

PROCESS

TECHNOLOGY

AUTOMATION + CONTROL + INSTRUMENTATION

May 2018 vol.31 no.11

PP100007403



High-Frequency RFID

Solutions that elevate the intelligence of your application

TURCK

A perfect view – even with condensation!

The future is 80 GHz: a new generation of radar level sensors

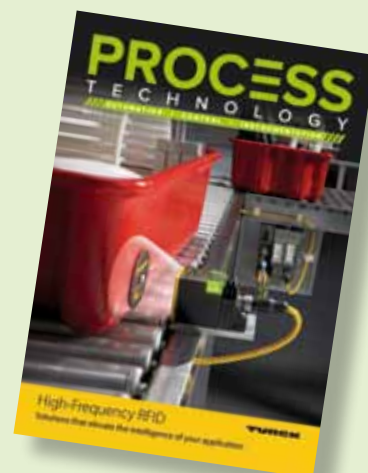
For the latest generation of radars, condensate on the sensor is not an issue. Totally unaffected by condensation or buildup on the antenna, VEGAPULS 64 accurately detects the liquid level. With the smallest antenna of its kind and exceptional focusing, it delivers outstanding performance every time. Simply world-class!

www.vega.com/radar



® Wireless adjustment via Bluetooth with smartphone, tablet or PC. Compatible retrofit to all plics® sensors manufactured since 2002.





Elevate the intelligence of your application with industrial RFID. Designed to meet the demands of any manufacturing environment, Turck Australia's high frequency (HF) and ultra-high frequency (UHF) industrial RFID solutions ensure processes are running as efficiently as possible.

RFID is capable of advanced data management that enhances product visibility throughout production and distribution. Further, since RFID enables users to both read and write information on a tag — even at diverse distances — it provides the capabilities and flexibility to accommodate a wide range of applications.

The versatility in performance and capabilities enables this technology to be used in situations where barcodes or other optically read alternatives are impractical. RFID tags can be embedded into the product to offer the desired reliability without being subjected to environmental elements, saving costs and downtime for the user.

RFID can also provide real-time tracking to allow for maximum data availability and accessibility. By integrating with common industrial networking protocols, RFID allows manufacturers to optimise their data management.

Turck Australia's solutions are designed to offer the complete package from digital and analog information and data collection to connecting directly to the cloud. This is industry 4.0 at work.

Turck Australia Pty Ltd
www.turck.com.au



CONTENTS

- 4 A real-world approach to the IIoT for process reliability
- 8 Hot products online
- 10 Driving the digital transformation with augmented reality
- 16 Electrosensitive protective devices for safe machines — Part 1
- 28 Arc faults in underground electrical enclosures
- 42 A culture of reliability



READ ONLINE!


*This issue is available
to read and download at*

www.processonline.com.au/magazine

A REAL-WORLD APPROACH TO THE IIoT FOR PROCESS RELIABILITY

Bart Winters and Francois Leclerc^*

New solutions enable online continuous monitoring of equipment and process health.



In the process industries, plants must operate not only at desired capacity but also at optimal efficiency. This means predicting undesirable process conditions and equipment failures before they occur, and then systematically addressing them as part of a continuous improvement process. The current approach at many facilities is to 'run-to-fail' since abnormal conditions and malfunctions aren't identified until alarms provide a warning or something breaks.

A growing number of industrial facilities are exploring the power of the Industrial Internet of Things (IIoT) to optimise their business performance. The IIoT enables plant operators to improve process reliability by capturing and analysing data, and then identifying the warning signs of potential issues — predicting when process adjustment and equipment maintenance are needed, and pre-emptively servicing installed assets before problems arise.

Seeking digital intelligence

In a highly competitive global marketplace, industrial organisations seek 'digital intelligence' to manage and operate hundreds or thousands of assets from a single site or across an enterprise to address critical operating demands. They need effective tools to transform process data into real-time information regarding process performance, equipment health, energy consumption and emissions monitoring.

Plant operators, process and equipment engineers, and managers require continuous monitoring and surveillance, notifications and collaboration with experts so that appropriate proactive actions can be taken. This will minimise degradation, poor performance and secondary damage to equipment to reduce costs, as well as increase throughput and profits.

In an effort to ensure uptime, companies have historically sent field technicians out to perform routine diagnostic inspections and preventive maintenance according to fixed schedules. This is a costly, labour-intensive process with little assurance that failure won't occur between inspections.

To improve efficiency, companies have implemented advanced process control (APC), defined operating boundaries with their alarm system, created key performance indicators (KPIs) and called on local experts to help solve operating problems. The ef-

fectiveness of these measures has been difficult to sustain as they rely on dedicated and knowledgeable on-site personnel.

Equipment failures have a significant impact on industrial operations, making it imperative to optimise predictive maintenance strategies. In addition, industrial firms are looking for ways to make sense of vast quantities of data that can have a significant impact on their performance. For instance, reporting and interpreting of alarms and alerts is central to safe operations. It is also important to act on abnormal situations quickly and effectively.

To support the variety of monitoring and decision support applications necessary within a manufacturing facility, data needs to be turned into information and delivered with context so it can be understood and used in a myriad of ways by various people.

Today's operational objectives

For manufacturers and other operating companies, asset failure and almost imperceptible reductions in process and equipment efficiency are constant threats to the operating plan and overall equipment effectiveness (OEE). As a result, they are shifting their spending to increased equipment maintenance, thus losing potential revenue. Factors such as availability of skilled workers and increasingly complex production processes are impacting the ability to predict and detect deteriorating asset health and process performance.

To maximise their overall performance, modern plants are looking for ways to transform their operating and maintenance philosophy from 'break-fix' to keeping operations running as efficiently and steadily as possible while decreasing unplanned downtime.

Key operational objectives include:

- Deploying online, continuous monitoring and exception-based alerts for process performance, equipment and controls.
- Capitalising on increased data availability across the enterprise.
- Putting data into context so as to compare assets to determine similar conditions or behaviour.
- Implementing tools for process and reliability engineers enabling visual data exploration to decrease reliance on complex machine learning algorithms to solve problems.
- Establishing collaboration with both internal and external subject matter experts (SMEs).

Integrated operational and maintenance strategies open up new possibilities for companies. Data from sensors monitoring both process and machine conditions are combined to identify any patterns that indicate a possible fault or process limitation. This allows the onset of a stoppage to be recognised early, and corrective measures to be planned and introduced in the most effective way.

Combining both process and equipment data leads to truly understanding asset capability, and enables the definition of accurate, consistent operating and integrity envelopes that can be used in APC strategies. The result is greater process stability within control and monitoring systems for situational awareness at all levels of operations, as well as improved decision support systems to ensure assets are operated in an optimal manner. With this approach, unplanned downtime can be avoided, and both staff and resources can be employed more effectively.

Leveraging the IIoT

There's no doubt the IIoT carries major implications for industry, especially at a time when infrastructure is ageing and veteran operators and engineers are retiring. There is a shortage of experienced workers to take the place of seasoned personnel, resulting in a loss of knowledge. The IIoT can be leveraged to institutionalise knowledge capture while requiring fewer internal experts. This can be done with the help of external experts, such as process licensors, who have expertise and visibility beyond the company's assets.

The IIoT allows companies to do more with their current systems and extend their business processes to enhance monitoring and reduce the time to action. For example, a cloud-based control loop and APC monitoring system can be set up to monitor controls across the enterprise by an internal or external domain expert. With visibility and knowledge across sites, experts can alert and collaborate with site SMEs and recommend actions when control degradations are detected. Each site can benefit from earlier detection and faster resolution of problems afforded by a higher level of expertise focused on control performance. For the enterprise, these capabilities can be deployed using fewer resources than having an expert at each site.

In order to make better business decisions, the IIoT offers companies the ability to:

- aggregate data from existing sources
- create additional data sources in a cost-effective way
- gain visibility into new data



FOR MANUFACTURERS AND OTHER OPERATING COMPANIES, ASSET FAILURE AND ALMOST IMPERCEPTIBLE REDUCTIONS IN PROCESS AND EQUIPMENT EFFICIENCY ARE CONSTANT THREATS TO THE OPERATING PLAN AND OVERALL EQUIPMENT EFFECTIVENESS.

- identify patterns
- derive insight through analytics.

Through this approach, previously unsolved problems, as well as new ones, can be solved.

Industry-leading companies are transforming their operations by utilising proven solutions in the areas of process and event data collection, combined process and asset-centric analytics, and visualisation technology to continuously and automatically collect, organise and analyse data. Indeed, advanced analytics is one of the pillars of the IIoT — connecting people, processes and assets to optimise business results. It can transform work processes from manual and reactive to automatic and proactive.

An IIoT-enabled plant uses a combination of advanced sensors, automation systems and cloud technologies integrated with current systems and data analytics to become smarter. This provides the ability to locate data in a cloud environment where it can be accessed and analysed with analytical tools. For example, an equipment vibration reading would be sent to the plant's DCS as a single value, whereas rich dynamic data stored in the cloud would allow engineers to study the harmonic signature of a bearing or shaft to determine the root cause of a pending asset failure. Currently, in most cases, dynamic data is only employed by specialists in custom applications — limiting its accessibility by other users in the plant.

In terms of predictive maintenance and process performance, IIoT-based solutions enable industrial enterprises to proactively manage their assets and make more informed decisions through analytics at the edge. Production and maintenance strategies can be combined for optimal overall performance and executed based on how assets are expected to function tomorrow — not solely according to a specific periodicity or on particular present conditions.

Another key driver of the IIoT is a reduction in the level of IT skills and expertise required to support standalone applications so that companies can focus on their core competency of running and managing operations.

Making the most of plant data

Major automation suppliers have developed innovative technologies that deliver real-time process and asset-centric analytics, performance calculations, event detection and collaboration for plant management, engineering, maintenance, centre of excellence experts and operations. These solutions are designed for online continuous monitoring of equipment and process health, enabling industrial facilities to predict and prevent asset failures and poor operational performance.

Today's tools for real-time process performance monitoring provide statistical calculations and embedded performance models which, when paired with near real-time surveillance of instruments, processes and equipment, allow users to accurately assess asset performance. They offer a clear window into plant processes — continuously monitoring operating conditions and enabling decisions and actions to prevent production loss, minimise downtime and reduce maintenance expenses.

The latest developments in the field of plant equipment and process health monitoring leverage secure, managed and hardened edge-to-cloud platforms, while focusing on data science and analytics, and applying digital twin patterns to drive their analytic models. With the help of external experts, these solutions enable industrial firms to extract meaningful insights from their data. This leads to improved decision-making and addresses such issues as safety improvement, asset management and optimisation of operations. As a result, process plants are becoming more agile, driving increased revenue and keeping the focus on what matters most: production.

By modelling first principle compressor performance and baseline performance, for example, current performance can be continuously compared to detect both sudden changes and long-term degradation. These events have successfully been demonstrated to trigger maintenance activity, such as chemical injection to clear fouling or a compressor wash, or to initiate further action if required.

Unlike condition monitoring solutions focused solely on equipment's physical



condition, the latest data analytics and asset monitoring solutions use performance degradation as a leading indicator of potential problems. With the IIoT, identification of performance degradation and actions to be taken is continuously improved since both process and equipment data are used, not only for a specific compressor but also for all compressors of similar design and service. Some tools employ predefined best practice templates for a wide range of equipment types, including pumps, compressors, exchangers, valves and turbines. Combined with an interface to process design simulation software, this solution helps users rapidly deploy equipment or process monitoring on any plant asset — eliminating the need for complex model development.

It is important to remember that the IIoT is not just about capturing sensor data. Information needs to be put into the asset context structure; merely operating on tag-based data will not ensure a repeatable and scalable solution. Processes are instrumented for control rather than reliability or optimisation, and as a result, much of the 'derived data' important for prediction and decision-making is locked in spreadsheets and other standalone tools. It is essential to continuously calculate this data and bring it into the IIoT environment where continuous runtime analytics can examine historical performance for use in machine learning algorithms.

Furthermore, IIoT solutions should not solely rely on a statistical model to detect deviations from normal. Having a fundamental, physics-based model creates a digital twin, with a virtual representation of the process or asset located in the cloud. This allows users to model and compare expected process performance against actual results and then apply these deviations as early indicators of health degradation.

Digital twins exist at the intersection of physical engineering and data science, and their value translates directly to measurable business outcomes: reduced asset downtime,

lower maintenance costs, improved plant and factory efficiency, reduced cycle times and increased productivity.

Benefits to industrial organisations

Rapid adoption of the IIoT has created economies of scale for smart sensors, connectivity, analytics and robust software platforms. This change is driving the adoption of enterprise-level performance management, process monitoring, predictive maintenance programs and business transformation with the goal of eliminating unplanned downtime and reducing operating costs while maintaining product quality and compliance.

A real-world approach to the IIoT enables the integration of current systems and the addition of new data sources and analytics to support complementary, continuous improvement processes focused on performance monitoring and decision support. The specific benefits of this approach include:

- Increasing process reliability and asset utilisation by up to 10%: Plants can reduce unplanned downtime by defining and operating within operating and integrity envelopes, predicting failures and providing proactive responses, as well as minimising rate and efficiency losses.
- Increasing operating efficiency by up to 10%: Industrial organisations can manage performance, including yields, energy and raw material usage, to achieve up to 10% reduction in costs. This results from enhanced engineering and production effectiveness with continuous monitoring, remote collaboration and ready access to required information, as well as improved decision support.
- Sustaining advanced control and preventable degradation with benefits up to 25%: Control teams can proactively maintain the effectiveness of control loops, controllers and models; adjust controls to new operating conditions and process changes; and quickly address critical instrument issues.

- Increasing safety: Production facilities can minimise risks by ensuring normal and stable operations, and also eliminate production stops for safety system verification.
- Reducing maintenance costs by up to 10%: Operations teams can take proactive measures to minimise equipment damage and emergencies while optimising maintenance based on real asset conditions, thus improving reliability and extending equipment life.

Conclusion

Organisations across the process industries are seeking to improve their return on large asset investments. Effectively managing assets, however, requires a wealth of information and analysis. Industrial facilities need combined production and maintenance strategies to minimise unscheduled shutdowns and optimise product quality while cost-effectively using the operations, maintenance and engineering resources they have on hand.

The true value of the IIoT can only be fully realised with a holistic view of asset management. Powerful virtual cloud networks will continually collect, aggregate and model data for accurate prediction of degradation and failures, and put contingencies in place to limit their impact on system availability. This approach is becoming fundamental to improving process reliability and driving cost takeout by delivering real-time, intelligent and actionable data to connected systems and the end user. Although it may take time for some companies to become an IIoT data-driven organisation, this evolution is coming and they should begin preparing for it.

**Bart Winters is the Asset Management Business Director at Honeywell Process Solutions. He brings over 30 years of experience in software development, project engineering, project management, marketing and sales consulting roles. Bart holds a bachelor's degree in manufacturing engineering.*

^Francois Leclerc is an Enterprise Solutions Leader at Honeywell. He has 35 years of global experience in process industry automation, including consulting, strategic planning, business process re-engineering, benchmarking, design and implementation of plant information (MES) systems, and developing and implementing control and optimisation for the mining, minerals, chemical and pulp and paper industries. Francois holds a degree in chemical engineering.

