that they can be swiftly rectified.

Specifically, the SIGRIST AquaScat HT online turbidity meter measures the turbidity of potable water according to IEC 27027 in a free-falling water stream. The device features a contactless design which eliminates fouling and minimises servicing.

The AquaScat’s calibration can be checked with a calibration unit using a glass reference. It is suitable for monitoring turbidity in water in a range of industries, including the food and brewing industries, chemical and pharmaceutical industries, crude oil production, dairy industry, drinking water treatment, machine and metal industry, petrochemical industry, power plants, pulp and paper industry and wastewater treatment.

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SERVO DRIVE
The Servotronix CDHD servo drive features digital I/O and STO (safe torque off) as standard. An EtherCAT module is optional, using CANopen over EtherCAT (CoE) protocol for motion control devices.

The servo drive has proprietary control algorithms that reduce the following error and the settling time of the load. For vibrations that occur at high frequencies, the drives rely on standard low-pass filters and notch filters. The vibration suppression function was developed to control vibrations induced by low-resonant frequencies ranging from 5 Hz to 400 Hz. This function is also capable of damping systems in which several distinct resonances occur.

Whenever an automated application employs a suspended load, ball screws, belt-driven linear slides or a non-rigid motor-load coupling, it runs the risk of vibration. With vibration suppression control as a standard feature, CDHD drives can effectively improve the cycle time and performance of machines in applications such as electronics assembly, semiconductors, machine tools and laboratory automation.

Motion Technologies Pty Ltd
www.motiontech.com.au

FLASHING SOUNDER
The Pfannenberg PYRA-MA is a flashing sounder with a pyramid shape designed to fit closely against any surface. It also carries a high sound level range of 80–100 dB and light intensity from 5–10 J in a small, robust design.

Up to eight different sounder tones are selectable, depending on the type of installation, making it suitable for machine start-up alarms as well as fire and gas alert alarms in buildings. The Xenon flashing light can be seen up to 17 m away, meaning the number of signalling devices required is reduced significantly.

The PYRA-MA range is built to withstand harsh environmental conditions and features IP66 protection from water and dust ingress, as well as a IK08 impact rating for events such as hailstorms. Its wide operational temperature range of -40°C to +55°C ensures that the freezing cold or the searing summer heat is no threat.

Control Logic Pty Ltd
www.control-logic.com.au

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VIBRATION MONITOR

FAG SmartCheck vibration monitoring technology comprises a compact, modular online measuring system for continuous monitoring of machinery and process parameters on a decentralised basis. It can be used on assemblies where such monitoring was previously too cost prohibitive.

The technology is suitable for early detection of rolling bearing damage, imbalances and misalignments among other faults on: electric and geared motors; vacuum and fluid pumps; ventilators and fans; gearboxes and compressors; spindles and machine tools; separators and decanters.

The system is ready for immediate use as it is supplied with a set of key data that facilitates general, reliable machinery monitoring. In addition, predefined configuration templates are available for monitoring of items such as fans, pumps and bearings. These can be matched to individual requirements, due to the integrated bearing database of FAG and INA standard bearings.

In addition to the standard parameters of vibration and temperature, it is possible to record other operating parameters such as speed, pressure and flow rate. All parameters can be correlated with each other and included in the alarm configuration.

The data is recorded and analysed centrally by the system. The current machine condition can be displayed directly on the device or transferred to any control facility as required.

Schaeffler Australia Pty Ltd
www.schaeffler.com.au

MULTIPROTOCOL I/O MODULES

Turck’s FEN20 compact Ethernet multiprotocol I/O modules make standard switching signals quickly and effectively bus-capable. Due to their multiprotocol plug-and-play functionality, the FEN20 devices with digital inputs and outputs are immediately ready for use in Profinet, Modbus TCP or EtherNet/IP systems.

The device detects the protocol used by listening to the communication traffic during the start-up phase.

The FEN20 devices are available in two different designs. The small 4DIP-4DXP, which measures 55 x 62.5 x 30 mm, fits in small control boxes, control panels or other existing housings and can also be retrofitted to make push-buttons and LED indicators quickly Ethernet ready. The larger 16DXP variant, which measures 57 x 152 x 47 mm, is designed for the same type of application and provides up to 16 I/Os. As a DXP variant it can be operated both as an input or output. The module also provides the division of the I/O signals into three independent potential groups which are isolated from each other — which can be used for safety shutdowns — and can be centrally controlled.

Both devices are equipped with an integrated web server to display diagnostic information and provide access to configuration parameters. The web page was created to offer a responsive design so that even a smartphone can be used for simple diagnostics.

Turck Australia Pty Ltd
www.turck.com.au
NEW PRODUCTS

LOGBOOK FUNCTIONALITY FOR DCS

Emerson Process Management’s Logbooks, an electronic database of operator log entries, can now be embedded in the DeltaV distributed control system interface to improve task management and enable more effective shift handovers with real-time visibility to active entries. Users can access Logbooks directly from their DeltaV workstations to view shift-based dashboards that highlight relevant log entries for the operations team.

Task management with Logbooks helps operators respond more quickly to high-priority tasks. With event monitoring, logbook entries are automatically created from DeltaV events. These entries can then trigger additional tasks in the system or flag issues to raise attention. The shift dashboard displays task status and existing flags to ensure necessary work is not missed.

Operators can easily identify their priority tasks with Logbooks with a customised dashboard for each user. Relevant log entries and assigned tasks are displayed and responsibilities are clearly defined for the operator. Communication between operators and managers is streamlined and operators can more effectively plan and prioritise work. The task-based actions make work planning, comment capture and report generation easy.

Emerson Process Management
www.emersonprocess.com.au

DC LINEAR ACTUATOR

maxon motor has released a 6 mm micro linear positioning drive with internal gearing, available in both metal and ceramic versions.

Micro DC motor linear positioning systems are suitable for applications that require accurate positioning and high forces while maintaining minimal weight and a small footprint.

The linear speed, length and forces can be controlled and adjusted by combining a suitable brushed or brushless DC motor, encoder and motor drive electronics. Up to 11 N continuous and 15 N intermittently can be achieved with linear speeds of 25 mm/s. The ceramic version gives high efficiency and longer lifespan, while for less demanding applications the metal version is more cost effective. With a linear actuator, thrust bearing system and planetary gearhead in one assembly a weight of only 2.9 g is possible, making the device also suitable for specialist robotic applications.

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

“Our Installation in record time – for optimal performance in your plant.”

New from VEGA: the optimised VEGAFLEX Series 80 TDR sensors.

The all-new product series VEGAFLEX 80 offers a variety of useful functions. Its simple adjustment concept guarantees even greater reliability for level and interface measurement. The instruments are optimised for all applications in liquids and solids. New versions for food and pharmaceutical production and for high-pressure and high-temperature applications round out the series.

www.vega.com/au/innovation.htm
Phone: 1800 817 135

Looking Forward
Over a five-year period from 2008 to 2013, there was a net decline of 143,384 Australian manufacturing jobs as a direct result of the global financial crisis and the high Australian dollar. Optimum efficiency is now a shared goal for all organisations, with the direct impact of improving profitability and availability of funds to invest in new products, new plants and new markets — the key to sustainable local manufacturing.

The industry — though on a slight upturn — is still highly competitive and costs such as materials and energy are rising, forcing manufacturers to sharpen up or potentially go offshore. Price increases cannot be passed on to suppliers or customers easily; instead, a further cost-cutting attack must be waged by improving procurement practices, increasing operational efficiency and eliminating waste.

The upgrade of obsolete or older technologies used for coding and labelling, and also through inspection equipment, is one way this can be done. There can be opportunities to significantly reduce total cost of ownership (TCO), and looking at this end-of-packaging-line equipment is critical because ‘no code means no product’.

Many manufacturers operate under the premise of ‘if it ain’t broke, don’t fix it’, but in this article we give five reasons why upgrading yesterday’s product ID and inspection equipment is absolutely necessary for controlling costs and discuss what you should consider when looking for a new supplier.

Why just OK isn’t good enough
Coding errors, machine breakdown and inspection issues can all lead to expensive downtime. In food and beverage manufacturing plants, stopped production can cost tens of thousands of dollars — so eliminating any instance where this may occur is critical to an operation’s bottom line.

Unreliable coders and labellers can result in missing codes and labels on batches, which in industries like food and beverage manufacturing is a huge compliance issue. Product information such as the retail barcode, alcohol percentage and manufacturer information must be properly readable and displayed on every label. Without adherence to strict label laws, manufacturers risk heavy fines and trust between supplier and manufacturer can be lost.

Product quality and the ability to deliver orders on time are the fundamentals to sustaining customer relationships.
Product quality and the ability to deliver orders on time are fundamental to sustaining customer (retailer) relationships. This should be reason enough to ensure your product ID and inspection equipment is up to scratch. But if you need more justification, here are another top five reasons to upgrade.

Reliability issues
There is no place in competitive manufacturing for equipment that breaks down often, doesn’t perform its job or requires more than a normal amount of maintenance.

On the production line, the barcode has an important function — to communicate critical information through the supply chain to ensure smooth flow of product from manufacturer to consumer. Unreadable codes or incorrect labels, as a result of faulty printing, coding and labelling, leads to excessive waste and errors in communication.

Inspection solutions can check product for quality criteria like weight, dimensions, appearance and contaminants — as well as barcodes — and reject product with faulty, unreadable or missing barcodes to avoid product track and trace issues.

Escalating operational cost
The cost of downtime doesn’t only impact production output. The cost of repair, maintenance, spare parts and staff idle time contributes significantly to operational costs. Money that could have been better spent on machine upgrades is instead ploughed into the ongoing revival of inefficient equipment that is more than likely using up more energy than it needs to.

The more money you can pull from inefficient operations, the more money you have to focus on remaining competitive.

Vendor support
Despite the smart and advanced technologies available to manufacturers, there is still a reported 65 billion dollars’ worth of last-generation, obsolete automation technologies in use on the factory floor.¹

There are a number of issues tied to this. Firstly, old and obsolete technologies are generally more difficult to service and in some cases will require a specialised technician or engineer to come out to your plant and fix the component. Secondly, as the workforce ages and workers trained to deal with yesterday’s equipment retire, demand for specialists will increase labour hire costs significantly. In a comprehensive report, surveying over 60 manufacturing companies, nearly 80% indicated that finding qualified technical personnel to maintain older site equipment is a major problem², and cited it as one of the reasons they planned to upgrade plant equipment in the near future.

Limited spare parts availability
Most of the issues relating to outdated technologies are based on the ability to locate reliable parts and, as we mentioned above, timely support from the vendor.³

Equipment is supported by the manufacturer for a set number of years, so the older it gets — and as newer technology options become standard — the harder it is to source spare parts. In some cases the original manufacturer may no longer be in business so you are reliant on another supplier to support your legacy products.

Though a good spare parts management plan can help predict when parts may need replacing so you can order well in advance, older equipment is less stable and can break down more regularly.

New technology
Most maintenance personnel in manufacturing environments will agree that despite the issues of obsolescence, this alone cannot justify executing a large capital upgrade project. Manufacturers should take into account not only the solutions potential to reduce downtime and risk, but also the positive economic impact on the business.

For example, the use of advanced ERP solutions such as cloud-based systems can offer enhanced functionalities and performance to speed up production and lower costs. Automating this process
is estimated to be 600 times more efficient than conventional approaches in consumption of system resources.\(^5\)

Where product ID equipment is concerned, new technology can not only improve quality of print, but also code on various sizes, shapes and substrates at higher speeds.

**What you should consider when upgrading**

*Is there a better solution?*

Any upgrade that simply swaps a system for one with like-for-like functionalities has failed to capitalise on an opportunity to add value to the business.

Look at your current application requirements and requirements for the future. This might be influenced by retailer expectations for increased product traceability, or compliance with government regulations, or most importantly by process improvement initiatives. Then ask yourself, is there a supplier that can offer a better way of coding/marking/labelling in line with these needs? Consider automation of the coding and labelling process and integration with inspection for process improvement.

**Total cost of ownership**

Finance and senior management are especially interested in this analysis. They want to know how long it will take to pay for the equipment through savings achieved by the new technology and also the estimated costs of running and maintaining the equipment for its proposed lifecycle. This helps to evaluate equipment with a 'low sticker price' but potentially high running and maintenance costs against a solution with a higher capital cost but lower lifecycle costs. There have been many cases where manufacturers have bought cheaper equipment from overseas and have found it very hard to find support locally in Australia.

To establish fixed total cost of ownership and eliminate the risk of obsolescence, consider the option of leasing or renting equipment with fixed monthly payments and the option to upgrade every set number of years.

**Quality of support**

Technology will always need to be maintained and repaired. How well you manage this comes down to the support of your supplier. If a problem can’t be fixed internally, can the supplier provide phone support? If the problem needs a technician, how soon can the supplier send someone out to you, or supply you with spare parts? Does the supplier offer operator and maintenance training to help your equipment run seamlessly? Remember, every minute of downtime equals lost revenue.