Honeywell Process Solutions Ltd
www.honeywell.com.au

HOT PRODUCTS

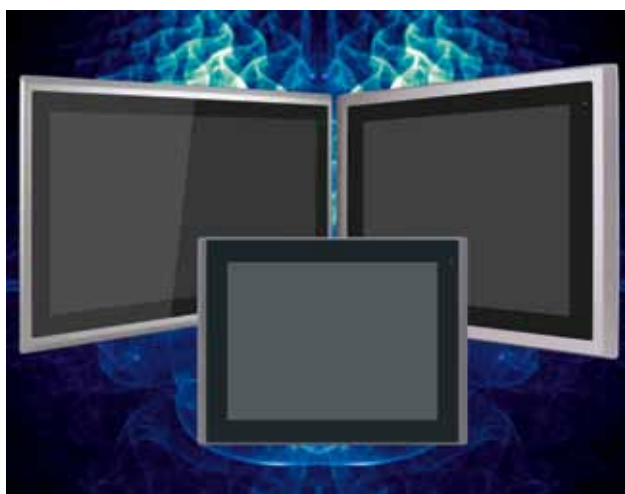
ON WWW.PROCESSONLINE.COM.AU THIS MONTH

ARM-BASED HMIs

Aplex Technology's ARMPAC Series of industrial ARM-based HMIs runs at low power levels with built-in memory and storage.

Backplane Systems Technology Pty Ltd

<https://bit.ly/2HgMBmy>



PHOTOELECTRIC POSITION ENCODING

The WCS Outdoor is optimised for position feedback in outdoor environments such as ports, offshore installations, ships or waste incineration plants.

Pepperl+Fuchs (Aust) Pty Ltd

<https://bit.ly/2K9tAiT>

HART COMMUNICATOR APP

ProComSol's DevCom app replaces a dedicated HART Communicator by turning a smartphone or tablet into a HART communicator at a lower cost.

Transtek Pty Ltd

<https://bit.ly/2vv20sX>



POWER SUPPLIES

Phoenix Contact's Quint Power power supplies now offer high system availability in the power range up to 100 W.

Phoenix Contact Pty Ltd

<https://bit.ly/2qSM1jJ>

FLUKE®



SIMPLIFY PRESSURE CALIBRATION

for faster, more
accurate results.

Let the new Fluke 729 Automatic Pressure Calibrator change the way you calibrate.

- Fast, easy setup with **automatic pressure regulation**
- Automatic, no-hassle calibration and documentation
- Built-in HART communication
- No hand pumps or manual adjustments required



Learn More
au.fluke.com/729

Contact Fluke Australia



 www.fluke.com.au

 1300 1 FLUKE

 auinfo@fluke.com

DRIVING THE DIGITAL TRANSFORMATION WITH AUGMENTED REALITY

More than one billion smartphone users worldwide will create or view augmented reality (AR) content in 2018, according to Deloitte Global predictions. At its core, AR blends the real environment — what you see, unassisted, in front of your own eyes — and a virtual, computer-generated environment.

Applications in the consumer space, such as gaming, retail and interior design, are already gaining traction — and highlight the potential of this technology to enhance experiences and drive deeper product engagement.

But dig a little deeper and it becomes clear that AR has the power to transform the manufacturing sector too — offering factory owners and operators a completely new way of engaging with mechanical devices and executing tasks. And accessing and implementing this technology is no longer out of reach.

In practical terms, there are three main areas that AR can be applied to in the manufacturing space:

1. **Product development:** AR is capable of evaluating 3D virtual models of new products, which can be easily modified, in their real context of use, saving time and money in the testing and evaluation stage of product design review.
2. **Maintenance:** Diagnosing machine problems and the corresponding repairs can be made significantly more time efficient, with AR technology identifying the machine problem and providing guidance through quick and easy repairs.
3. **Safety applications:** AR technology reduces safety risk and enhances reliability by allowing the user to diagnose a mechanical issue without exposing themselves to dangerous situations or interrupting the equipment while it is still in operation.

These capabilities are just the beginning. As we continue to unlock the potential of AR in industry, there will no doubt be many more applications to follow.

The introduction of any technology needs to deliver real business value, and I have seen that AR has the potential

to deliver improvements across three core areas.

Reinforcing safety

AR provides real-time, easy-to-follow, visual, step-by-step operating procedures and key messages to operations personnel, reducing human error and guiding operators to appropriate equipment for performing specific tasks. AR solutions superimpose information on existing hazards over the operator's location, supplying the operator with critical information. The technology also allows the operator to assess environmental conditions without having to get too close, and improves compliance standardisation across processes to effectively reduce safety risk. This is an invaluable asset that can both protect employees and reduce human error, making it instrumental in improving plant operations.

Boosting efficiency

Resource, time and cost efficiency is another important implication of AR technology to consider. There are countless applications that greatly reduce the time and money spent on plant operations. For example, implementing AR in chemical manufacturing can capture key operational data digitally to immediately give real-time operations visibility, and automate task management to accelerate operator rounds while creating a digital audit trail for regulatory compliance.

Reducing downtime

AR enables real-time collaboration between reliability and maintenance engineers and operators performing maintenance rounds to increase asset uptime — ensuring that the plant is running at maximum capacity without faults caused by human error.

We are just now uncovering the potential for this new generation of AR tools on the plant floor. Although much



progress has been made to get to this point, recent advances in easier integration and practical use cases should help speed the adoption of these solutions within manufacturing.

Historically, AR installations have involved expensive equipment, a complex rollout and a high degree of technical expertise, but this is changing — and fast. Increased mobile usage, combined with innovative software engineering tools, has made it possible for developers across industries to achieve affordable AR solutions.

I encourage the manufacturing industry to fully harness the capabilities of AR and reap the wide array benefits it offers. Ten years from now, we will realise that 2018 was only the beginning — and the time to start profiting from this transformation is now.

Peter Herweck is Executive Vice President of Industry Business and a Member of the Executive Committee at Schneider Electric, having had a full career in industrial



automation at Mitsubishi and Siemens. He previously held management and board positions at Siemens, including President of the Automation & Drives Group at Siemens Ltd China, President of the Industry Sector in North-East Asia, Head of Corporate Strategy and Corporate Vice President, and Chief Executive Officer of the Process Industries & Drives division.

RTU FOR INTELLIGENT TELECONTROL

Scalable Controllers/Couplers for RTU Applications

SUBSTATIONS OFFSHORE ELECTRICAL



GAS RENEWABLES WATER

WAGO Telecontrol RTUs provide an All-in-One System for Measurement, Regulation, Control and Telecontrol:

- DNP 3.0 standards
- IEC 60870-5-101/-103/-104
- IEC 61400-25
- IEC 61850-7-420 (Server/Client)
- MODBUS, CANopen, PROFIBUS, Devicenet
- MMS and GOOSE

CYBER SECURITY

Advantages of WAGO's solution:

- The PFC100 and PFC200 are characterized by **cross-platform real-time Linux**
- The PFC controllers use an **open-source operating system** that can be scaled, updated and supports tools such as Rsync
- The **Linux® foundation** supports essential security protocols and is constantly being enhanced
- Support for **CODESYS PLC runtime**
- Interface and fieldbus diversity: **CANopen, PROFIBUS DP, DeviceNet, MODBUS TCP, IEC 60870, IEC 61850 and DNP 3.0**
- Maximum security requirements per ISO 27000 series
- On-board **VPN functionality**: VPN tunnel possible via IPsec or OpenVPN directly
- Data encoding in the controller directly via **SSL/TLS 1.2 encryption**
- Parallel data access: Data transmission to the cloud via an **MQTT** or **OPC UA**, also wireless
- WAGO meets all relevant guidelines in the area of IT security

There can be serious consequences for energy producers if they aren't securely connected to the Internet. Cybercriminals can use system controllers to hack into control centers and shut them down, jeopardizing the power supply and even threatening wide-range blackouts in a worst-case scenario. The good news: Operators now know the dangers and cybersecurity is becoming more important. WAGO controllers will play a crucial role in your company's security policies and procedures. PC-based operating systems must receive weekly security updates as they do not otherwise provide sufficient cybersecurity; the hardened firmware of a WAGO controller, however, does meet the corresponding security requirements.





ULTRASONIC SENSORS

The UC-F77 ultrasonic sensors from Pepperl+Fuchs offer IO-Link, sound beam adjustment, synchronisation, long detection ranges of up to 800 mm and minimal dead bands. The series has a space-saving housing design and is available in a standard or side-looker version with integrated M18 thread for through-hole mounting. The minimised dead bands and long detection range mean objects close to the sensor and farther away are detected reliably. The sound beam width is easy to switch depending on requirements and therefore supports a wide range of applications.

Automatic sensor synchronisation allows sensors to operate without cross-talk when installed close together, and a high level of detection reliability is guaranteed even when there are interfering surfaces or strong vibrations from compressed air tools. The IO-Link interface enables quick commissioning and parameterisation via the control panel and provides additional diagnostic information.

Pepperl+Fuchs (Aust) Pty Ltd
www.pepperl-fuchs.com

THIN CLIENT HMIs

SRP-FPV240 series solutions provide a sustainable and scalable automation platform for boosting productivity. This occurs by increasing production efficiency and minimising system downtime through centralised management. Because applications are run on the terminal server not on thin clients, applications only need to be installed once on the server to be available to all client devices. This reduces operational complexity and facilitates more efficient management of access privileges, authentication and security.



SRP-FPV240 series solutions paired with ThinManager software allows secure and centralised management of all thin client devices, server processes and data visualisation sources in an automation network. Visualisation features enable multiple sessions and displays to be viewed on a single monitor for advanced multitasking operations. Additionally, the display layout and content delivered to client terminals can be completely customised according to specific user profiles.

For added reliability and security, SRP-FPV240 solutions pre-installed with ACP BIOS for ThinManager support both server failover and plug-and-play functionality. The provision of server failover means that in the event of a server failure, all thin clients have the ability to switch to a backup terminal server without interruption. With plug-and-play functionality, if a thin client fails, the terminal can be easily replaced without any configuration. The new thin client simply retrieves the terminal configuration data and assumes its identity.

The multidisplay thin client models (SRP-FPV240-AE, SRP-FPV240-02 and SRP-FPV241-AE) support multiple display outputs and video interfaces (VGA, HDMI and Display Port) as well as Full HD and ultra HD (4K).

Advantech Australia Pty Ltd
www.advantech.net.au



INSERTION ELECTROMAGNETIC FLOWMETER

The Series IEF insertion electromagnetic flow transmitter is an adjustable insertion flowmeter featuring electromagnetic technology that measures fluid velocity in addition to providing several continuous signal outputs.

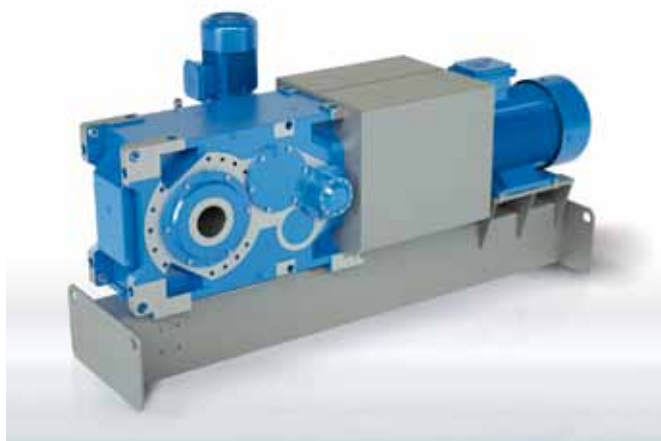
The series is specifically designed to offer high performance paired with simple installation and use. Each unit is adjustable to fit pipe sizes from 102 to 914 mm, and offers several output options including selectable BACnet MS/TP or Modbus RTU communications protocol over 2-wire RS-485 in addition to the standard analog, frequency and alarm outputs.

Outputs include analog: 4–20 mA, 0–5 V, 0–10 V or 2–10 V (display selectable); pulse/frequency: 0–15 V peak pulse, 0–500 Hz or scalable pulse output (display selectable); and two alarm outputs (empty pipe detection or minimum/maximum velocity, and reverse flow indication).

The measurement range of the series is 0–6 m/s with an accuracy of $\pm 0.5\%$ of reading at calibrated velocity, $\pm 1\%$ of reading from 0.6 to 6 m/s and ± 0.006 m/s at < 0.6 m/s.

The operating ambient temperature range is -29 to 71°C , while the process temperature is up to 121°C . Wetted parts are made from 316 stainless steel.

Dwyer Instruments (Aust) Pty Ltd
www.dwyer-inst.com.au



GEAR UNITS

NORD Drivesystems' MAXXDRIVE industrial gear unit provides high output torques from 15,000 to 250,000 Nm and is suitable for applications such as agitators, conveyor belt drives, mixers, mills, drums or crushers.

The helical gear unit provides power from 1.5 to 4000 kW and is available in 11 sizes. These are supplied with various output shafts to ensure optimum connection for any application. In addition, they can also be supplied with double or triple input shafts, IEC input flanges for direct connection of electric motors, output flanges and a range of suitable torque arms.

The bevel unit can be used under extreme conditions as it can withstand fluctuating ambient conditions due to a temperature management system. Various cooling and heating options are available and for maximum flexibility, the gear units are fitted with easily accessible back stops for quick and simple changes to the direction of rotation. Taconite sealing on the input and output shafts offers a robust shield against dusty or wet environments and accessible greasing points ensure maintenance can be undertaken efficiently.

NORD DRIVESYSTEMS (Aust) Pty Ltd

www.nord.com

WATERTIGHT SAFETY LIGHT CURTAINS

Watertight enclosures allow light curtains and light grids to be used in harsh working environments with exposure to water and steam. Treotham offers a range of watertight safety light curtains from Reer that are Ecolab food-grade certified.

The light curtains protected by watertight cases are IP69K protection rating tested and are capable of resisting up to 80 bar of water jet pressure at 80°C. The housings also offer additional mechanical protection of the light curtain.

The H version (heated) has a thermostatically controlled heating system and can work down to -25°C. The F version with the use of inert and non-toxic components allows WTF and WTHF enclosures to be used in the food and beverage industry, where no residuals are left when frequent washdown procedures are requested or when they come in direct contact of food.

Treotham Automation Pty Ltd

www.treotham.com.au



Beamex MC6-Ex

New intrinsically safe field calibrator and communicator!