*Is it futureproof?*

When upgrading any equipment, you may consider waiting for the next inevitable new technology, but that is not always necessary. Many new systems are built to handle not just today’s demands, but also tomorrow’s. So when buying, ensure that systems are equipped to grow with your business should you wish to expand and introduce new product lines in the future.

**The bottom line**

Today’s production, operations and maintenance managers have a whole range of coding and labelling technologies to choose from — all of which have their place in satisfying Product ID requirements for a myriad of packaging types. When choosing the best supplier, the question is how reliable the equipment is, what its lifecycle costs are, and how quickly support is available and how good is the support when needed.

**References**

3. Ibid. p16.
4. Ibid. p16.

Matthews Intelligent Identification Pty Ltd
www.matthews.com.au
CUSTOM GEARMOTOR
maxon motor has released a brushless DC flat motor that is 68 mm in diameter and 38 mm long, delivering 100 W of power on a controlled 24 V supply. The design combines a 14-pole motor wound in a three-phase configuration that delivers high torque and low speed. The brushless DC motor also has a 4096 count per turn encoder built inside the motor that does not contribute any additional length.

Acting as a torque multiplier is a 42 mm, 936:1 ceramic planetary gearhead. The gearhead ratio, combined with the encoder resolution, gives a position resolution of 3.8 million counts per revolution. This high-torque and high-positioning resolution makes the brushless motor suitable for the positioning of heavy loads in the manufacturing industry or for the control of sensors or valves in fluid handling processes.

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

NEW PSRmini
HIGHLY COMPACT SAFETY RELAYS

No wider than 6 or 12 mm, the new safety relay with force-guided contacts offers enormous space-spacing potential of up to 70% at full capacity.


VALVE GEARBOX
The AB550M gearbox is designed for use with motorised quarter-turn valves and dampers. It is manufactured with cast iron housing components, high-performance axial thrust bearings, a protected steel input shaft and a polyurethane coating to deal with arduous applications and aggressive environments.

The ability to support electric actuators weighing up to 46 kg and input speeds of up to 72 rpm offers suitability for many applications in the chemical, power generation, water and sewage treatment, HVAC and general industries. With a maximum output torque of 600 Nm, 45 mm maximum output bore, output flange sizes from F07 to F16 and ±5° adjustable 90° stroke, the product will operate a large range of ball, butterfly and plug valves, or power and process dampers.

The ambient operating temperature range can extend from -60°C to +200°C, whilst the standard IP67 environmental protection can be increased to IP68 for marine, continuous submersion and buried service duties. A fire-safe option conforming to ISO10497 is also available.

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www.rotork.com

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OCTOBER 2015 - WHAT’S NEW IN PROCESS TECHNOLOGY 33
PHOTOELECTRIC SENSORS

The Contrinex C23 Series of photoelectric sensors includes diffuse, reflex, through-beam and background-suppression types. They detect objects of different colours and material types, even under difficult conditions. All PNP switching versions of the sensor series are equipped with IO-Link.

The miniature photoelectric sensors have a reduced size (20 x 30 x 10 mm) and can detect even fast moving objects. Specially developed Contrinex optics provide high black/white performance for the sensor version with background suppression. Typical applications include conveyor belts used in production and automated food packaging.

IO-Link sensors are compatible with all IO-Link master versions. As a result, set-up and status diagnostics can take place centrally. In addition, the IO-Link interface allows process data to be read and modifications to be made to sensing ranges or functions, such as stretch and delay, directly on the sensor.

IO-Link functions include data monitoring and diagnosis of sensor functions; sensitivity adjustment and teach-in; a choice of switching type and configuration of switching behaviour; the setting of sensor mode and emitting sequences; and detection counter and temperature measurement.

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

TRACE OXYGEN ANALYSER

Cryogenic air separation is used to produce high-purity oxygen, nitrogen, argon and carbon dioxide, and highly accurate oxygen measurements are a crucial part of the quality assurance process. The Michell XZR400 series oxygen analyser uses Michell’s MSRS zirconium oxide oxygen sensor, which contains a metallic sealed reference and ensures long-term repeatability of measurements as no reference air is required. Unlike electrochemical sensors, which require regular replacement, the MSRS sensor of the XZR400 should last in excess of seven years. Calibration is not needed as frequently either (every 3–6 months) and can be carried out with just one calibration gas, saving time and money.

The XZ400TS was found in test to operate at an accuracy of 0.1 ppmv using a 10.5 ppmv test gas, with the unit displaying exactly 10.5 ppmv.

The XZR400 range features three configurations: rack, wall and bench mount. All models include an intuitive touchscreen interface for quick and easy operation, barometric pressure, digital flow meters and a 4–20 mA output as standard. Options include additional outputs such as Modbus RTU over RS485, RS232 and process pressure correction.

AMS Instrumentation & Calibration Pty Ltd
www.ams-ic.com.au
**BRUSHLESS DC MOTOR FOR VACUUMS**

Maxon motor has released a brushless DC motor suitable for use in ultrahigh vacuum. The 22 mm, 24 V brushless DC motor is an off-the-shelf solution for an application that traditionally requires high levels of customisation. The all stainless steel construction, SmCo magnet-based brushless motor features low outgassing and can be baked out at 240°C. It is also vibration tested to MIL-STD810F.

Scientific and vacuum applications for DC motors are extremely varied. An example is the Watt balance, a machine developed to compare masses with electrical values in a vacuum. Its purpose is to redefine the measure of a kilogram. In the past we have relied simply on a known set of platinum-iridium weights that have varied with one another over time. The Watt balance seeks to overcome this problem using Planck’s constant to define the kilogram in terms of voltage and current. The vacuum capable motor has allowed scientists to build a 3-axis robot providing the necessary mass movements for the experiment.

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

**SPLIT SLEWING RING BEARING**

The igus split slewing ring bearing is lubrication-free and can now be fitted to a shaft that is already installed. The polymer slewing ring bearing can be split so that the bearing can easily be mounted in place. It has been created due to a customer request so that it can be placed, for example, around a shaft or a pipe and then closed again in its ring shape. The movement can then work as usual.

During assembly, bearings are usually positioned on a shaft and fixed. The standard igus iglidur slewing ring bearings are made of aluminium, with a lubrication-free liner between the inner and outer rings to reduce friction between the two rings. For the special split slewing ring bearings, these sliding elements can’t be used as they won’t stay in the same position while splitting the housing. Lubricant-free tribo tape made from iglidur A160 is therefore used instead. The self-adhesive film is 0.5 mm thick and can be cut easily. It is self-lubricating, which makes it maintenance-free, and is also FDA compliant.

The split slewing ring bearing is available on request, so that all special requirements can be considered for a customer-specific design.

Treotham Automation Pty Ltd
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Bearings with brains make intelligent machines

Within engineering, we think of an intelligent machine as a mechanical system that can take care of itself; a machine capable of accurate self-diagnosis that can quickly communicate its condition to an operator so that the problem can be resolved as soon as possible. It could be anything from a high-end car to a complex machine on a factory floor. An intelligent machine must look after itself, so that it can continue to work at maximum efficiency.

This is not to suggest that an intelligent machine is maintenance free — that really is a futuristic dream — but it uses its in-built intelligence to detect potential problems and streamline maintenance intervals and procedures. All mechanical parts are prone to failure, of course. The trick is to detect this proactively, as part of a planned condition monitoring regime, and take action in advance, rather than waiting for the machine to fail and then spending time and money repairing it.

Intelligent machines will rely on several critical factors. The most important, by a long way, is information. Without data, there can be no intelligence or diagnosis. This data needs to be gathered, transmitted for analysis and processed, which in turn requires sensors, data transmission and computing power.

The immediate answer might at first simply appear to be enhanced condition monitoring: adding an array of sensors to a machine in order to read its vital signs, then transmitting them over a wireless network to a central point. But a far more effective solution now exists in the form of smart bearings that collect and transmit process data independently from inside the very heart of a machine.

By embedding into each bearing a tiny, self-powered wireless sensor that transmits real-time information about process conditions, it is possible to take condition monitoring far beyond what was previously possible.

Conventional condition monitoring detects the early signs of failure by measuring vibrations caused by changes on the bearing’s surface. But this means that damage has already begun to occur. Rather than identifying this deterioration, SKF Insight detects the conditions that cause bearing failure before they can have an effect, and makes this information instantly available to operators.

Miniature electronic circuits, powered by the motion of the bearing itself, transmit this process data via a wireless link. There is no need to supply external power, making the technology supremely unobtrusive — because there are no wires ‘in’ to provide power, or wires ‘out’ to deliver the signal. This means it will work in places that would previously have been impossible.

SKF developed SKF Insight because it knows that bearings rarely fail in service under normal operating conditions due to factors such as subsurface fatigue. Instead, the cause of failure is usually misuse or neglect — insufficient lubrication, for example, or running the bearing under conditions outside those originally specified. Insight’s embedded sensor measures the critical parameters that cause early bearing failure, such as lubricant contamination, or temperature, allowing operators to take corrective action while the machinery is still operating. And by applying sensors directly within the bearing, SKF Insight identifies the risk of failure before even microscopic damage occurs.

The intelligent wireless technology inside the bearing allows bearings to be configured in smart networks, which communicate via wireless gateways. And because the bearings are self-contained they can be used right in the heart of a machine, where it was previously impossible to embed sensors. This is a huge step forward in real-time condition-based maintenance, and provides a vastly improved understanding of the operating environment. Having such a deep knowledge of operating conditions — in real time — could even make it possible to upgrade a machine, extending its life or power rating beyond its initial specification.

SKF Insight is already being put to work in high-end applications such as wind turbines. But consider the machine that we spend most of our time with: the car. Think about all the problems that could be avoided with this kind of advance intelligence, and you can see why the technology embodied within SKF Insight is truly a revolution — joining both bearings and condition monitoring.

A much longer and more detailed version of this article can be read online at: http://bit.ly/1KYD56H

SKF Australia
www.skf.com.au
MULTITURN ENCODER

Eltra has released the compact EAM36 magnetic multiturn encoder with a 36-mm diameter. Because it is based on the self-powered Wiegand system, no internal gears or batteries are required to maintain a position reading after a power cycle. It has 51-bit resolution, which consists of 12 bits for a single turn and 39 bits for number of revolutions.

Multiturn encoders with parallel outputs can have a very large number of outputs, making the cables very thick and difficult to attach to connectors. The EAM36 has SSI serial output, which only requires four wires (two for clock and two for data).

The product has an IP65 enclosure rating and a maximum operating temperature of 85°C. With a maximum shaft speed of 8000 rpm, it is available in both flange-mounting and hollow-shaft versions. Typical applications include position monitoring in machines where high gear reduction ratios are used.

**Micromax Specialists in Automation Pty Ltd**
www.micromaxsa.com.au

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X-Y PIEZO NANOPositionERS

The Aerotech QNP-XY piezo nanopositioner stages provide the highest resonant frequency and stiffness of positioners with comparable size and travel, according to the company. This allows users to achieve higher throughput in exacting processes.

With resolution to 0.15 nm, linearity to 0.007% and repeatability to 2 nm, the stages meet the most demanding requirements of applications from microscopy to optics alignment. They are offered in travel ranges from 100 to 600 µm.

QNP piezo stages are guided by frictionless precision flexures that are optimised using finite element analysis for fast closed-loop response. The integrated XY package minimises stack height and moving mass, resulting in better static and dynamic multi-axis performance. When coupled with Aerotech’s Q-series controllers and drives, the stages demonstrate subnanometre positioning resolution and in-position stability, and high-positioning bandwidth. They are available with or without capacitance sensor feedback and a wide range of software options.

**Coherent Scientific Pty Ltd**
www.coherent.com.au

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WIRING ENCLOSURES
The BIG series by ILME introduces a significant change in the design of hoods and has been specifically designed to meet the diverse requirements of the wiring market. The large dimensions of these enclosures have been chosen to offer an adequate space to store conductors.

The width of the new BIG enclosures is greater compared to those of previous versions and the cable compartment is now fully accessible during assembly — the connector insert is fully inserted in the lower half of the enclosure.

Offering three times the space compared to standard enclosures means it is possible to bend cables and pipes with greater bending radii.

The BIG enclosures are particularly suitable for MIXO modular inserts, being versatile and customisable for multiple cable entries. Each insert is used to manage power and signal electrical connections, pneumatic, fibre-optic or Ethernet connections and has a dedicated entry, meaning it is now possible to use one BIG connector enclosure for installations that previously required two.

The possibility of splitting the enclosure in two halves simplifies the installation of the insert. It is also possible to connect the insert with a cable and later insert it in the lower half of the enclosure.

Treotham Automation Pty Ltd
www.treotham.com.au

ROBOTIC MACHINING SOFTWARE
ABB Australia has introduced its latest RobotStudio add-in, the Machining PowerPac.

The Machining PowerPac software is designed for the programming of applications such as machining, deburring, polishing, grinding and deflashing. It can be used with a variety of CAD-model-based path generation applications and allows users to configure specific applications in a sequence of steps simultaneously.