AMS

AMS INSTRUMENTATION & CALIBRATION PTY LTD

Phone: +61-3-9017 8225
Fax: +61-3-9729 9604
E-mail: sales@ams-ic.com.au
Internet: www.ams-ic.com.au

- ATEX and IECEx approved for all hazardous zones
- Very accurate calibrator delivered with traceable, accredited calibration certificate
- Enables a fully paperless and automated calibration process
- Integrated field communicator for HART, FOUNDATION Fieldbus and Profibus protocols
- Multifunctional process calibrator for pressure, temperature and electrical signals

beamex
A BETTER WAY TO CALIBRATE

www.beamex.com
info@beamex.com

FIBRE-OPTIC AMPLIFIER

When the installation space at the detection site of a machine is not large enough even for a miniature sensor, fibre-optic sensors are often the only option for detecting objects. The separation of optics and evaluation make it possible to come close to the detection object both with scanners and with through-beam systems. When using highly flexible fibre-optics or variants with diverted light emission, technical and economical solutions can be implemented even under unfavourable installation conditions. High temperatures, aggressive oils, chemicals or mist are conditions in which the appropriate versions of fibre-optic sensors are needed. In both hidden and invisible mounting, fibre-optic sensors often have the decisive advantage that their amplifiers can be installed at easily accessible places.

The GLL170 fibre-optic amplifier is now easier to operate and offers a higher level of flexibility. With both the GLL170 with a potentiometer and the GLL170T teach-in version with digital display, the user can flexibly adjust the sensor parameters to the application.

Both amplifier versions fulfil the requirements of enclosure rating IP66 even without a rear cover. This means they can be installed directly on the machine, and this can be done using either mounting rail supports or fixing holes in the housing. The teach-in version

features both PNP and NPN output types in one sensor. Also, its alpha-numeric display makes monitoring the process parameters simple.

SICK Pty Ltd

www.sick.com.au



SURGE PROTECTION TESTING

Phoenix Contact has released Checkmaster 2, a mobile test case that lets technicians quickly test all Phoenix Contact pluggable surge protection devices to prevent unexpected failures and avoid unnecessary service calls.

The system features a convenient, integrated hand scanner that reads and identifies the surge protection device by its barcode. The test object is then inserted into the associated test adapter and the test process started via the touch panel screen. The surge protection device is electrically tested in an automatic test process that compares the current electrical parameters of the components with the specified reference values.

All of the installed protective elements of the surge protection device are electrically tested in a single cycle. These include triggered spark gaps, gas-filled surge protectors, varistors and suppressor diodes.

The results are easy to see and read on a colour display, and three status levels inform the technician of the current quality of the device. The three status levels are OK: Test passed, Warning: Tolerance limit reached, and Defect: Replacement required. These help the technician make informed decisions about the device to ensure the ongoing availability of systems.

The tests undertaken by the product conform with the requirements of IEC 62305-3 and are performed using a high voltage generator. For user convenience, the device documents and saves all test results to its internal memory. A USB port lets technicians transfer data for further processing as well as update software.

Phoenix Contact Pty Ltd

www.phoenixcontact.com.au

SOLAR PUMP INVERTER

The ABB ACS355 solar pump inverter can be used off-grid using a generator backup or with grid supply. Its low-voltage AC drive of 0.3–18.5 kW saves maintenance costs by operating with energy drawn from solar panels. When used in dual supply mode power will be available regardless of the weather, and the inverter functions with power point tracking (MPPT) algorithms to derive maximum power from the PV cells when required.

The product features automatic start and stop with solar irradiation (MPPT), self-diagnostic protection and dry run protection. The flow calculation function provides calculation of the flow without having to install a separate flow meter. Additionally, the solar pump inverter provides a pump cleaning function to prevent solid materials from building up on pump impellers or piping.

With a safe torque off function that stop the drive in case of danger, including the option to control and monitor the drive remotely, the inverter is smart, safe and versatile. It offers protocol support for Profibus-DP, CANopen, DeviceNet, Ethernet and Modbus RTU.

Control Logic Pty Ltd

www.control-logic.com.au



BATCH VISUALISATION TECHNOLOGY

Honeywell Process Solutions (HPS) has introduced a control technology solution that increases productivity for batch operations and speed-to-market of batch products by allowing operators to 'look ahead' into their processes and see an intuitive and comprehensive timeline of every task required to complete a product batch.

Honeywell's Experion Batch uses visualisation technology to provide batch automation processes with the benefits of distributed control capability. This approach provides operators with insights into upcoming events or potential delays, which make it easier for them to conduct multiple tasks, take appropriate actions sooner and adjust next steps accordingly. It also makes operations less critically dependent on individual operator experience, which will help manufacturers overcome skill gaps at a time when more veteran operators are retiring.

Experion Batch is designed for industries such as pharmaceuticals, specialty chemicals and food processing, where manufacturers are challenged to increase operator efficiency and product quality while using fewer resources. The technology simplifies ongoing maintenance by eliminating the need for a centralised, dedicated batch server. This provides added benefit to users by enabling engineering and maintenance personnel to take a unit controller out of service without affecting other units. It also allows plants to easily and quickly transition from recipe testing to execution while reducing testing and validation efforts, and is aligned with international batch standards ISA S88 and IEC 61512-1.

Honeywell Process Solutions Ltd
www.honeywell.com.au



Level Sensing...

BESTA



Sitron



Gems
Sensors & Controls



...we've got your Control Components

FULL RANGE OF FLOW, PRESSURE
& ENVIRONMENTAL SENSORS

WEKA MAGNETIC VISUAL LEVEL
INDICATORS MANUFACTURED
LOCALLY (316SS & +GF+ PLASTICS)

LOCAL SUPPORT & STOCK
FOR QUICK DELIVERY

CCEZY.COM.AU +61 2 9542 8977


Distributors through Australia and New Zealand



ELECTROSENSITIVE PROTECTIVE DEVICES FOR SAFE MACHINES

PART 1

Otto Goernemann and Hans-Joerg Stubenrauch, SICK AG



The optoelectronic technologies available for machine safety protection are nowadays very diverse and provide advanced functions to not only protect workers, but also to improve productivity.

The measures and products for implementation of machine safety requirements have become more diverse over the years. The goal is ever better integration of the functional safety in machines and systems for safeguarding. Various technologies for implementation of protection measures are now available.

With electrosensitive protective equipment (ESPE) — in contrast to physical guards — protection is not based on the physical separation of persons at risk from the risk itself. Protection is achieved through temporal separation. As long as there is somebody in a defined area, no hazardous machine functions are initiated and such functions are stopped if already underway. A certain amount of time — the so-called stopping/run-down time — is required to stop these functions. An electrosensitive protective device (ESPD) must detect the approach of a person to the hazardous area in a timely manner and, depending on the application, the presence of the person in the hazardous area. The safety requirements for ESPDs independent of their technology, or principle of operations, are stated in the international standard EN 61496-1¹.

Benefits of electrosensitive protective devices

If an operator frequently has to access a machine and therefore is exposed to a hazard, use of an ESPD instead of (mechanical)

physical guards (covers, safety fencing, etc) is advantageous due to:

- Reduced access time (the operator does not have to wait for the protective device to open)
- Increased productivity (time savings when loading the machine)
- Improved workplace ergonomics (the operator does not have to operate a physical guard).

What hazards are not protected?

Since ESPDs do not provide any physical barrier, they are not able to protect persons against emissions such as ejected machine parts, work pieces or metal shavings, ionising radiation, heat (thermal radiation), noise, sprayed coolants, cutting oils, lubricants, etc. The use of an ESPD is also not possible on machines with lengthy stopping or run-down times, which require unrealisable minimum distances. In such cases, physical guards must be used.

Technologies for ESPDs

Electrosensitive protective devices can implement the detection of persons through various principles: optical, capacitive, ultrasonic, microwave and passive infrared detection. Due to poor accuracy, capacitive and ultrasonic systems have proven inadequate. Passive infrared detection offers no certainty of distinction and microwave systems have not yet been adequately tested. In practice, opto-



electronic protective devices have been proven in use over many years and in large numbers.

Optoelectronic protective devices

The most common ESPDs are optoelectronic devices such as:

- Safety light curtains and photoelectric switches (AOPDs: active optoelectronic protective devices)
- Safety laser scanners (AOPDDR: active optoelectronic protective devices responsive to diffuse reflection)
- Camera-based protective devices (VBPDs: vision-based protective devices).

Safety light curtains and photoelectric switches (AOPDs)

AOPDs are protective devices that use optoelectronic emitting and receiving elements to detect persons in a defined two-dimensional area. A series of parallel light beams (normally infrared), transmitted from the sender to the receiver, form a protective field that safeguards the hazardous area. Detection occurs when an opaque object fully interrupts one or more beams. The receiver signals the beam interruption by a signal change (OFF state), which is used to stop hazardous machine functions. The international standard IEC 61496-2² includes the safety requirements for AOPDs.

Typical AOPDs include single-beam photoelectric safety switches, multiple light beam safety devices and safety light curtains. Multiple light beam safety devices offer a detection capability of more than 40 mm and are commonly used to protect access to hazardous areas. AOPDs with a detection capability of 40 mm or less are called safety light grids or safety light curtains and are used to protect hazardous points directly (see Figure 1).

On multiple light beam safety devices and safety light curtains, not all light beams are generally activated at the same time, but are switched on and off, one after the other, in rapid succession. This improves resistance to interference from other sources of light and increases the reliability accordingly. For state-of-the-art AOPDs, sender and receiver automatically synchronise through an optical link.

By using microprocessors, the beams can be evaluated individually, allowing additional functionality beside the pure protective function.

Safety laser scanners (AOPDDR)

AOPDDR are protective devices that use optoelectronic transmission and reception elements to detect the reflection of the optical radiation generated by the protective device. The reflection is generated by an object in a defined two-dimensional area. Detection is signalled by a signal change (OFF state) in its output signal. Safety laser scanners are mainly used for stationary and mobile hazardous area protection.

Safety laser scanners scans the surroundings with infrared laser beams in two dimensions and monitor a hazardous area near a machine or vehicle. They operate on the principle of time-of-flight measurement. The scanner transmits very short light pulses and, if the light strikes an object, it is reflected and received by the scanner. The scanner calculates the distance to the object based on the time difference between the sender and receiver. A uniformly rotating mirror in the scanner deflects the light pulses so that a section of a circle is covered. The scanner determines the exact position of the object from the measured distance and the angle of rotation of the mirror. The user can program the area in which object detection trips the ESPE (protective field). State-of-the-art devices allow simultaneous monitoring of several areas or switching of these areas during operation. For example, this feature can be used for adjustment of the monitored area to the speed of the vehicle or a graduated response (warning field, protective field) to prevent unnecessary interruptions in operations.

Safety laser scanners use individual pulses of light in precise directions and do not continuously cover the area to be monitored. Resolutions of between 30 and 150 mm are achieved through this operating principle. With the active scanning principle, safety laser scanners do not need external receivers or reflectors, but they need to be able to reliably detect objects with extremely low reflectivity (such as black work clothing). The international standard IEC 61496-3³ states the safety requirements for AOPDDR.

Camera-based protective devices (VBPD)

VBPDs use image capture and processing technologies for the detection of persons. Special light transmitters are currently used as light sources. VBPDs that utilise ambient light are also possible.



Figure 1: Access protection and hazardous point protection.

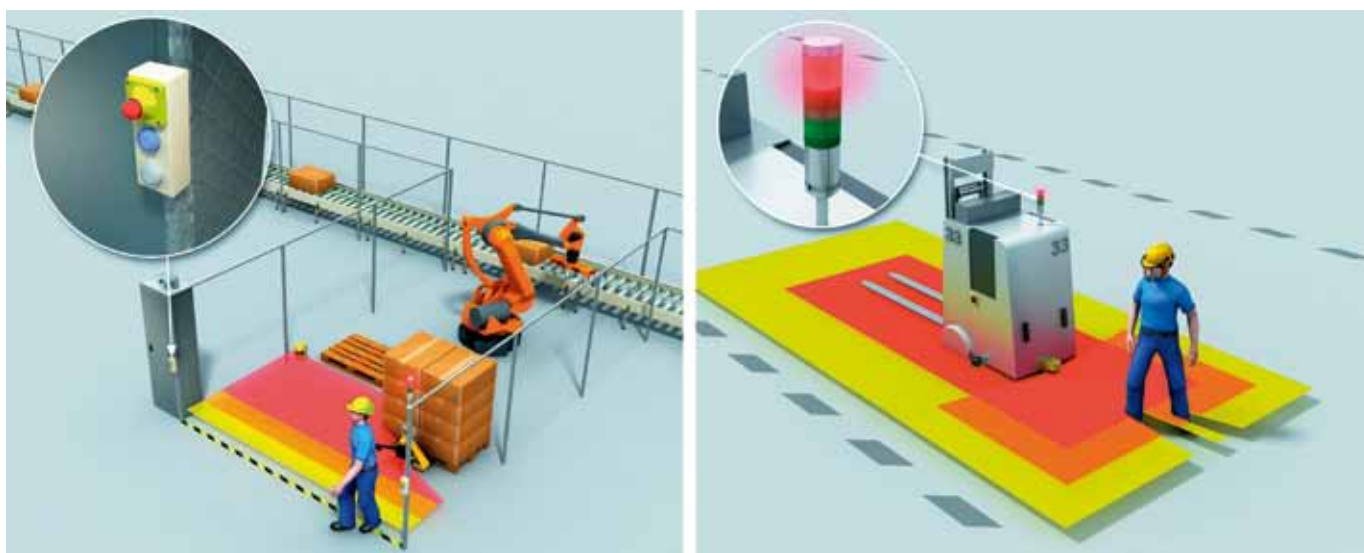


Figure 2: Stationary and mobile hazard area protection with a safety light scanner.

Various principles can be used for detection, including:

- Interruption of the light reflected back from a retroreflector
- Time-of-flight measurement of the light reflected by an object
- Size and distance measurement of an object
- Monitoring of changes from background patterns
- Detection of persons based on human characteristics.

The international standard series IEC 61496-4-x⁴ includes the safety requirements for VBPDs.

Protective devices resolution

The detection capability is defined as the limit for the sensor parameter that causes the ESPD to trigger. In practice, this is the size of the smallest object detected by the ESPD within the defined monitored area (protective field). The detection capability is specified by the manufacturer and in general is determined by the sum of the beam separation and effective beam diameter. This ensures that an object of this size always interrupts a light beam and is therefore detected regardless of its position in the protective field. For safety laser scanners, the detection capability is dependent on the distance to the object, the angle between the individual beams of light (pulses) and the shape and size of the transmitted beam.

The reliability of detection is determined by the type classification in the EN 61496 standard. Type 3 is defined for AOPDDRs, while for AOPDs there are Type 2 and Type 4 (Figure 3). Requirements regarding optical sources of interference (sunlight, different lamp types, devices of the same design, etc), reflective surfaces, misalignment during normal operation and the diffuse reflection of safety laser scanners play an important role.

Important factors that influence reliable ESPD protection

Minimum distance and stopping/run-down time

There is always a stopping or run-down time after the signal is given to cease a hazardous machine function. The delay for the entire system (the entire control chain) is included in the overall stopping time. This time determines the required minimum distance of the protective device from the hazardous area. The required minimum distance is calculated according to the EN ISO 13855⁵ standard.