The integrated post-processor generates accurate robot paths from the CAM software so the robot machining application can be completed more rapidly than ever before, according to the company.

The Machining PowerPac provides several strategies to generate machining path and curves. By optimising the speed, acceleration or axis setting, users can dynamically preview the tool path and ensure the right target robot configuration.

Furthermore, the Machining WAVE Paths and Tool Axis Interpolation features are instrumental for extending the lifetime of the machining tools by creating smooth tool axis changes and flexible tool contact points.

ABB Australia Pty Ltd
www.abbaustralia.com.au

POE+ SWITCHES
Antaira’s LNP-1202G-SFP and LNP-1204G-SFP are 12-port, industrial-grade, unmanaged ethernet switches with high-power PoE+ capabilities that are IEEE 802.3at/af compliant.

The units require a power input of 48–55 VDC to support up to 30 W of PoE power output per port.

The LNP-1202G-SFP series supports ten 10/100/1000Tx (with eight PSE) RJ45 ports and two 100/1000 SFP slots, whereas the LNP-1204G-SFP series supports eight 10/100/1000Tx (with PSE) RJ45 ports and four 100/1000 SFP slots. The PoE ports provide self-adjusting power to ensure that excess power is not supplied to end devices, thus preventing damage.

The SFP fibre ports are able to support any type of fibre connection — multimode or single-mode — for short- or long-haul applications. The SFP ports can also support dual-rate speeds, meaning either 100Fx or 1000Fx fibre connections.

The PoE+ switch models provide high EFT, surge (2 kVDC) and ESD (6 kVDC) protection. The devices also have a dual power input design with reverse polarity protection.

Additionally, there is a built-in relay warning function to alert maintainers when power failures occur. The LNP-1202G-SFP and LNP-1204G-SFP series have an IP30-rated, compact, fanless, DIN rail and wall mountable design. Each product is built to withstand industrial networking hazards like shock, drop, vibration, electromagnetic interference (EMI) and temperature extremes. Operating temperature version options include a standard -10°C to 70°C model range or an extended -40°C to 75°C model range.

Antaira Technologies
www.antaira.com.tw
NEW PRODUCTS

ULTRAMINIATURE PHOTOELECTRIC SENSORS
Control Logic has released the Panasonic EX-Z thru-beam ultra-miniature photoelectric sensors, which are small enough to consider using in applications where, previously, fibre-optic sensors were the only option. These units have the added advantage that the sensor and amplifier are fully self-contained in one extremely small package.

The EX-Z sensors are available in two body styles, front or side sensing and three different models with ranges of 50, 200 and 500 mm. Due to the built-in slit mask, the longest range model has the ability to detect an object as small as 1 mm, while the shortest range unit can detect an item as small as 0.3 mm. The high-brightness 4-element red LED provides strong light emission stability over a long period of time while at the same time making sensor alignment an easy task. All models are rated to IP67 for use in process lines where water is used or splashed and rust-resistant stainless steel sensor mounting brackets and screws are also available.

Control Logic Pty Ltd
www.control-logic.com.au

ENERGY HARVESTING PRESSURE TRANSMITTER
Emerson Process Management is making energy harvesting a reality for its Smart Wireless transmitters through the use of Perpetuum’s Vibration Energy Harvester and Intelligent Power Module solutions. Energy harvesting converts unused energy, such as vibration from pumps and motors, into electrical energy. Perpetuum vibration energy harvesters provide external power to Emerson’s transmitters, decreasing maintenance by extending the life of the power module.

The Rosemount 3051S wireless pressure transmitter is the first Emerson wireless transmitter capable of utilising this energy harvesting technology. Additional wireless Emerson transmitters will use this technology in the future.

Perpetuum’s Intelligent Power Module holds the same form, fit and operational capability as Emerson’s current Smart Power Module, with the operational enhancement of enabling Emerson’s wireless transmitters to accept multiple forms of external power.

This energy harvesting solution is fully certified to FM (Class1 Div1, Groups A, B, C, D), as well as ATEX and IECEx (Zone 0). It is intrinsically safe and classified for use in hazardous areas, thereby reducing potential safety risks to plant personnel.

Emerson Process Management
www.emersonprocess.com.au

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CHANGING VAPOUR PHASE
ITS EFFECT ON RADIATION-BASED LEVEL MEASUREMENT
Radiation-based continuous level gauges provide highly reliable measurements because no part of the instrument system is exposed to the process fluid and requires penetration into the process vessel. However, to ensure accurate and repeatable measurement, users should carefully consider the operating conditions inside the vessel. A dynamic vapour space, where the atmosphere above the process fluid changes due to the reaction of the process fluids or changes in temperature and pressure, can have a significant effect on the accuracy of the measurement.

Calibration of any radiation-based measurement system requires referencing the system at known process conditions. For continuous level applications, this means referencing the system at known process levels within the measurement span. The best practice procedure is to acquire references at 10% increments of the measurement span at operating conditions. Often this procedure is not achievable due to a limited ability to alter the process level during operation.

What are often overlooked are the effects the vapour space has on the performance of the system. If, for example, the system is calibrated under conditions that do not produce the same vapour conditions (specifically vapour density) as are present when the vessel is operating, one can then expect the system to have inherent systematic error.

A specific example of such an operating process would be ammonia storage tanks. Liquid ammonia storage utilises pressure or refrigeration systems to maintain the liquid phase. If the process fluid temperature rises due to solar heating, the liquid ammonia can vaporise and will increase the density of the vapour space above the liquid. The increase in vapour density will impact the transmission of radiation through this volume above the process fluid and cause an error in the radiation-based level measurement. The same phenomenon can be realised through a decrease in pressure in the vessel.

Another example of changing pressure influencing the output from a radiation-based level measurement system is observed in a hydrofluoric acid storage drum. One method of transferring the process from the storage drum to the process stream is done by differential pressure between the two vessels. In order for the process fluid to be moved from the storage drum, the drum must be pressured to a level greater than the operating pressure of the working vessels, and the converse is required to transfer from the working vessel to the storage drum. During the pressure changes the vapour phase is altered, causing the vapour density to increase or decrease depending on what action is required. The error in measured level can present issues when accounting for inventory of acid in the storage drum and can present issues when loading the storage vessel from truck delivery of the hydrofluoric acid.

Consider the following application, shown in Figure 1: the desired vertical measurement span is 3658 mm and utilises a single detector and a single 45° collimated source. The vessel has a 3658-mm inside diameter and 13 mm of steel wall thickness, plus 50 mm of insulating material.

In the chart of Figure 2, the solid line curves represent the response curves of a continuous level for this measurement. The dashed line curves, right-hand scale, represent the error in the measurement when referenced to the empty vessel condition. The variations of the curves are due to the addition of saturated steam at various operating pressures. The specific vapour density values shown are 0.6, 1.1, 2, 3.66 and 5.15 kg/m\(^3\). The red curve is shown as a reference, with 0 kg/m\(^3\) upper phase density.

It can be seen from the graph that as the vapour space density increases, the signal measured by the detector decreases in an exponential fashion. When compared to a system referenced at a zero upper phase density, the errors can become substantial in terms of the measurement span. It is also observed that the potential error decreases as the process value increases. This is due to the fact that as the process level rises, the vapour space represents a smaller proportion of the measured volume. Therefore, the linearisation curve approximates an approach of a low upper phase density.

It should be clearly stated that the true errors are dependent upon several variables: expected upper phase density and variations from the expectation; measurement span/vessel geometry; the number of sources used for the measurement; and the expected operating point. All of these factors should be considered when specifying equipment for a continuous level application.

A solution for the above conditions can be employed by performing a direct and continuous measurement upon the vapour space. With the ability to monitor the changes in vapour space density, the measurement signal and linearisation of the detector output can be compensated to reduce the inherent error discussed above. Essentially, this vapour space measurement provides a reference that the continuous level measurement can be compensated against.

The reference can be accomplished with a separate radiation-based detector to provide a reference for the continuous level measurement. It employs the same radiation source as the continuous level measurement and therefore utilises the same transmission.

Figure 1: Example vessel.
Instrumentation

Figure 2: Response curves under vapour phase variation.

Figure 3: Process value over time showing vapour phase compensation.

Figure 4: Process level trend showing vapour phase compensation.

path through the vessel contents as the continuous level detector. The reference should be made through a radiometric measurement because this technology is the only one that portrays vapour density fluctuation. If one would attempt to measure the vapour space via pressure only, the density could still vary based upon differences in temperature or vapour space composition.

Figure 3 shows an application of two detectors summed together (top level and bottom level) to provide a continuous level measurement output shown by the red trend line (overall level). The vapour compensation output is shown in pink, which is the result of a direct measurement of the vapour space above the process fluid. Near point 0.88 on the horizontal scale, a change occurs in the process vessel. The operating pressure is reduced and the vessel is being emptied. If vapour compensation was not provided the level indication would have fallen well below the actual process level, and the indicated level would show less material in the vessel than was truly present.

In Figure 4, trend data taken from the instrument during a depressurisation and de-inventory cycle is shown. The blue trend line indicates a vapour-compensated level indication and the red trend line shows the same instrument output without the vapour compensation function. Both trends are representative of the total level output from the measurement system. Before depressurisation (point 20 on the horizontal scale) there is relative agreement between the trend lines, showing that the system was calibrated under pressurised operating condition. However, after depressurisation and de-inventory of the vessel there is substantial variation, approximately 30% of the indicated span, between the two curves. The consequences to the system operators would be the belief that the vessel has been reduced to 20% of the measurement span, when in reality the true level was closer to 50%.

There is an additional advantage that vapour density compensation offers, and it is related to the ability to calibrate the measurement system. Since it is often difficult to change the process level while in operation, and calibration of the radiation-based measurement requires several reference points throughout the measurement span for proper calibration, there is a conflict of needs. When vapour density compensation is added to a measurement system, calibration can occur at non-operating conditions and will compensate the measurement for the increased vapour space density observed when in typical operation. In turn, an error is minimised when brought to operating pressure/vapour density conditions. This aspect has the effect of simplifying the calibration process and balancing operation limitations with calibration requirements.

In summary, we have discussed the effects of a dynamic vapour space and the negative impacts that are possible on the repeatability and accuracy on a radiation-based measurement. There is a tested and proven solution for accommodating these operational issues. This solution can actively compensate for the errors caused and can simplify the calibration process by referencing the radiation signal. The solution can be employed when conditions are known to have a dynamic vapour space due to temperature or pressure fluctuations or variations in vapour material composition, as well as when operational conditions do not allow for the optimal calibration conditions.

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MINE DEWATERING PUMPS

Mine dewatering is one of the toughest applications for a submersible pump — it is not only issues with abrasion and high temperature but the wastewater involved is highly corrosive.

Tsurumi Pump has released a range of all stainless steel pumps designed for just such liquids. The biggest of these are the 6” and 8” LH series pumps with motors of up to 110 kW. Impellers, casings, motor frames, outer covers, strainer stands and flanges are all made of corrosion-resistant 316 stainless steel.

The LH stainless steel series with 110 kW motors provide pumps with flows of up to 6500 L/min and heads to 107 m.

The LH series in their standard cast iron configuration are already popular in mines because of their slimline design. The high head configuration means they can outperform other brands that need to be used in tandem to achieve the same head capacity.

The LH series also incorporates Tsurumi’s standard features, all aimed at delivering life cycle costs significantly below the industry average. These include an anti-wicking cable entry that prevents water ingress into the motor if the power lead is damaged or the end submerged.

All Tsurumi motors feature in-built thermal protection that cuts power on overcurrent or extended dry run conditions. The self-reset activates once the motor has cooled, allowing the pump to automatically restart.

The entire range offers double silicon carbide seals with an oil lifter, incorporated in the seal chamber, which ensures seal surfaces are always lubricated.

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SERVO DRIVE

The Allen-Bradley Kinetix 5700 servo drive offers dual-axis servos, a large 1.6–60 kW power range and time-saving tuning technology. Used in place of multiple servo drives, the next-generation platform can help machine builders reduce cabinet-space requirements by up to 70%, reduce wiring requirements by as much as 60% and achieve easier configuration and commissioning.

The servo drive uses Load Observer real-time tuning technology, which helps remove the need to tune each individual axis. This can help machine builders deliver high-performance motion control out of the box and reduce commissioning time by days, weeks or even months for the largest machines.

Once a machine is operational, the servo drive uses Tracking Notch Filter technology to detect and remove resonant frequencies and automatically make tuning adjustments over time to help optimise machine performance. DSL feedback ports provide support for Kinetix VP servo motors with single-cable technology. This enables machine builders to package motor power, brake and feedback wires all in a single cable, helping to reduce motion wiring requirements by as much as 60%.

The servo drive also combines high-performance vector and servo motor control to help reduce machine complexity and reduce time and labour costs during integration. Additionally, Rockwell Software Studio 5000 Logix Designer software provides a single, easy-to-use design environment for configuring the servo drive and integrating it with Logix controllers for both motion and safety applications. The servo drive also supports both hardwired safety and integrated safety over EtherNet/IP.