The consideration of the minimum distance applies to ESPDs with two-dimensional protective fields, such as light curtains (AOPDs), laser scanners (AOPDDR) or two-dimensional camera systems.

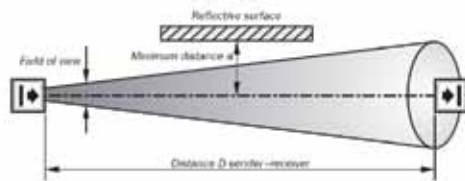


Figure 3: Calculating the minimum distance from a reflective surface.

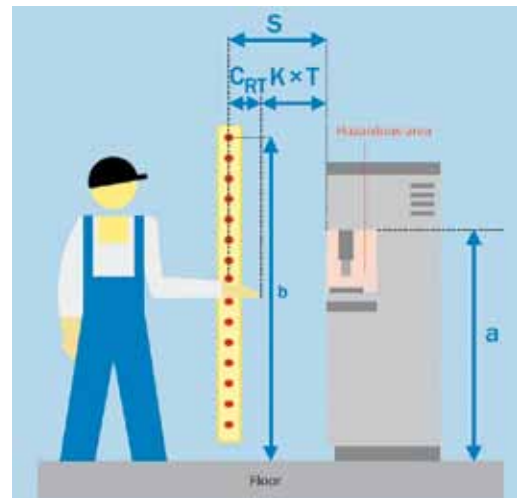


Figure 4: Parameters for determining the required minimum distances when approaching at a right angle.

	Type 2	Type 4	Advantage Type 4
Functional safety	Between the test intervals, the protective function may be lost during a failure.	The protective function is retained even during several failures.	Higher risk reduction
EMC (electromagnetic compatibility)	Basic requirements	Increased requirements	Higher reliability of the detection capability Higher system availability in difficult ambient conditions.
Maximum field of view of the optics	10°	5°	
Minimum distance a from reflective surfaces over a distance D of < 3 m	262 mm	131 mm	
Minimum distance a from reflective surfaces over a distance D of > 3 m	= distance × tan (10°/2) (Figure 3)	= distance × tan (5°/2) (Figure 3)	
Several senders of the same design in a system (workplace)	No special requirements (Beam coding is recommended)	No effect; however, if affected, OSSDs switch off	

Table 1: Main differences between AOPDs of Type 2 and Type 4.

The general formula for calculating the minimum distance (safety distance) is:

$$S = (K \times T) + C$$

where:

S is the minimum distance in mm, measured at the closest hazardous point to the detection point, detection line or detection plane of the protective device

K is a parameter in mm/s, derived from the data for the approach speeds of the body or parts of the body

T is the overall stopping time of the system

C is an additional distance in mm.

The additional distance C is dependent on the detection capability (Figure 4) of an ESPD when approached at a right angle, and dependent on the height of the protective field above the reference level for a parallel approach.

For the overall stopping time T, the following parameters must be taken into account:

- Stopping time of the machine
- Response time of the safety-related control
- Response time of the protective device (ESPD)
- Additions according to the detection capability of the ESPD, the protective field height and/or the type of approach.

In Part 2

In Part 2 of this article we will examine how interference can be prevented in complex environments with multiple ESPDs and more advanced functions of ESPDs, such as blanking and muting to allow for more flexible safety protection.

References

1. European Committee for Standardization 2004, EN 61496-1:2004: Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests.
2. International Electrotechnical Commission 2013, IEC 61496-2:2013: Safety of machinery — Electro-sensitive protective equipment — Part 2: Particular requirements for equipment using active opto-electronic protective devices (AOPDs).
3. International Electrotechnical Commission 2008, IEC 61496-3:2008: Safety of machinery — Electro-sensitive protective equipment — Part 3: Particular requirements for active opto-electronic protective devices responsive to diffuse reflection (AOPDDR).
4. International Electrotechnical Commission, IEC 61496-4-x: Safety of machinery — Electro-sensitive protective equipment: Particular requirements for equipment using vision based protective devices (VBPD).
5. European Committee for Standardization 2010, EN ISO 13855:2010: Safety of machinery — Positioning of safeguards with respect to the approach speeds of parts of the human body.

SICK Pty Ltd
www.sick.com.au



A boost for safety and speed

Grasberg contains the world's largest gold deposit and the third-largest copper deposit.

The atmosphere in underground mines is anything but pleasant, with hot, noisy and tight quarters. No matter how vigilant workers are about safety, risks abound. So when planning the underground mining operations at the Grasberg mine in Papua, Indonesia, owner Freeport-McMoRan Copper & Gold wanted an alternative that involved as few people in this hostile environment as possible. The company's search brought it to the Kiruna mine in Sweden.

In Kiruna, underground mining has been carried out remotely since 2012. Operators work in an air-conditioned control room — their connection to the underground mine is via a screen and a joystick to control the machinery. In the end, Siemens's automation solution partner, Midroc — the company that implemented the underground mining solution for the Kiruna mine — was contracted in 2015 to install a similar set-up in Indonesia.

Since 1973, Grasberg has been operated as an open-pit mine. However, the open-pit mine cannot be made any deeper and operations must now go underground. The effort is well worth it: Grasberg contains the world's largest gold deposit and the third-largest copper deposit.

"The underground operations are currently in different stages of implementation," said Mark Yseboodt, sales development manager for mine automation at Siemens.

The first is the block cave mine. Block cave mining is a highly efficient form of underground mining: large ore blocks are cut from beneath, allowing the ore to collapse under its own weight. After collapsing, the ore is brought to loading points and conveyed to a crusher. The crushed ore is then loaded onto driverless trains and transported to an unloading station, from where it is brought up to the surface.

To put the extent of the operations in the block cave mine into perspective, there are 20 chute galleries with a total of 121 loading points and nearly just as many crushers, plus three unloading stations. Eleven production trains and five service locomotives travel 28 km of electrified rail. A CCTV system with 220 cameras allows operators in the control centre to monitor all activities in real time. At peak production, the mine will produce 160,000 tons of ore per day.

The automation system, based on Simatic PCS 7, connects the underground equipment to the operators in the control room: the chute galleries, unloading stations and service area including the motor control centre (MCC), variable frequency controllers (VFC), uninterruptible power supply (UPS) and CCTV. As in Sweden, the operators are able to monitor and control a range of activities in a comfortable and, most

importantly, safe environment. For example, the chutes and crushers are driven from the control room, as well as the train movements.

"A special aspect of Simatic PCS 7 is that it has interfaces to all equipment, even equipment from third parties," said Yseboodt. A case in point is the Bombardier train system being installed in the mine. From their screens in the control centre, operators have direct access to the train automation system without having to change screens or even the user interface.

Creating a safe environment was a key concern for Grasberg's operators, and the communication system delivered by Siemens is a key component. While some of the communication between the control centre and the devices is wired, for the most part wireless networks are employed.

"In an operation like a mine, you can't afford any mistakes or errors. The communication system has to work at all times," said Yseboodt. For this reason, all systems feature double redundancy. For wireless communication, rapid roaming has been employed, allowing the mobile devices to roam between access points within 50 ms.

The next stage is the deep mine lower zone. The mine is half as large as the block cave mine but in many ways similar in its set-up. However, instead of unmanned trains, conventional trucks are employed for ore transport within the mine.

Simatic PCS 7 is not only being put into service for mining operations: the third area is for a common infrastructure project. The focus is on traffic control and ensuring safety for truck and bus movements and for two tunnels.

In line with Grasberg's wishes, the delivered solution is basically the same as the one in Sweden. The biggest difference is in the communications networks.

"In the five years since operations started in the Kiruna underground mine, the amount of data that has to be transferred has grown exponentially," said Yseboodt. "The rapid roaming access points in the wireless communication network have been adjusted accordingly."

Grasberg is getting a solution that fits the bill in more than one way. Not only is worker safety improved because fewer people are exposed to unsafe situations, the solution also brings more speed. And that's good for the bottom line.

Siemens Ltd

www.siemens.com.au



EMBEDDED PC

The Aaeon BOXER-6640 is a high-performance standalone embedded PC featuring sixth or seventh generation Intel Core i socket type processor, fanless operation, extensive I/O, compact size and robust construction.

The BOXER-6640 is based on the Intel H110 chipset, and supported processor options include: seventh generation Core i7-7700T, i5-7600T, i3-7300T and sixth generation Core i7-6700TE, i5-6500TE, i3-6100TE. It is equipped with two SODIMM sockets supporting up to 32 GB of DDR4 system memory, two Gigabit

RJ-45 Ethernet connectors, four USB 3.0 ports, three USB 2.0 ports, three RS-232 ports, one RS-232/422/485 port and 8-bit DI/O. A 2.5" SATA hard drive or an mSATA SSD can be internally mounted for operating system and data storage. System expansion is possible via two full-size Mini-Card slots and one LPC connector. The onboard Intel HD graphics engine supports high-resolution displays and provides two HDMI or DP outputs via combination connectors as well as one VGA output.

The heat sink and fanless design of the BOXER-6640 coupled with an operating temperature range of -20 to 55°C ensures long-term operation in industrial and embedded environments.

The BOXER-6640 can be powered from a 9–36 VDC source. An optional 100–240 VAC power pack is also available.

Interworld Electronics and Computer Industries

www.ieci.com.au



Dedicated gas solutions for industry

- ✓ **ARCAL™ Welding Gas**
dedicated range of reliable high-performance gases to suit any job
- ✓ **LASAL™ Laser Gas**
formulated with the ultimate performance of your laser in mind
- ✓ **FLAMAL™ Flame Cutting Gas**
designed to optimise your processes no matter what flame process you use



Gas that works for you™





SAFETY SYSTEM

Rockwell Automation has introduced a safety-based communications protocol known as the Allen-Bradley Guardmaster GuardLink safety system.

Traditionally, safety devices are wired to separate safety inputs, which requires significantly more wiring and introduces more potential fault points. When wired in this series connection, users lose the ability to distinguish information from each device.

With GuardLink, safety devices are easily connected in series while providing access to individual device diagnostics. This system provides safety, diagnostics, remote reset and lock command over a single four-conductor cable with up to 32 devices per link. In addition, installation costs are said to be reduced, with an up to 38% reduction in wiring when using GuardLink.

The GuardLink technology seamlessly integrates with Allen-Bradley Guardmaster safety relays and components, allowing users to access status information throughout their entire safety system. The connection of safety devices with smart taps enabled by GuardLink technology and standard cabling to a Guardmaster safety relay allows greater visibility into the system, down to individual guard doors and E-stops.

The GuardLink safety system fully integrates with the Logix platform with predetermined tag names in the Rockwell Software Studio 5000 application. Its simplified design and reduction in wires allows for simple plug-and-play installation.

Rockwell Automation Australia

www.rockwellautomation.com.au



CLAMP-ON FLOW METER

The measurement of flow in a pipe, especially in the water and waste sector, is important either to quantify the flow for fiscal purposes or to control the flow as part of a process.

The TransPort PT900 from BHGE is a clamp-on flow meter that attaches fixtures with transducers onto the outside of a pipe to measure flow within the pipe without cutting into the pipe or shutting down the process. A portable flow

meter can be moved around to different measurement locations, making it useful for spot flow metering, checking other meters or for temporary installations.

The TransPort PT900 draws on the ruggedness and performance of its predecessor, the Panametrics TransPort PT878, but incorporates more intuitive and user-friendly capabilities from today's smart device technology. TransPort PT900 features an updated clamping fixture and a compact flow transmitter with streamlined user interface on a wireless tablet. Regardless of the user's experience level, the TransPort is designed to be easy to install and to use.

Thermo Fisher Scientific

www.thermofisher.com.au

PROCESS CLAMP METER

The Fluke 773 milliamp process clamp meter is designed for troubleshooting 4–20 mA control lines, PLC loops, transmitters or any other 4–20 mA circuit, without breaking the loop. The instrument eliminates unnecessary downtime through its non-invasive measurement method. It is available to rent from TechRentals.

The clamp is clipped around the loop signal wire, enabling the user to conduct signal measurement tests without disrupting processes. With an extension cable for the detachable clamp, a measurement spotlight and a dual backlight display, the product is suitable for measurements in hard-to-reach and dimly lit spaces.

The milliamp process meter provides precise readings with 0.2% accuracy and 0.01 mA resolution and sensitivity. The instrument has power-saving features such as auto-off and backlight timeout to extend its battery life.

TechRentals

www.techrentals.com.au



PROMUX

MODBUS IO Modules

REMOTE IO PRODUCTS



- MODULES FOR ALL SIGNAL TYPES
- ANALOG AND DIGITAL IO MODULES
- MODBUS RTU COMMUNICATIONS
- IO MAPPING MODULES
- MODBUS TCP GATEWAY



PROCON
ELECTRONICS

MODULAR IO DESIGN

Stand alone Analog & Digital IO modules for all major signal types

MODBUS RTU RS485

Up to 128 devices on a RS485 network

IO MAPPING

Simple to Complex Mapping of all IO connections is supported

FULL ISOLATION

Up to 1500VRMS input-to-output and 500VDC channel-to-channel isolation

HIGH ACCURACY

Temperature resolutions (T/C or RTD) of 0.1°C

REMOVABLE TERMINALS

Removable 2-piece terminals for easy wiring and quick change outs

INDUSTRIAL SPECS

*Operating Temperature Range:
-40°C to +80°C*

CONTACT

Ph: 02 96248376

Fax: 02 96208709

Email: info@proconel.com.au

www.proconel.com



CHILLED MIRROR HYGROMETERS

The Optidew 501 and 401 chilled mirror hygrometers from Michell Instruments offer a faster response to changes in humidity.

Michell's engineers have developed a hybrid mirror to provide a fast response to changes in temperature and humidity, while also improving the drift-free accuracy of the fundamental chilled mirror technique by 25% to $\pm 0.15^{\circ}\text{C}$. Three choices of sensor are available: single- and dual-stage cooling, plus a dual-stage sensor that is designed specifically for use in harsh, demanding applications such as control of metallurgical processes. The harsh environment sensor is capable of operating in temperatures up to 120°C .

The Optidew 501 is a wall-mounted unit, while the Optidew 401 is a benchtop instrument. Both are available with a full colour touch screen HMI for easy local operation and interrogation. The Optidew 501 is also available as a transmitter, without a screen, for integration into a DCS, or an environmental monitoring system. Michell also offers PC-based software for data capture and graphing. The transmitter version also includes a multicolour LED indicator that clearly displays the instruments' status for operators to view locally.

The Optidew 501 and 401 both have two 4–20 mA outputs and offer a choice of digital communications. The wall-mounted Optidew 501 has Modbus RTU over RS485 as standard, with an optional Ethernet connection and SD card slot for data logging. As a benchtop unit, the Optidew 401 has a wider range of communications as standard: RS485, USB and SD card data logging. An Ethernet connection is also available.

AMS Instrumentation & Calibration Pty Ltd

www.ams-ic.com.au

WIRELESSHART ADAPTER

The BULLET is a loop- or line-powered (7–32 V) WirelessHART adapter that enables new and existing wired 4–20 mA and HART field devices to communicate wirelessly. Built to withstand the

harsh environmental conditions in process plants, the BULLET has an explosion-proof/Zone 0 housing. It supports up to eight field devices in HART multidrop mode. It also features Pepperl+Fuchs' StepVolt technology, allowing users to set insertion voltage from 1 to 2.5 V in order to optimise the usage of available loop power and wireless communication bandwidth. This technology enables the BULLET to deliver reliable data over long distances, even if only a low voltage is available.

The BULLET's aluminium Ex d housing fully encapsulates the antenna with an antistatic dome. It is highly durable and suitable for use in temperatures from -40 to $+85^{\circ}\text{C}$. Users can benefit from the combination of ruggedness and flexibility by attaching the BULLET to any field device and supplying it with either regular or solar loop power. The BULLET WirelessHART adapter is designed to meet all application and area classification needs including Class 1, Div. 1 explosion-proof and Zone 1. It comes with all relevant certifications (including ATEX, UL, IECEx) for use all over the world.

Pepperl+Fuchs (Aust) Pty Ltd

www.pepperl-fuchs.com



SENSOR FOR AGV AUTOMATION

The Leuze OGS 600 sensor is designed to enable cost-effective vehicle automation for the transport of materials and goods in production and storage areas. With its edge detection and control signal transmission to the drive, the trace can be guided optically, which means that driving can be automated in the simplest of ways.



The routes of the driverless transportation system can be flexibly adapted by means of optimised trace tapes. The compact design of the OGS 600 and its low minimum distance to the ground of 10 mm means it can be integrated even into flat vehicles. Models with different detection widths and response times cover a wide range of possible applications, even for narrow curves and at high speeds. Parameterisation and interface integration is implemented via Leuze's Sensor Studio software. An assistant analyses the contrast between the ground and the trace and recommends the ideal trace colour.

Leuze electronic Pty Ltd

www.leuze.com.au



PERMANENT-MAGNET SYNCHRONOUS MOTORS

NORD DRIVESYSTEMS' permanent-magnet synchronous motors without cooling fins achieve level IE4/super premium efficiency. This is suitable for the food, beverage and pharmaceutical industries, and other hygienically demanding applications. The efficient

smooth-surface motors are suitable for use in dry areas as well as in applications requiring frequent cleaning. As they generate very little excess heat, they need no fans and therefore do not contribute to the spreading of germs.

The synchronous motors operate more efficiently than induction motors, specifically in the partial load range. This results in lower cost for energy consumption and lower TCO. The motors feature a particularly high power density and a long product life. Frequency inverters can be mounted directly onto the motor or near the motor for flexibility.

Three motor sizes (80, 90, 100) with power ratings from 0.75 to 2.2 kW are available. They complement the existing smooth-surface induction motor range, which already covers outputs from 0.37 to 1.1 kW. The motors can be supplied with a brake.

For washdown-enabled inverter-controlled drive systems with an IP66/IP69K protection rating, the company can draw on four different suitable gearbox series. Washdown drive configurations all feature die-cast aluminium housings with smooth surfaces, designed so that cleaning fluids and foams easily run off. For extra corrosion protection, they can be fitted with the nsd tupH Sealed Surface Conversion System, which is approved for food and drink applications in accordance with FDA Title 21 CFR 175.300.

NORD DRIVESYSTEMS (Aust) Pty Ltd

www.nord.com





your trusted partner

global network, national coverage, local support



With a partnership spanning over 15 years, Control Logic is Australia's *official and only* provider of GE Automation & Controls hardware and software.

At Control Logic we understand what's important to you. Gain access to the full range of GE Automation & Controls products and solutions and receive full complimentary technical support backed by local GE engineering expertise.

CONTROL LOGIC - UNRIVALLED SUPPORT



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



SPECTRAL UV SENSOR

The TriOS OPUS spectral UV sensor is, by analysing the full spectrum, able to deliver readings for nitrate ($\text{NO}_3\text{-N}$), nitrite ($\text{NO}_2\text{-N}$), organic water ingredients (COD_{eq} , BOD_{eq} , DOC_{eq} , TOC_{eq}) and SAC254. It can be used in a wide range of fields from municipal water and wastewater to industrial water treatment, river, estuarine or oceanographic research.

The OPUS examines only the UV spectrum, allowing significantly improved resolution in sampling (0.8 nm/pixel) compared with UV-VIS sensors that examine both UV and visual wavelengths (2.2 nm/pixel). For the targeted variables this is critically important as more coarse resolutions may miss the narrow difference between nitrate and nitrite.

The nano-coated hydrophobic lenses of the OPUS help repel build-up and can be replaced if they become damaged over time. As with other TriOS sensors the optical path length can be customised to suit individual applications and even changed (0.3–50 mm) after purchase if the process conditions change.

Available in both stainless steel and titanium bodies, it also supports a wide range of mounting options including inline pipe fitting, flowcell (with chemical or built-in ultrasonic cleaning), single or multisensor floats and unmanned autonomous buoys with solar power and telemetry.

If a local display or transmitter is not required, the TriOS G2 interface allows direct integration of the sensor to existing systems or data loggers via an integrated network (WiFi/LAN) or ModBus interface. Utilising the G2 module, operators can also configure or download from the OPUS via a standard web browser.

Control Components Pty Ltd

www.controlcomponents.com.au



CONNECT → CONFIGURE → DOCUMENT

Complete DD-based HART Communicator for Any device:

PC, Tablet or Phone - Your choice!

Any operating system:

Windows, iOS or Android - Your choice!

Full line of registered HART Modems:

USB, RS232, Bluetooth, Bluetooth Low Energy - Your choice!

Use your own host device or one of our complete systems. Hazardous Area options available.

NEW!

iOS Version now available!

Significant cost savings • Mobile convenience • Satisfaction guaranteed

HART

WirelessHART

HART-IP



SILICONE RUBBER VACUUM PAD

Designed to offer optimum absorbing performance and efficient handling, the ZP3P vacuum pad from SMC features a blue-coloured silicone rubber pad that prevents wrinkles and is compliant with FDA regulations. The bright blue colour makes it easy to spot during contamination inspections, making it suitable for the food and medical sectors.

The product features a thin and soft pad skirt with reduced leakage and a strong grip, so it can be used with thin workpieces that deform during adsorption. The flat shape of the vacuum pad with a central stopper creates a surface that does not damage or deface the product and prevents wrinkles on thin materials such as vinyl and film.

Highly adaptable, it can work with difficult workpieces that are uneven, soft, variable or ultrathin, such as film-wrapped products.

The pad design is suitable for a wide range of applications, such as film packaging, palletising, printing and labelling. There are seven different types of adapters to choose from and the option of a buffer.

SMC Australia | New Zealand

www.smcworld.com



TOUCHLESS TURNER

What used to take two machines can take one with the Intralox OMNI-DIRECTIONAL Turner. The company claims the turner aligns and turns in less space, at up to twice the previous throughput rate, compared to previous technology.

Capable of turning packages 90° to the left or right on demand, the turner allows for touchless, impact-free product turning and multiside product labelling. It has the ability to run large or heavy packages at high speeds, with efficient throughput (up to 80 ppm). The compact size translates to up to 30% footprint savings, according to the company, and the combination of turning and aligning in one machine further reduces space requirements.

Intralox Australia Pty Ltd
www.intralox.com



MODULAR IO-LINK INTERFACES

The Phoenix Contact block-modular Axioline E I/O system includes IO-Link I/O boxes. With the eight-channel Axioline E AXL E IOL DI8 M12 6P and AXL E IOL DO8 M12 6P IO-Link I/O boxes, the Axioline E IO-Link master can be set up as a modular I/O station and signals distributed in the plant or machine can be acquired or issued. This enables users to adapt their I/O volume in the field flexibly and economically.

Because data and the electricity supply is transmitted via a cable with IO-Link, the IO-Link I/O boxes can be linked to the IO-Link master with just one unshielded sensor/actuator cable. Analog signals in the field can also be acquired or issued simply via the Axioline E IO-Link analog converter.

Phoenix Contact Pty Ltd
www.phoenixcontact.com.au

TURCK

Your Global Automation Partner



WARNING

Not suitable for managing
complex data
(or your reputation).

Rugged, reliable industrial automation products from Turck are built to perform in the toughest conditions, and our engineered solutions are customised to meet your application challenges. Cheap knock-offs can't compare. **Turck works!**



TBEN-S-RFID Ultra-Compact I/O Modules

Manages complex data, with seamless PLC integration, in RFID environments. Measures just 1.25 x 5.6 inches.

Call 1300 132 566 or visit www.turck.com.au

ARC FAULTS IN UNDERGROUND ELECTRICAL ENCLOSURES

The design of electrical enclosures has not significantly changed since the 1990s, but the energy levels used in underground mining have increased significantly.

The potential for arc faults to compromise the integrity of sheet metal (IP) and flameproof enclosures was investigated in some depth in the 1990s. The outcomes of these studies provided an assessment of arc fault behaviour and identified some unacceptable risks.

Since 1990 the design of enclosures has not changed significantly. However, the internal energy levels have increased substantially. Hence, it is prudent to revisit the hazards and assess the associated risks.

The environment

The underground mine operating environment is characterised by high energy electrical enclosures in close proximity to workers. Underground coalmines have the additional hazard of explosive coal dust.

There are a number of possible misconceptions relating to arc fault events in flameproof electrical enclosures, some of which pertain particularly to the underground mine environment.

Not all fault currents are limited by the NER

By design, the majority of electrical faults in a typical mining electrical system manifest as phase-to-earth faults, which, in an earth fault limited system, enables detection and isolation without catastrophic consequence. Earth fault current is limited by use of a neutral earthing resistor (NER). However, this mechanism does not limit fault current in a phase-to-phase fault.

Certified Ex d enclosures are not necessarily explosion proof during an arc fault

In those instances when phase-to-phase faults occur, or where earth fault currents are not limited, it is sometimes assumed that type-tested Ex d (flameproof) enclosures are sufficiently robust to withstand the internal pressure rise due to arcing. However, in practice pressure and temperature rises due to arcing can exceed those generated by gas explosions.

The explosion protection afforded by the Ex d principle may therefore not be sufficient.

Venting the arc blast may be hazardous in an underground mine

While venting of an enclosure can reduce or prevent damage to the enclosure, the consequences of venting an arc blast in a confined space can pose a significant hazard for nearby personnel and might lead to ignition of coal dust.

The hazard

There are multiple reported instances of arc fault incidents in underground mines; however, the frequency is relatively low compared to phase-to-earth (earth fault) events. The potential consequence of phase-to-phase faults is considerably more hazardous than a phase-to-earth fault due to the substantially higher fault currents and temperatures that result.



© stock.adobe.com/au/muzretsov_konsta



THERE ARE A NUMBER OF POSSIBLE MISCONCEPTIONS RELATING TO ARC FAULT EVENTS IN FLAMEPROOF ELECTRICAL ENCLOSURES, SOME OF WHICH PERTAIN PARTICULARLY TO THE UNDERGROUND MINE ENVIRONMENT.

An interesting analogy is drawn from comparable explosion energies. According to Jeff Glenney, writing for coalage.com:

"The energy released by an arc flash can be calculated as voltage x current x duration. A phase-to-phase fault in a 480-volt system with 20 kA of fault current provides 9.6 MW of power; if the fault lasts for 200ms, then 1.92 MJ will be released, which is the energy equivalent of detonating almost half a kg (459g) of TNT"

The literature

Research undertaken in the 1990s investigated the performance of electrical enclosures when subjected to arcing faults. The studies aimed to determine the consequence of an arc fault occurring in underground electrical enclosures, and to quantify the levels of energy required to compromise the integrity of those enclosures. This research used a combination of mathematical modelling and experimental data to verify results.

The findings, at that time, suggested that typical flameproof and vented IP enclosures were generally able to withstand the faults associated at the expected power levels. The reports emphasised that the findings were only indicative, and implied that further work was required to establish more rigorous results.

While some literature was published, few directives, guidance or recommendations were incorporated into contemporary published standards for electrical equipment for mines and quarries of the era.

Some of the main studies and their results are summarised below.

CSIRO/SIMTARS

In the report *Pressure rise due to arcing in flameproof enclosures*², CSIRO, on behalf of the Safety in Mines Testing and Research Station (SIMTARS), used mathematical modelling to estimate arc power and compared the results with experimental data. It also looked at the contribution of coal dust in increasing the measured pressure rise due to arcing faults.

ACARP/SIMTARS

The Australian Coal Association Research Program and SIMTARS published a series of three reports that looked to "establish whether there is a potential hazard due to fault arcing in underground mining equipment". The study assessed fault levels in Australian underground mines, based on equipment ratings from 1970 and projecting to 2000. It also provided in some detail a survey of US and UK literature:

The first stage of the study, *Arc fault containment in flameproof enclosures*³, found that arcing faults could cause unacceptably high pressures which could rupture an enclosure or cause the "emission of incandescent material". The likelihood could be increased significantly in the case of three-phase faults and/or coal dust ignition. The study also determined that power system protection was unlikely to restrict pressure rises to acceptable levels.

The second part of the study, *C1461*⁴, aimed to determine the impact of high energy arcing faults on pressure rise and flame transmission in flameproof enclosures.

Stage three, *C4032*⁵, involved an investigation of IP55 sheet metal enclosures and their suitability to house switchgear in underground coalmines. It explored enclosure venting to minimise the hazards due to an enclosure bursting, and/or expelling hot gases during an arc fault.

Ampcontrol

Ampcontrol published a study that examined explosion protection methods and their limitations as a consequence of the increasing demand for energy⁶. It determined that explosion protected equipment is not generally certified to withstand internal releases of electrical energy. An estimated probability of failure of equipment due to arcing pressure was deemed unacceptable and opined that such a failure could result in a dust explosion. It recommended that all electrical enclosures be capable of withstanding the internal pressures caused by possible arcing faults without damage.

Mining Electrical Mining Mechanical Engineering Society

Acknowledging that increasing demand on electrical supply was reducing safety margins, the *Code of practice for the control of fault arcs in flameproof enclosures used in underground coal mines*⁷ noted that "whether through duty of care, or through specific legislation, there is a requirement for mine operators to consider the impact of internal arcing within an enclosure irrespective of the voltage source". This research found the threshold at which an arcing fault hazard was adequately controlled was 1200 V; above this level problems of insulation failure, contamination and mechanical failure must be considered.

It is worth noting that the above list is significantly aged, hence its relevance needs to be assessed against the characteristics of modern electrical enclosures.

Characteristics of modern electrical enclosures

Since the aforementioned investigations, a number of factors have impacted on the potential performance of electrical enclosures subjected to arc faults.

- Fault levels have increased markedly as larger and more powerful electrical equipment is brought into use. Since the energy of an

arc fault is typically proportional to the square of the fault current, the consequence of elevated fault currents further aggravates the consequences of an internal arc fault.