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COMPRESSED AIR BOOSTERS

Half the size of their predecessor, the DN C series boosters from Kaeser have a small footprint offering a solution for when space is at a premium. Optimised for low vibration and low noise emissions, these compact units run noticeably quieter due to an enclosure with integrated after-cooling as well as a low vibration structure.

The DN C series boosters are available with Sigma Frequency Control (SFC). Incorporating a variable speed drive ensures better harmonisation of the booster on the input side with the upstream compressor output. The SFC functionality helps adjust the free air delivery as consistently as possible to meet the needs of the system. This reduces switching differentials on both sides, as well as potentially resulting in overpressure, leaks and machine load.

All serviced parts are easily accessible from one point. This intelligent component layout makes the DN C series boosters service friendly.

The boosters also include an integrated Sigma Control 2 controller, equipped with special booster software, to ensure optimal system operation while also enabling convenient connection to master controller systems via Ethernet. Since all individual components can be perfectly coordinated with one another, the entire station can be optimised to provide maximum efficiency and performance. Integration is also possible within an Industry 4.0 environment.

Ready for immediate electrical connection on delivery, the DN C series boosters from Kaeser are available with drive powers from 22 to 45 kW and free air delivery 2.9 to 19.60 m³/min.

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ANCA Machine Tools (AMT) celebrated its 40th anniversary of operation at the end of 2014. Founded by Pat Boland and Pat McCluskey 40 years ago in Melbourne, AMT has grown into a global organization with manufacturing sites and branch offices all around the world. Today, AMT is a market leader in quality CNC grinding machines.

AMT’s success is a result of its continuous development of cutting-edge technology and a focus on innovation. Continuing in that tradition, AMT has launched a number of new machines, including the FX Linear and MX Linear machines. Both machines are powered by the LinX linear motor developed by ANCA Motion, a sister company of AMT.

Prior to FX Linear and MX Linear machines, AMT had been a silent observer of linear motor technology for many years. “AMT was aware of the benefits that can be brought by linear motors. Over time the ball screws can wear even on the best machines, and you have to consider backlash and the loss of preload,” said Simon Richardson, AMT MX platform product manager.

“When installing and aligning a ball screw on a machine, tighter tolerances are required over the entire length of the ball screw when compared to fitten of linear motors.”

However, AMT has resisted using linear motors for quite a long time. Philip Wysocki, electrical systems engineer at AMT, said: “The traditional linear motor is flat in construction, which creates a lot of issues when implementing these motors on machines.”

Machines with flatbed linear motors typically require a separate chiller for thermal stability, and the attractive force between coil and magnet bed creates tremendous downforces on the bearings, making everything wear faster and hence decreasing efficiency. In addition, flatbed-style linear motors used in grinding machines typically have a back-iron in their magnetic circuit which further increases the downforces and creates cogging.

With the arrival of ANCA Motion’s cylindrical LinX linear motor, he believes it has found technology which it can confidently adopt into its tool-grinding machines. The LinX linear motor overcomes all the problems related to flatbed linear motors and delivers superior performance due to its cylindrical design.

ANCA Motion’s LinX motor consists of a shaft containing magnets and a forcer containing wound copper coils. The symmetric design results in zero attractive forces between the forcer and shaft, greatly reducing the loading requirement on support bearings. The thermal barrier design separates and removes heat from the motor, eradicating thermal growth for the machine. “Thanks to its excellent stand-alone thermal stability, AMT’s machines don’t require a dedicated chiller for the LinX linear motor. This is a huge advantage over competitors’ flatbed motor-based machines, significantly reducing the power usage and space occupation,” said Richardson.

With LinX’s simple construction, non-critical air gap and lack of physical contact between shaft and forcer, machine manufacturers can greatly simplify installation, reduce maintenance and extend machine life. The LinX’s design allows it to easily replace ball screws in existing machines and makes the machine design a lot easier.

“Due to its simple construction, only one or two supports are required at the shaft ends, depending on its orientation. Not only has the axis installation time been significantly reduced by more than 200% when compared to ball screws, but the installation of LinX motors is much safer than flatbed linear motors,” Wysocki continued.

The ironless design of ANCA Motion’s LinX linear motor and its even force over the entire stroke bring out unprecedented motion performance. Because of its direct-drive nature, the motor can track motion commands more accurately and repetitively to achieve better surface finish.

Richardson added: “With the LinX linear motor, we don’t need to worry about cogging, backlash or reversal error. The tool’s surface finish, ground by a LinX-powered machine, is significantly better than the result from a best-performance ball screw machine. You can see the tangible difference easily. This is just unbelievable when you are talking about microns.” In addition to the improved surface finish, the LinX motor also enhances the cycle time due to its higher acceleration and faster traverse speed. Since the launch of FX Linear and MX Linear machines, LinX-powered machines have been installed in various regions all around the world — and AMT customers are very satisfied with the performance of these machines.

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OPERATOR INTERFACE
The Allen-Bradley PanelView Plus 7 Performance terminal expands on the recently released PanelView Plus 7 Standard model with a larger screen option, more processing power, expanded connectivity and greater software support.

The Performance model has six screen-size options, including a 19” option. The 19” screen offers machine builders and end users more display area on which they can design, control and monitor large applications.

The Performance model also includes new keypad options to complement the terminal’s standard touch screen. A more powerful CPU supports larger displays and larger applications than the Standard model’s maximum of 25 screens and 200 alarms.

With the addition of an embedded ethernet switch and two ethernet ports, the terminal can support device-level ring (DLR) topology for single-fault resiliency. The terminal also has expanded mobile connectivity.

Remote desktop services enable a plant manager, maintenance technician or support provider to securely access the HMI from a remote location to troubleshoot a problem, walk through set-up procedures or review alarming. In addition, plant operators can monitor HMI data within the plant using a tablet, smartphone or other mobile device.

With video playback support, machine builders and end users can incorporate helpful videos into the terminal to support operator training and troubleshooting. Microsoft Office viewers and Internet Explorer support give operators instantaneous access to network-based Office files and HTML pages, such as standard operating procedures, directly from the terminal.

Rockwell Automation Australia
www.rockwellautomation.com.au

CONTROLLER
NI has announced updated embedded systems hardware based on the LabVIEW reconfigurable I/O (RIO) architecture. The hardware includes the Controller for FlexRIO, for designers with high-performance embedded applications.