- Operating voltages, and hence conductor separations, have increased from 1 kV a decade ago to 3.3, 6.6 and 11 kV in contemporary equipment. The increased conductor separation also increases arc energies.
- Modern design tools aim to optimise material and manufacturing costs. The use of finite element tools in the design of Ex d enclosures has sought to optimise material strengths and structural elements to minimise manufacturing cost, and has in effect reduced safety margins inherent in more robust enclosures.
- Improved machining tolerances, together with the use of sealing 'O' rings, has meant tighter clearances around flame paths and less capacity to vent over-pressure.
- There has been a general increase in operating voltages, to deliver increased power without increasing losses and this contributes to:
 - Greater insulation stresses
 - Greater clearance distances required
 - Increased arc voltage.

All of these factors result in either increased likelihood of an arc fault, or increased enclosure pressure in the case of an arc fault. In comparison, enclosure strength has not changed dramatically.

Given the characteristics of today's operating environment a number of unknowns arise:

- Safety margins inherent in enclosure designs
- Frequency or likelihood of arc faults in underground mines
- The effect of arc energy on enclosure external temperatures, and hence the potential to ignite surface coal dust
- Likelihood of ignition of coal dust by arc blast.

Where to from here

There are a number of possible actions which may be considered to mitigate the potential risks posed by an arc fault in underground electrical enclosures. The pressure during an arc fault is determined by:

$$\text{Pressure} \propto \frac{V_A \cdot I_{FL} \cdot t_f \cdot k_h}{Vol}$$

To reduce the pressure rise within the enclosure:

- Minimise arc voltage (V_A): Ensure conductors and busbars are mechanically restrained to prevent movement (separation) under magnetic fields
- Minimise arc fault currents (I_{FL}):
 - Direct first fault to earth by design of layout
 - Use VAR support, VSDs, soft-starters and star-to-delta connections to limit DOL starting currents
 - Insert series impedance to supply
 - Use HRC fuses
- Minimise arc duration (t_f) by using:
 - Fast acting overcurrent protection
 - Optical detection to trigger shorting bar
- Consider enclosure volume (Vol) to determine if an increase in enclosure volume to reduce internal pressures is practical.
- Other actions which may be taken to mitigate risk include:
 - Improve insulation
 - Consider the use of inter-phase barriers
 - Use earthed barriers (limit earth fault current)
 - Eliminate organic materials near possible arc paths
 - Maintain enclosures clean from contaminants
 - Revise standards to be more definitive in terms of requirements

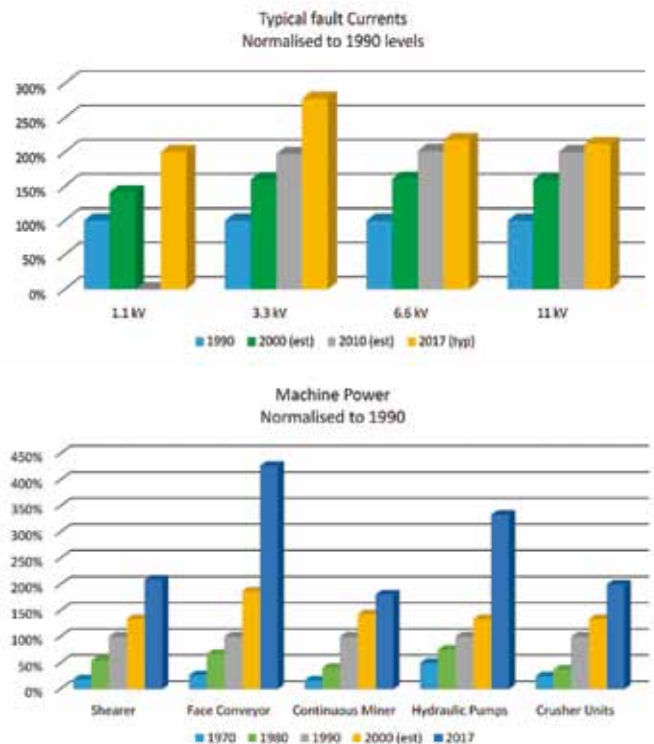


Figure 1: Typical fault current and machine power changes.

- As an industry, determine whether the existing risk is acceptable given the low probability (but high consequence) of arc faults in underground enclosures.

Summary

Some work has been conducted in the area of arc faults in underground electrical enclosures. This work was, however, completed some time ago and the findings are out of date given the changes which have occurred in the mining environment since the research was completed.

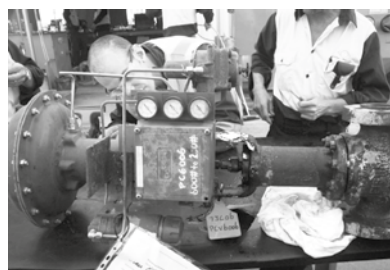
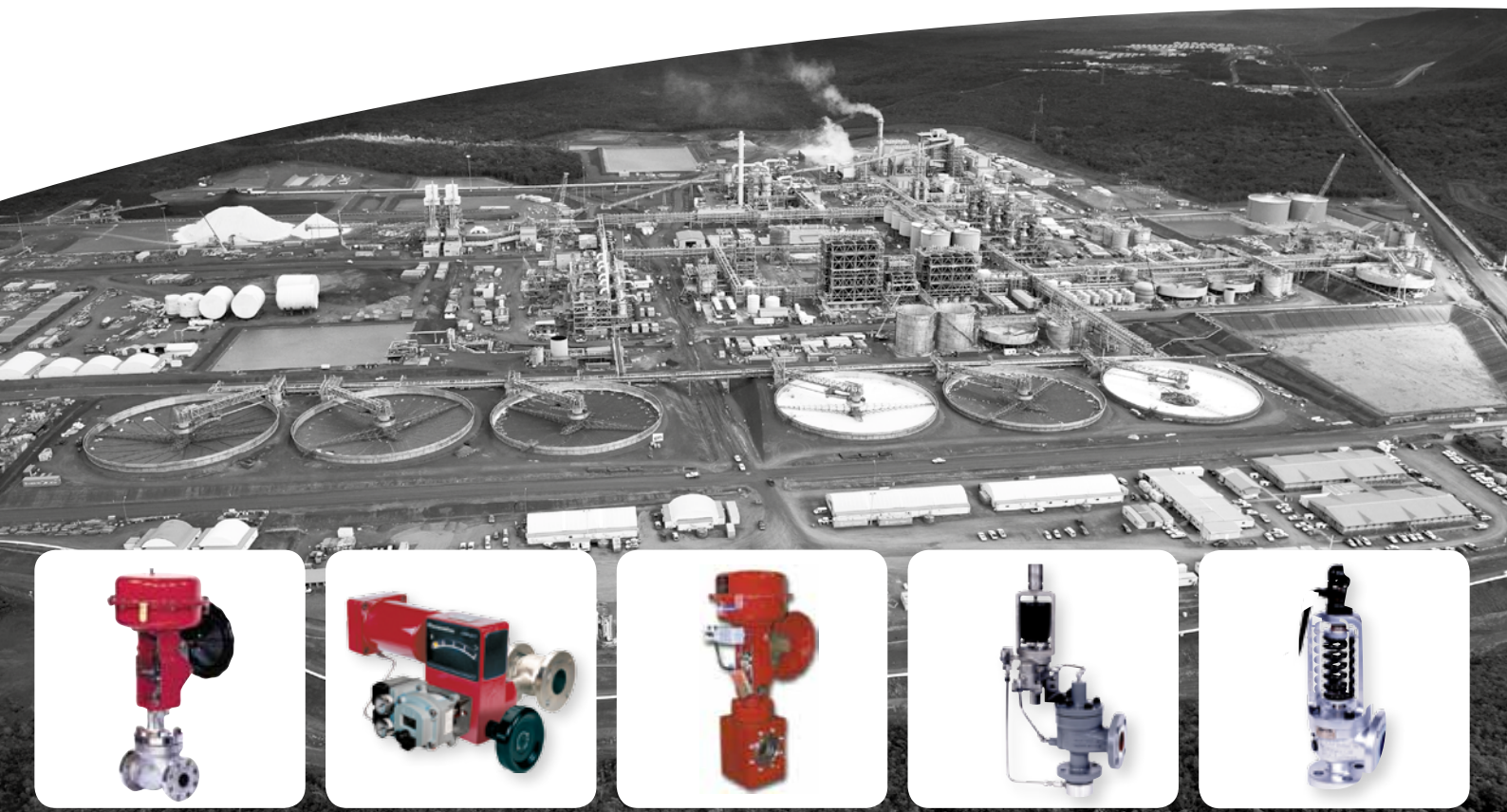
In line with the principles of continuous improvement and risk management, it is pertinent to revisit the risks presented by arc faults in flameproof enclosures to address the changes in the operating environment.

References:

1. Glenney J 2015, 'Reducing Arc Flash Hazards in Coal Mines', *coalage.com*, <<http://www.coalage.com/departments/operating-ideas/4344-reducing-arc-flash-hazards-in-coal-mines.html>>.
2. Murphy AB and Lowke JJ 1990, *Pressure rise due to arcing in flameproof enclosures*, Division of Applied Physics, CSIRO (for SIMTARS).
3. Birtwhistle D and Byers K 1990, *Arc fault containment in flameproof enclosures, Stage 1*, National Energy Research Development and Demonstration Program.
4. Birtwhistle D and Byers K 1991, *C1461: Arc Fault Containment in Flame Proof Enclosure*, Queensland University of Technology, SIMTARS.
5. Byers K, Birtwhistle D, Crisp J and Weber G 1996, *C4032: Safety Aspects of IP55 Enclosures used in High Fault Level Underground Coal Mines*, SIMTARS.
6. Reczek A 1998, *C7035: High Energy Electrical Systems in Coal Mines*, Ampcontrol SWG.
7. Mining Electrical Mining Mechanical Engineering Society 2004, *Code of practice for the control of fault arcs in flameproof enclosures used in underground coal mines*.

Ampcontrol Pty Ltd

www.ampcontrolgroup.com



**VALVE AND INSTRUMENT COMMISSIONING | PRODUCT TRAINING | OVERHAUL AND REPAIR | IN-SITU
WELDING AND RE-SEATING | EVT TESTING | OUTAGE MANAGEMENT | SIGNATURE DIAGNOSTICS**

THROUGH OUR EXCLUSIVE DISTRIBUTION AND REPAIR PARTNER ARRANGEMENT WITH GE FOR MASONEILAN AND DRESSER-CONSOLIDATED PRODUCTS AND WITH OVER 106 YEARS OF EXPERIENCE, WE'VE BECOME THE LEADING EXPERTS IN THE REPAIR OF SUCH VALVES AND ALL OTHER MANUFACTURERS TOO, USING OUR EXTENSIVE ARRAY OF BOTH FIXED AND COMPLETELY MOBILE SERVICE CONTAINERS AND OFF-ROAD VEHICLES.

WE SERVICE:

- CONTROL VALVES
- PRESSURE SAFETY VALVES
- TANK VENT VALVES
- REGULATORS
- ACTUATED AND MOTOR OPERATED VALVES
- MANUAL ISOLATION VALVES
- TURBINE BYPASS VALVES
- DESUPERHEATERS
- PROCESS INSTRUMENTATION



WE OFFER EXPERT SIZING AND SELECTION AND PROCESS APPLICATION EXPERTISE TOO!

**ENGINEERED QUALITY SOLUTIONS MATTER,
FOR LONG-TERM RELIABILITY WHERE YOU
DEMAND HIGH PERFORMANCE!**

1300 658 701
sales@powerflo.com.au
www.powerflo.com.au

SWITCHMODE POWER SUPPLIES

The Omron S8VK-G single-phase switchmode power supply conforms to UL Class I Division 2 rating and has a universal voltage input of 100 to 240 VAC. It also supports DC input from 90 to 350 VDC and features a double set of DC output terminals together with push-in terminal technology for easy wiring. It provides stable operation due to its built-in overload and overvoltage protections, with momentary power boost to 120%.

The S8VK-G is available in various models for 15, 30, 60, 120, 240 and 480 W loads, with output voltages 5, 12, 24 and 48 V. It can operate over a wide temperature range of -40 to 70°C. Using thermal simulation, this power supply has a sleek exterior to ensure a compact small size to save space.

The heat generating components of this power supply are at the top to ensure less heat build-up in the panel using gravity ventilation. This leads to longer life for the power supply and the surrounding components in the panel. The robust design of the DIN rail-mounting clip offers high resistance to any vibration being transmitted by nearby machines. The push-in plus technology firmly holds wires in place with less insertion force to further offer easy and fast installation saving time and increase its efficiency.

Omron Electronics Pty Ltd

www.omron.com.au



MOBILE-READY COLLABORATION SOFTWARE

Emerson has announced Plantweb Optics, a mobile-ready collaboration software platform for viewing plant reliability and operational performance. Connecting technicians, engineers and plant management through Plantweb Optics is said to provide cross-functional collaboration and decision-making to help plants operate safely.

With access to data across an organisation, the product translates equipment health data into a user-friendly format and instantly and securely delivers it to relevant personnel so they can make more informed decisions impacting production. The collaboration software improves the user experience with intuitive visualisation and customised alerts to reduce or eliminate irrelevant data. On mobile devices, personnel can quickly access equipment health scores and can combine multiple views for easier monitoring of facilities across multiple locations.

Today, plant management is unable to see critical data from various siloed systems and its impact on broader operations. Solutions exist to connect plant data to other users through complicated mapping processes, but those solutions deliver only raw data, leaving behind the rich information available from asset management systems. Using industry-standard, embedded communications protocols, Plantweb Optics can share data with big data machine learning and analytics software to create strategies for asset management.

Emerson Automation Solutions

www.emersonprocess.com.au

Robust MAGNETIC PROGRAMMABLE Incremental and Absolute Encoders





Features

- Program with a mobile phone
- No software to install
- Wi-Fi connection to encoder
- Online storage of configuration
- Range of housing sizes 58 and 36mm Dia.

Options

- Incremental Only
- Absolute single or multi turn
- Gray or Binary Code
- Dual Incremental and Absolute
- Any values 1 to 16,384

www.pca-us.com.au
+ 61 2 9482 3733

**POSITAL
PRADA**

Configure
with your
mobile phone



TopView Alarm Management and Alarm Notification Software

A comprehensive alarm management and alarm notification software system from Exele for wherever data and events need to be monitored. Use TopView® with process and automation data and events, relational databases, system performance and network ping response data. Generate audible alarms, send e-mail notification, SMS/text notification, voice call-out notification, and SNMP traps. Plus, desktop and mobile apps to keep users connected to important data and events.

Especially useful in water and waste-water, power generation and transmission, oil and gas, pharmaceutical, data centers, metals and mining, manufacturing, building management, chemical, pulp and paper, research, communication, transportation, IT, and system performance. Easy to use, easy to manage, infinitely scalable



KEPServerEX Connects disparate devices and applications, from plant control systems to enterprise information systems

KEPServerEX is the industry's leading connectivity platform that provides a single source of industrial automation data to all of your applications. The platform design allows users to connect, manage, monitor, and control diverse automation devices and software applications through one intuitive user interface. KEPServerEX leverages OPC (the automation industry's standard for interoperability) and IT-centric communication protocols (such as SNMP, ODBC, and web services) to provide users with a single source for industrial data. The platform is developed and tested to meet our customers' performance, reliability, and ease-of-use requirements to manage, infinitely scalable

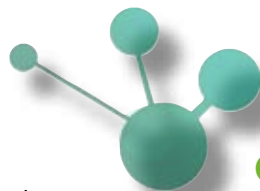


CIMON-SCADA' is a powerful and reliable all-in-one tool for monitoring and controlling industrial sites.

CIMON SCADA is developed by specialists who designed with open structure to satisfy various user characteristics and easy to build interface with software system.

Compatibility in communication with variety of industrial devices helps to construct an optimum network and able to build stable and innovative integrated network.

Diverse Web function for networks and remote control by mobile supports ODBC and stands SQL to connect universal databases. OPC Server and Client It provides an easy interface for data communication with external software that conforms to the standard OPC specifications.



GETTING IT TOGETHER

CIMON Industrial Automation Computer

CIMON-IAC provides system stability with fanless design and guarantee equipment survivability. NU1R is designed fanless and non-noise system and it is helpful for dusty industrial areas. It is also good for green IT system since it is strong in heat and vibration, and low energy consumption.



Cimon- PLC

Cimon- PLC is an industrial control device based on international standards of IEC61131 which is appropriate for the plant site that requires high reliability.

CIMON-PLC is optimized for Industry 4.0 makes various industrial sites more smart.



OPC Server | BACnet | DNP3 | Modbus/TCP

Collaboration Tools With More Accessible, Common Platforms Promote Data-Sharing Connect, access, and control your industrial data with Fetch Automation solutions.

Power Monitoring and Control System
Water Supply Facility Management and Control Systems
Building Control and Management

CIMON Industrial Computer IPC

CIMON's industrial panel computer guarantees survivability in intense manufacturing site and provides best performance by standard mount of Intel Quad-core CPU and SSD(Solid state disk) in industrial automation field.

Offers system stability through fanless and internal design to achieve survivability. Using HW board which is designed to endure severe field circumstances, we ensure operability for various industrial sites.

128GB SSD, 4GB RAM, Intel Baytrail-I Embedded Processor E3845 Quad Core 1.91GHz (FANLESS)3 Serial, 2 Ethernet, up to 6 USB port Windows 7 Professional



Fetch Automation | Solutions for Industrial Automation and IoT

Call Toll Free 1800 819 100

Email: sales@fetchautomation.com.au | Web: www.fetchautomation.com.au

This publication may contain references to products produced and/or offered by other companies. The product and company names may be trademarked and are the sole property of their respective owners. Fetch Automation Pty Ltd disclaims any proprietary interest in the marks and names of others.

TANK PROTECTION VENTS & VALVES

- VACUUM/PRESSURE RELIEF
- INERT GAS BLANKETING



**BLANKETING
VALVES**

**PILOT OPERATED
VACUUM/PRESSURE VENTS**



**WEIGHT
& SPRING
LOADED
VENTS**



FLAME ARRESTORS – INLINE & END OF LINE

AUSTRALIAN AGENT & TECHNICAL SUPPORT



Tel: (03) 9699 7355

www.pressureandsafetysystems.com.au

9344855-MANPT

3D MEASUREMENT SOFTWARE

FARO has released the FARO CAM2 2018 software platform, specifically designed to enable users to realise the best value and performance with all FARO metrology products across the automotive, aerospace, machine tools and metal fabrication industries.



CAM2 2018 integrates with FARO portable coordinate measuring machine products and offers an advanced user interface that streamlines and simplifies most inspection activities, as well as updated reporting dashboards that facilitate short cycle, actionable intelligence. It is a tightly integrated software platform for the entire FARO measurement product range to ensure that users are able to leverage the full range of FARO hardware features and functionality, now and also in the future, through software updates and patches.

CAM2 2018 now includes Repeat Part Management (RPM) functionality for easy production implementation and minimum training. This smart tool enables a specific inspection process to be designed once and then repeated and executed by anyone on the factory floor. Accordingly, this ensures resource-efficient, consistent oversight and quality control of inspection routines without the need to have highly skilled metrology professionals drive and manage the process.

The software also features integrated web-based dashboard reporting that delivers real-time inspection results and insightful trend analysis in a user-friendly set of adaptable visual reports. The RPM Control Center information can be shared across the organisation in real time and accelerate the ability to take immediate corrective action as required.

FARO Singapore Pte Ltd

www.faroasia.com

DRIVE FOR BASIC APPLICATIONS

ABB's ACS150 micro drive is designed for OEMs, machinery builders or panel builders, and is available in either single- or three-phase supplies with a power range of 0.37 to 4 kW.

With a high starting torque and compact size, it is suitable for applications such as mixing, conveyors or fan applications. The ABB ACS150 features an integrated PID control for optimal airflow by simply adjusting the fan speed based on a given reference value, also providing energy efficiency when compared to mechanical flow control methods. Integrated EMC filters provide high electromagnetic compatibility with low EMC emissions in selected environments and an optional FlashDrop drive configuration tool makes configuring unpowered drives quick and easy.



Control Logic Pty Ltd

www.control-logic.com.au



Clever boxing: Oji opts for energy efficiency in Yatala

Oji Fibre Solutions is part of the pulp and paper division of Oji Holdings Corporation — the world's fifth-largest pulp and paper company. From fresh fruit and produce, meat, poultry, seafood and beverages to reseller and industrial manufacturing, the wide range of industries that Oji Fibre Solutions has been supplying innovative corrugated cardboard packaging solutions to in Australia and New Zealand is immense.

As part of the company's expansion of its packaging business in Australasia, Oji recently invested in the development of a new 5.8 hectare site in Yatala, Queensland. Complementing the company's existing manufacturing plants in Melbourne and Sydney, the Yatala site houses a newly constructed 2.4-hectare manufacturing facility.

From here Oji manufactures and supplies innovative corrugated cardboard packaging solutions to its customers throughout Queensland, northern New South Wales and the Northern Territory.

As part of Oji's commitment to delivering innovative and environmentally sustainable products, the facility operates to a green-star rating system. From daylight sensors and a lighting control system to a rainwater harvesting system, Oji implemented a number of initiatives that would assist them in reducing emissions and increasing energy efficiency throughout the operation. It is no surprise then that in designing and building the new manufacturing facility, they also chose to invest in the latest and most energy-efficient manufacturing technology.

Energy efficiency was therefore a key criteria for Oji Engineering Manager Peter Henley when selecting the compressed air system for the new facility. From material handling to the conveyor systems, pre-feeders and corrugator, compressed air would be a key utility required throughout the manufacturing process.

After considering a number of vendor packages, Oji chose to invest in a Kaeser compressed air system, consisting of a Kaeser CSD 85 series fixed speed rotary screw compressor, and a CSD 125 SFC Sigma frequency controlled rotary screw compressor, in addition to a comprehensive compressed air treatment package.

A frequency controlled rotary screw compressor was selected as part of the compressed air package in order to meet the fluctuating demands for compressed air of the new manufacturing facility in the most efficient way possible. As the lead compressor, the CSD 125 SFC is responsible for supplying the site's initial requirements for compressed air.

The inclusion of the Sigma Control 2 compressor controller also enables compressor performance to be precisely matched to actual air demand, thereby allowing additional energy savings.



In any compressed air installation where a frequency controlled compressor is installed, this will be the compressor that operates longer than any other unit within the system. With frequency control, the operating pressure can be consistently maintained with ± 0.1 bar. In turn, the consequent ability to reduce maximum system pressure also reduces energy costs. With the CSD 125 SFC, Oji technicians can view the relationship between pressure consistency and speed directly on the Sigma Control 2 display.

Due to the ability to provide a soft rise in motor starting current from zero to full load without current spikes when using frequency control, there is no effective limit to the number of possible motor starts within a given time period because overheating is prevented. The continuously variable acceleration and deceleration significantly reduces component stress.

The additional fixed speed Kaeser CSD 85 series rotary screw compressor at Oji was installed to act as the lag compressor. This means that it only starts up and produces compressed air when the demand exceeds that which the CSD 125 can produce alone. This therefore ensures that the fixed speed unit is not operating in a loaded state for extended periods of time. The result of this configuration for Oji is optimum energy efficiency, reducing power costs, by only producing the precise amount of compressed air required at any one time.

"We have been using Kaeser compressors for some time now on our other sites," said Henley. "They have proven to suit our application and be reliable and efficient in meeting our compressed air requirements. We have also found that they are well suited to operating in the Australian climate."

Kaeser Compressors Australia

www.kaeser.com.au



INTEGRATED PUMP DRIVES

Capable of storing up to four operation modes that can be displayed and changed directly at the control unit, the SK 200E series integrated pump drives from NORD DRIVESYSTEMS are said to include reliable and economical frequency inverters, especially tailored to pump applications that require precise adjustments of power output.

NORD configures complete drive systems for various application areas (IP55/IP66, ATEX Zone 22/3 d), in powers up to 22 kW, and its integrated process and PI controller functions enable the fully automated control of process variables as well as compensation of disturbances.

Due to two analog inputs, the inverters can directly process sensor data such as pressure or flow rate. Optional signal and power plug connectors facilitate handling and ensure compatibility. A programmable energy-saving function automatically reacts to partial load operation, increasing efficiency and reducing running costs.

Operation is straightforward and flexible via control terminals, bus or an optional potentiometer that enables adjustments directly at the inverter.

In addition, the customised parameters can be quickly exported to other units via a pluggable storage module, the system bus, or Ethernet interfaces. With control cabinets no longer required, the decentralised option minimises cabling effort for users, and since the inverter is supplied pre-assembled the installation effort is reduced.

NORD DRIVESYSTEMS (Aust) Pty Ltd

www.nord.com





The DCAP Hand Pump
helps technicians get the job done faster while precisely controlling pressure in multiple applications




Calibrating pressure transmitters

- Generate and control pressure easily and precisely — the same pump can be used to calibrate both the static and differential side of a DP transmitter
- Works with the **Ralston FieldLab** system to log the complete calibration

Calibrating analogue or digital pressure gauges

- Controls pressure efficiently without worrying about leaks
- Quickly connects to each adapter without a wrench or thread tape when used with the **Ralston Quick-test™** system of hoses and connectors

Setting a pressure switch

- The fine adjust piston lets the technician open and close pressure switches easily to quickly adjust set-points

Custody transfer flow computer calibration in gas pipelines

- Low volume pump and hoses help save time getting to pressure
- Easily connects without a wrench or thread sealant using **Ralston Quick-test™** adapters

ISO 9001:2015 Certified

Made in the U.S.A.



TRANSTEK
CALIBRATED EQUIPMENT • OUTSTANDING SERVICE

For sales & service:
(08) 9331 7500
sales@transtek.com.au
www.transtek.com.au

RFID SAFETY SENSORS

The BID R03K non-contacting, transponder-coded safety sensors are suitable for monitoring guard doors and safety flaps. Since the passive RFID transponder is uniquely identified by the sensor, high coding levels and high bypass protection can be implemented.

The series is especially suitable in environments where high levels of dust or contamination are expected. The large interrogation range of the sensors makes them insensitive to vibration, making them a good solution when doors sag or are misaligned, and also makes the sensors easy to install. For particularly strong vibrations, a variant with an optional holding magnet is available.

The compact size offers flexibility integrating the device into the application. The devices can be used in applications up to PLe and SIL 3 due to built-in safety logic and an OSSD output stage.

Balluff Pty Ltd

www.balluff.com.au





ROBOTIC PCB PROBER

The Access DH2 Prober is a dual head robotic flying probe system suited to low-volume PCA testing where the interfacing between two points is necessary.

The open architecture design of the Access DH2 makes it possible to utilise flying probe technology for many different test methods where automated probing of the PCA under test is required. The Access DH2 can be used with traditional Huntron Tracker products, configured to work with conventional test instruments (oscilloscopes, spectrum analysers, etc) or specialised test cards such as boundary scan. The Access DH2 design also allows a plug-and-play approach to automating manual guided probe applications.

The Access DH2 is a refined and updated version of the original Huntron dual head Access DH prober, the most noticeable change is the size. The Access DH2 has been resized to fit through a standard 91.4 cm door. The probing area is same as the original Access DH, but wider and not as deep, improving the probing area. The redesigned cabinet now has two side-by-side 48.3 cm instrument racks making system integration more convenient.

Using the Access DH2 to make measurements on powered circuit boards with the RG316 coax cable connected to the test probes will allow the user to make higher frequency measurements with oscilloscopes and spectrum analysers. The motor control has also been improved and the vision system enhanced with higher resolution, auto-focus cameras and software-controlled ring lights.

Metromatics Pty Ltd
www.metromatics.com.au

PHOTOELECTRIC SENSORS

The Wenglor PNG//smart photoelectric sensor range offers intelligent sensors with five different functional principles, all equipped with IO-Link.

Sensor settings can be easily saved and duplicated for other applications due to the IO-Link interface. This simplifies initial start-up and saves time, and condition monitoring permits predictive maintenance. Should replacement become necessary, the sensor's configuration is automatically transferred to the new device by means of a data storage function. Clear visualisation provided by Wenglor's wTeach2 software makes it possible to match the sensors precisely to complex applications. Switching thresholds and functional reserve are rendered visible, permitting a qualitative assessment.



The sensors work with laser, red or blue light, and offer precise optical characteristics. They are adjusted at the factory such that each sensor has the same switching distance when the settings are identical (whether via potentiometer or IO-Link). Due to a balanced spot with an aligned optical axis, no subsequent realignment of the spot is required. This simplifies initial start-up as well as replacement. The sensors also don't influence each other when they're mounted directly next to or opposite each other, and they are insensitive to interfering light.

Treotham Automation Pty Ltd
www.treotham.com.au

Introducing the new

Flexy205

IIoT Gateway and
Remote Access
Router

eWON
www.flexy205.biz



**GLOBAL
M2M**

AU +61 3 9338 8189 | NZ +64 9 889 0110
sales@globalM2M.com.au | sales@globalM2M.co.nz



MAGNETIC FLOW METER TRANSMITTER

Emerson has introduced the Rosemount 8712EM wall-mount magnetic flow meter transmitter with additional protocols, more diagnostic capabilities and usability features to help users in the water and wastewater, metals and mining, and other industries gain quick and easy insight into their processes.

The meter's local operator interface was designed using human-centred design concepts, making it easier and faster for technicians to navigate in the field.

The Rosemount 8712EM's diagnostic suite includes high process noise detection and ground fault detection. The electrode coating diagnostic offers two setpoints to

alert when coating is present and when it is affecting flow measurement, enabling preventive maintenance. Smart Meter Verification continuously monitors the health and performance of the meter for greater measurement confidence.