The controllers are fully supported by LabVIEW software, the LabVIEW FPGA Module and NI Linux Real-Time, now based on Security-Enhanced Linux, which enables advanced security features for industrial IoT applications. To meet the evolving requirements of the IoT, NI’s platform brings together intelligent systems, connectivity and system-to-system communications, coupled with analytical software tools designed to deliver business insights and customer value.

NI Linux Real-Time gives access to an extensive community of applications and IP with a secure and robust Linux-based real-time 64-bit OS, while an embedded UI offers a local HMI and the ability to use the control system to customise and handle HMI tasks, cutting component costs as well as development and integration time. Secure digital (SD) storage gives greater control over how data is stored, managed and accessed.

The Controller for FlexRIO is now available with a dual-core ARM processor and a Kintex-7 FPGA, making it possible to implement high-speed control algorithms and advanced signal processing with support for over 30 high-performance I/O adapter modules. Users can scale faster and transition from prototyping on PXI to deploying on the compact 44 x 140 x 234 mm controller with minimal software changes.

National Instruments Australia
www.ni.com/oceania

COMPACT PROCESS VALVE ACTUATORS
The CQ Compact is a range of compact fully concentric, balanced-design pneumatic and hydraulic valve actuators that deliver an efficient, self-contained solution for applications demanding functional integrity and safety where space is limited.

In addition to providing reduced dimensions, the CQ’s symmetric design also presents a good weight balance on the valve, enabling increased efficiency for assembly and disassembly. The weatherproof housing contains a helical mechanism which transforms linear piston motion into 90° (±5°) rotation for the operation of quarter-turn valves. As an option, rotation can be increased to 180°. Complete customisation of the torque profile is available to suit individual valve requirements.

The range features a choice of cylinder sizes and different actuator builds for diverse applications. The CQ design incorporates the removable valve adaptation within the overall dimensions for maximum compactness, and actuators can be easily and safely disassembled for field maintenance. Internal coatings provide enhanced corrosion protection, while external epoxy finishes and a wide choice of seal materials can be specified to meet requirements.

The actuators are available for single- or double-acting operation with output torques up to 600 kNm. Pneumatic operation is available using air, nitrogen or natural gas at 12 barg pressure, while 210 barg is recommended for hydraulic operation. Environmental and hazardous area certifications include IP66M/IP68M, PED, ATEX, IECEx and GOST.

The units are also suitable for SIL3 safety-related duty. The standard operating temperature range is -30°C to +100°C, with an optional low-temperature limit of -60°C.

Rotork Australia
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Compact Process Valve Actuators
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New Products

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Oct 2015

WIRELESS GATEWAY

Emerson Process Management has introduced the Smart Wireless Gateway 1552WU, a Wi-Fi access point that also connects WirelessHART sensors to the control network.

Jointly developed as an integral part of Cisco’s IoT systems, the 1552WU gateway is a fully featured mesh access point that simplifies Wi-Fi and WirelessHART installations, lowers costs and reduces deployment time. Users no longer have to run fibre-optic cables for ethernet communication to every WirelessHART gateway. The 1552WU seamlessly connects to neighbouring access points allowing complete wireless coverage, with only local power wired to the 1552WU.

By integrating Emerson’s WirelessHART gateway with Cisco’s outdoor, hazardous-location-qualified access points, the 1552WU provides customers with the efficiency, scalability and security of a single wireless network solution that can be utilised for multiple-use cases, including plant control, worker mobility and safety. This solution extends to meet the demands from both operational technology and information technology in industrial environments to realise the Internet of Things vision.

Emerson Process Management
www.emersonprocess.com.au
THINGS THAT MATTER: DIGITALISATION IS THE KEY TO SHAPING THE FUTURE

The world is going through a transformation driven by globalisation and digitalisation, which makes me very optimistic for Australia’s future — as long as our leaders embrace the transformation. Traditional manufacturing and process industries are being redefined and the traditional boundaries are blurring. Digitalisation overlaps into all parts of the economy and transforms the way we do business. And every change, including the recent change of Prime Minister, brings with it new opportunities to create positive energy and to position Australia for a stronger and more confident future. At the end of the day we are inspired by the desire to shape the future, but we must be grounded in reality.

Some of the basic tenets that society operates on are having efficient and competitive energy, industry and infrastructure. These are the things that matter to business, society and the world at large. At Siemens we focus on the impact of digitalisation across three areas. First is the future of manufacturing and industry, where we see automation and digitalisation merging and leading to a fourth industrial revolution. Second, we see the emergence of what we call ‘intelligent infrastructure’ where digitalisation is applied to bring numerous efficiencies and open opportunities that haven’t even yet been considered. Third, we see digitalisation being used to ‘create sustainable energy’ — providing data that can optimise ongoing performance.

But if digitalisation is so important, where does it sit in the business and political agenda? Who needs to drive it?

Clearly, this has to start at the top. Digitalisation transforms the entire business and the entire economy. The immense scope of change it brings — and the level of investment required — means that it belongs on the CEO’s agenda and even on the agendas of the Prime Minister and state Premiers. It encompasses digitising both horizontal and vertical value chains and it completely changes product and service offerings, and it brings productivity gains for our infrastructure such as rail and roads, city buildings and energy.

Digitalisation also requires substantial investment. From now until 2020, German industry is expected to invest €40 billion annually in digitalisation applications. Industrial firms surveyed say they will invest, on average, 3.3% of their revenues on Industry 4.0 solutions over the next five years. This corresponds to nearly 50% of all planned capital investments. It is also why the Australian-German bilateral relationship is so important, and I’m really pleased to be a member of the Australian Government’s advisory council on this relationship. For instance, Germany leads the world in advanced manufacturing productivity; therefore, knowledge transfer and joint major projects would greatly benefit Australia.

The last thing to remember is that this is not a purely academic theory — it must be grounded in reality if we are to shape the future. It’s really happening and it’s based on technology available today combined with process and engineering know-how. Within five years in Germany, over 80% of companies will have digitalised their value chains. German companies expect that by 2020, 86% of horizontal and 80% of vertical value chains will achieve a high level of digitalisation and will thereby be closely interconnected.

With this in mind, now more than ever positive human energy needs to transform into positive actions. This in turn creates confidence, which in turn creates growth, which in turn becomes a continuous cycle. And digitalisation gives us something to be very positive about.

Jeff Connolly is Chairman and CEO of Siemens Ltd and has enjoyed a 30-year career at Siemens spanning all portfolios and including senior roles across Europe and Asia. He is a thought leader in the public arena, with his active participation in many industry and government boards. He is passionate about Australia’s opportunities with the future of industry, intelligent infrastructure, sustainable energy and digitalisation.
By 2019 the global field service market is forecast to be worth $3.52 billion *

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