Universal transmitter capability allows the 8712EM to operate with any existing magnetic flow meter sensor and allows backwards compatibility with all Rosemount magnetic sensors. This feature not only makes the transmitter easier to integrate with older units, but it also adds the 8712EM's advanced diagnostic features to those existing meters.

The Rosemount 8712EM supports HART 7 with 32-character tag capability for reduced start-up time, as well as options for intrinsically safe HART outputs and Modbus RS485.

Emerson Automation Solutions
www.emersonprocess.com.au

FIBRE-OPTIC ACCELEROMETER

The SCAIME OBAC-002 is a fibre-optic accelerometer that offers precise and reliable low-level vibration and DC acceleration measurement. The accelerometer also has very low transverse sensitivity, which makes it suitable for motion and DC-level measurement.



The design of this miniature fibre-optics accelerometer allows flexible mounting to the testing structure, either bolted or welded. It is also highly insensitive to temperature change with thermal drift of $\sim 0.07^\circ\text{C/g}$ over the operating temperature range of -20 to 50°C . The sensor can also be directly integrated to a SCAIME web server for easy parameterisation and analysis.

This vibration sensor has application in adverse environ-

ments due to its robustness and measurement integrity, and has been used in defence and military applications and also in tankers, and the general oil and gas industry. The OBAC-002 fibre-optic accelerometer is also highly insensitive to electromagnetic interference, resistant to water and corrosive substances.

Measurement range is from -2 to $2g$, with a frequency response of $0-20$ Hz, transverse sensitivity of $<1\%$ and a resolution of $0.1\%FS$.

Bestech Australia Pty Ltd
www.bestech.com.au



COMPACT ELECTRONIC CIRCUIT BREAKER

Phoenix Contact has released a highly compact, single-channel electronic circuit breaker, the PTCB. At 6 mm wide by 106 mm high, the PTCB electronic circuit breaker offers space-saving circuit protection and potential distribution. It also helps technicians save on costs, as less space is required in the control box.

The smart device protects 24 VDC loads against overload and short circuiting. It can be used as a standalone circuit breaker or with Cipline complete DIN rail terminals and accessories for additional outputs or with multiples connected together. Adding the PTCB to existing applications is quick and easy as the device does not require users to purchase another set of terminals.

Suitable for a wide range of applications, technicians can adjust the trip values on the device from 1 to 8 A to tailor the PTCB to their needs and ensure optimal adaptation to the connected load. The device can also be modified during start-up as well as adjusted at any time to respond to changes in the application.

The device is equipped with a relay status indicator with a pre-warning LED so that users can see the functional status of each circuit breaker, and it is suitable for use in temperatures ranging from -25 to 60°C .

The PTCB range of electronic circuit breakers features three adjustable devices with different nominal current ranges between 1 and 8 A, and four devices with fixed nominal currents of 2 , 3 , 4 and 6 A.

Phoenix Contact Pty Ltd
www.phoenixcontact.com.au

REGISTER NOW www.safety-connect.com.au



SAFETY²⁰¹⁸ CONNECT

Incorporating the National Safety Conference

29–30 AUGUST 2018 Brisbane Convention & Exhibition Centre



SPEAKERS INCLUDE



ELDEEN POZNIAK
CEO, Pozniak Safety
Associates (Canada)



ADAM WATSON
Head of Operations &
Emergency Management,
WorkSafe Victoria



ALANNA BALL
Founder, Women
in Safety



JUSTIN NAPIER
General Manager of
Regulatory Operations
Group, Comcare



MARTINE BRIERS
Group Manager –
HSEQ, Coates Hire



MARK COCKER
Acting Chief Executive,
WorkSafe Tasmania

PLATINUM SPONSOR



GOLD SPONSORS



Interested in exhibiting
or sponsoring?

Contact Narelle Granger:
ngranger@wfmedia.com.au 02 9487 2700

SPONSORS



ENHANCING THE FUTURE FOR HEALTH & SAFETY PROFESSIONALS

ORGANISED BY



MEDIA PARTNERS





Diamond mine treats calculations as assets



Growing competition has required faster development and higher efficiencies in almost every sector. Companies go to significant effort to invest in their most important assets — namely, the products they deliver. These products comprise various designs, techniques and intellectual property, all of which are managed across an organisation with careful thought and attention.

There's a fundamental process behind these company assets that is often overlooked, and its lack is responsible for aches and pains that most engineers face on a regular basis. What's often missing is calculation management, a process that treats calculations like the vital, valuable company asset they are.

The Diavik Diamond Mine in Canada's Northwest Territories recently invested in tools and processes for making the most out of the calculations performed there. The mine is owned by a joint venture between the Rio Tinto Group (60%) and Dominion Diamond Corporation (40%), and is operated by Yellowknife-based Diavik Diamond Mines Inc., a subsidiary of Rio Tinto.

The technical processes involved in a diamond mine consist of a large number of variables, parameters and potential for inefficiencies. At Diavik these processes are regularly analysed to give the company a more precise understanding of the mine's future yields, and to find efficiencies along the way. To perform this analysis, Diavik has traditionally relied on spreadsheet tools, but is now trying to move beyond the limitations it experiences using spreadsheets alone.

As the Superintendent of Process Technology at Diavik, Yuri Kinakin uses a host of analysis techniques to ensure that Diavik is using the best techniques available for processing their materials. Recently, Kinakin moved some of Diavik's analysis requirements into Maple, the calculation management tool from Maplesoft, in order to simplify calculations and provide better insight compared to what was available with previous tools.

The large number of parameters involved in Diavik's processes can result in some complicated calculations. The matrix multiplications they perform have traditionally taken more time and effort to complete than necessary.

"We use our spreadsheet tool more than we want to," said Kinakin. "Maple just made it easier — calculations we used to do in previous tools can be done in Maple using only a few lines."

Another common task for Kinakin and his team requires fitting curves to a set of throughput data they gather regularly. They are interested in finding the probabilities that their throughputs will exceed specific quantities; thus accurate probabilities become valuable information in each process plan. Instead of doing polynomial fitting in other tools, Diavik used Maple's curve fitting package, which was designed specifically for this kind of work. Using Maple, Diavik was not only able to get accurate fits for their process data, but they could provide transparency for their analysis, making calculations easy to understand across the entire team.

As Diavik takes positive steps to manage its process calculations better, it hopes to use Maple for even more work. Similar to many technical organisations, Diavik is still reliant on a variety of spreadsheets that, while functional, don't provide the flexibility or simplicity that is needed.

"Our spreadsheets can be unnecessarily complicated, and over the years, we've seen them grow into something very big and clunky," Kinakin commented. As more calculations are transitioned to being managed by Maple, Diavik hopes to provide easier, more auditable reports that allow other teams to validate the work being done.

Although Kinakin has only been using Maple at Diavik for a few months, he has already experienced time savings in his process planning. By making complex calculations easier to perform, Kinakin has been building a stronger foundation of calculations that can provide more accurate solutions to the questions he had previously been trying to answer using spreadsheets.

Kinakin's approach to calculation management is a sign of the growing need across industries to treat calculations as a valuable, structured asset. The current pace of technical projects requires a proactive approach to managing calculations properly, in a way that cuts out the redundancies and downtimes associated with the often disorganised techniques of the past. By using Maple to perform calculations in a robust, fully documented environment, Kinakin is helping Diavik make the most out of the intellectual property it has been building over its decades-long history.

Australian Scientific & Engineering Solutions Pty Ltd
www.ases.co



COMMS 2018 CONNECT

SYDNEY

Rosehill Gardens
14-15 June 2018

**NEW
VENUE!**

*Events for critical
communications
users and industry*

- **500+ USERS AND INDUSTRY EXPERTS**
- **30+ EXHIBITORS • 30+ SPEAKERS**
- **4 TRAINING WORKSHOPS • 2 CONFERENCE STREAMS**

SPEAKERS INCLUDE



BILL SCHRIER
Senior Advisor
First Responder
Network Authority



GILES TANNER
General Manager,
Communications
Infrastructure Division
ACMA



LAWRENCE MCKENNA
Telecommunications
Section Manager
Wood & Grieves
Engineers



PAUL BARNES
Director IT, Operations &
Communications,
Fire & Rescue NSW



WILLIAM HEAPY
Director of Planning
& Strategy
AxiCom

TRAINING WORKSHOPS – INCLUDED IN CONFERENCE PACKAGE

- **Radio spectrum management** — what's trending in 2018
- **Control rooms** — environment trends and future development
- **The Internet of Things for public safety** — what lessons can be learnt from other countries when developing our application ecosystem for first responders — the next steps
- **Critical messaging in the modern world**

In conjunction with the

ARCIA Industry Networking Dinner

14 June — Rydges Parramatta

Book with your conference package
or visit www.arcia.org.au
to book your tickets

Digital Partner



Lanyard/Networking
Drinks Sponsor



Media Partner



Association Partner



Supporting Associations & Publications



For more information or to register visit www.sydney.comms-connect.com.au

AS I SEE IT



A CULTURE OF RELIABILITY

Reliability is a key business imperative for any company in an ever-increasingly competitive global market. It is a cornerstone of any operational excellence program. Those companies operating in the top quartile of reliability performance, when benchmarked against the average performance of their peers, enjoy 4% more availability, at half of the maintenance cost (as a consequence, not an action), and typically have a better safety record as a result.

Those top performers have some important behaviours in common. They have reliability-centric business processes in place. They maintain their assets proactively and have an optimal mix of preventive (time-based) and predictive (condition-based) maintenance work processes. They have strong reliability engineering capabilities. They apply IIoT sensing and analytics technology appropriately for condition monitoring and diagnosis of their assets.

But the key factor that allows the top performers to achieve all these things is the culture. They have been successful in embedding a reliability culture in their organisations. To draw a parallel, over the past decades — and to everyone's benefit — almost all organisations have been successful in embedding a safety culture. Everyone is aware of safety, and the role they play in making themselves and others in their workplace safe. Gone are the days when safety was considered the sole responsibility of the safety manager.

The top performers in reliability have achieved the same with a reliability culture. Everyone in the organisation understands their role and impact on reliability, and the enormous financial and business advantage gained through performing in the top quartile. They understand the value of integration between departments (operations, maintenance, finance, IT, materials management etc) and the benefits of a coordinated focus on reliability performance. In these top performers, the days are gone when reliability was considered the sole responsibility of the maintenance manager.

The path to this culture requires investments in people. Top-performing companies ensure that their people understand the bigger picture, see the benefit in changes to work processes, and the introduction of technology that will enhance them, not detract. So how do the top performers do that?

They build integrated teams. Whoever is leading an initiative, a business plan is unlikely to be successful without cross-functional collaboration. Each organisation brings valuable perspective to business plan development, execution and measurement against business objectives.

They focus and start small. Smaller initial improvement projects address clear business needs in a measurable way, while also providing the opportunity to demonstrate to the organisation what success looks like, and to evaluate broader applications and deployment as they gain expertise.

They transform employees as well as processes. The greatest benefits are realised when worker skills are enhanced and work processes are updated to take advantage of new technology and work practices.

With these considerations top of mind, businesses will be well positioned to get significant returns on their reliability program investments. And with strategic business plans guiding these investments, they will also gain experience and expertise that will drive a broader adoption of new work practices and IIoT technologies for reliability improvements.

Murray Cox is the Director of Reliability and Wireless in Australia and New Zealand for Emerson's Automation Solutions consulting services. He has over 25 years' experience in the automation industry and has experience in control systems, safety instrumented systems, measurement technologies and wireless.



Westwick-Farrow Media

A.B.N. 22 152 305 336

www.wfmedia.com.au

Head Office

Cnr. Fox Valley Road & Kiole Street,
(Locked Bag 1289)

Wahroonga NSW 2076

AUSTRALIA

ph: +61 2 9487 2700 fx: +61 2 9489 1265

Editor

Glenn Johnson

gt@wfmedia.com.au

Publishing Director/MD

Geoff Hird

Art Director/Production Manager

Julie Wright

Art/Production

Colleen Sam, Wendy Blume

Circulation

Dianna Alberry, Sue Lavery

circulation@wfmedia.com.au

Copy Control

Mitchie Mullins

copy@wfmedia.com.au

Advertising Sales

Industrial Group Sales Manager

Nicola Fender-Fox – 0414 703 780

nfender-fox@wfmedia.com.au

Sandra Romanin – 0414 558 464

sromanin@wfmedia.com.au

Tim Thompson – 0421 623 958

tthompson@wfmedia.com.au

Subscriptions

For unregistered readers price on application.

If you have any queries regarding our privacy policy please email

privacy@wfmedia.com.au



September 2016 total CAB audited circulation (Aust + NZ)
5,598 readers (73% personally requested)



Contact the editor

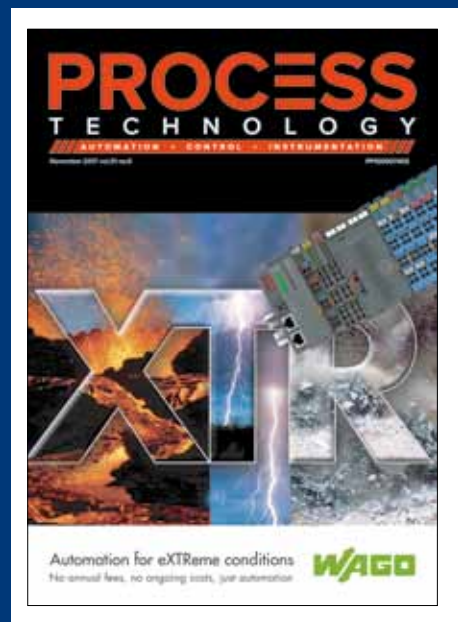
Printed and bound by SOS Print+ Media Group
Print Post Approved PP100007403
ISSN No. 0819-5447

All material published in this magazine is published in good faith and every care is taken to accurately relay information provided to us. Readers are advised by the publishers to ensure that all necessary safety devices and precautions are installed and safe working procedures adopted before the use of any equipment found or purchased through the information we provide. Further, all performance criteria was provided by the representative company concerned and any dispute should be referred to them.

Information indicating that products are made in Australia or New Zealand is supplied by the source company. Westwick Farrow P/L does not quantify the amount of local content or the accuracy of the statement made by the source.

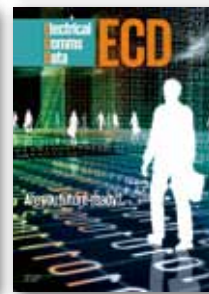
FREE

to industry and business professionals



The magazine you are reading is just **one of twelve** published by Westwick-Farrow Media.

To receive your **free subscription** (magazine and eNewsletter), visit the link below.



www.WFMedia.com.au/subscribe



**FROM IDEA TO
IMPLEMENTATION,
EVERY PART MATTERS.**

**Choose quality, performance
and value without compromise.**

Decisions have consequences. Making the right choices can improve the efficiency and productivity of your entire organisation.

Because every decision matters, every part matters. That's why RS Pro gives you everything that matters – quality, performance, choice and exceptional value for money.



Find out more
au.rs-online.com/RSPRO

