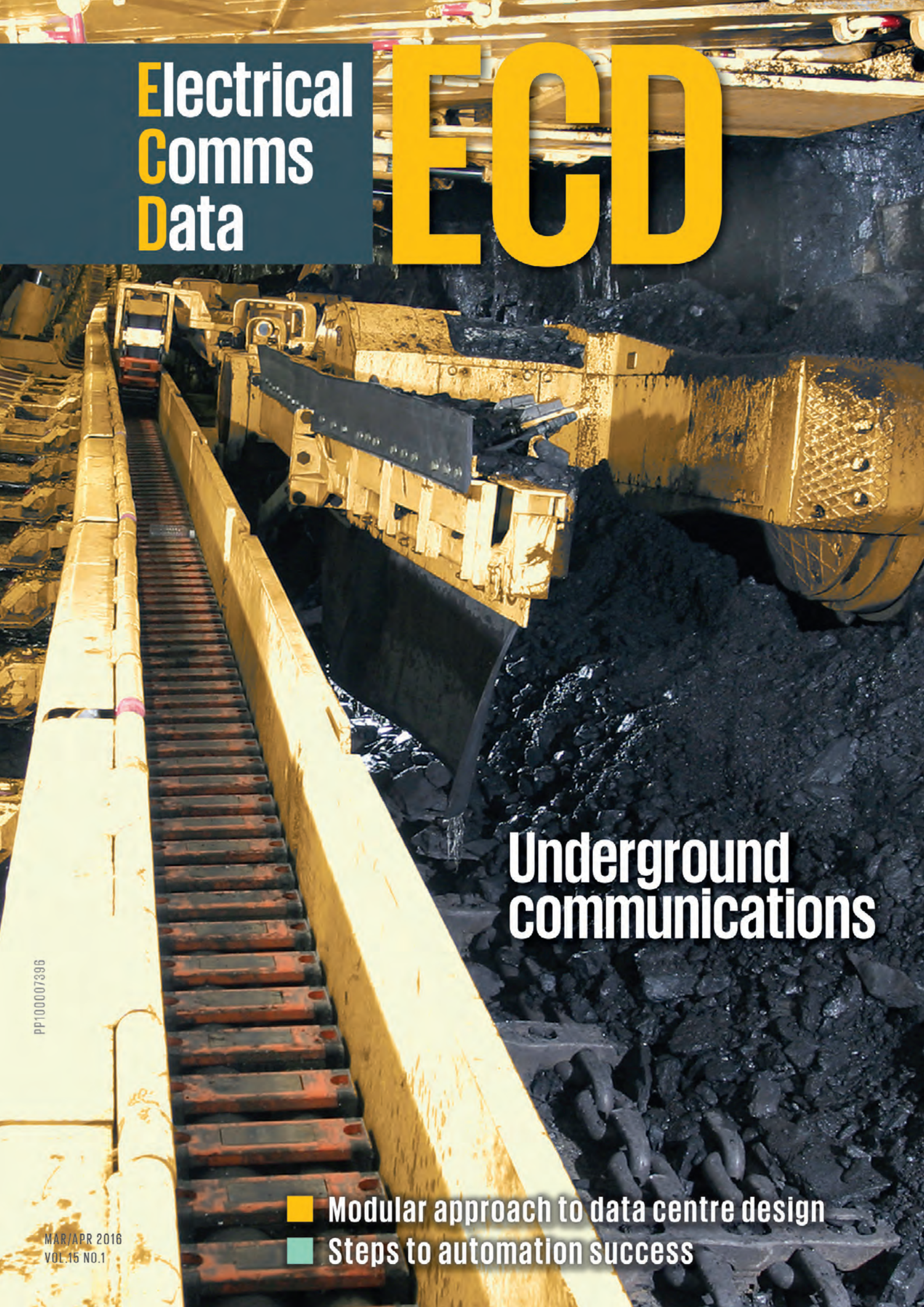

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Underground communications

- Modular approach to data centre design
- Steps to automation success

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CONTENTS

14 Electrical Distribution

38 Comms + Data

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FROM THE EDITOR

It's been over two years since the faulty Infinity and Olsent-branded cables were recalled. However, so far only around half of the recalled cables have been remediated. According to data released by the Australian Competition and Consumer Commission, around 2300 kilometres of unsafe Infinity cable had not been located or remediated as at 1 January 2016.

This means that thousands of Australian homes and businesses are sitting on a ticking time bomb. Forty six percent (1776 km) of these cables are in New South Wales and they could become dangerous as early as now. While some progress has been made, a lot more work needs to be done to protect lives.

The ACCC recently reminded builders and electricians that they could be liable for damages or fines if they haven't taken steps to remediate the faulty cable.

According to the ACCC, "If you installed Infinity cables and have not yet remediated them or alerted someone to ensure the cables are remediated under the supplier's recall, you could — be issued Rectification Orders by the electrical safety or building regulator in your state or territory, or be sanctioned in other ways; be prosecuted, fined, or possibly lose your licence if you ignore those sanctions; be held financially liable for property damage, injuries, or loss of life because you failed to alert the home owner or the appropriate regulator; be responsible for the loss of a life."

So if you have installed these cables but not yet remediated them, now is the time.

Mansi Gandhi – Editor
mgandhi@westwick-farrow.com.au

UNDERGROUND COMMUNICATIONS

Craig Stratton, Market Manager – Industrial Market

In underground mining, communications infrastructure is a vital component of the operation. Fibre-optic networks offer a reliable, high-speed, low-latency, intrinsically safe, interference-proof, flexible and modular option for evolving underground mine communication systems.

Underground communication networks are the critical link between operations underground and personnel at the surface. Mines are constantly changing and the mining process is highly mobile. As the operation has advanced, equipment and people are constantly moving. The potential for explosive gases, rock falls, wet locations, temperature extremes, confined spaces, high voltage and electromagnetic interference are a few of the hazards the underground network must survive. Furthermore, the demands on the network have increased through convergence of data. By adding surveillance video feeds, sensor data, miner tracking data, machine control signals, mine phones and production data to a singular network, the need for bandwidth over a distance which grows daily has become paramount to effective underground operations. Fibre-optic networks offer a reliable solution for underground mine communications. Optical fibre systems are also capable of handling the convergence of data over long distances. Designed to be modular for ease of maintenance and expansion, and portable to facilitate changes in the network infrastructure, optical fibre systems enhance safety by eliminating spark hazards found in conventional copper cabling solutions. Optical fibre systems are readily available and easy to deploy and maintain. In this article, we will review the basics of optical fibre, cable and connection systems for use in underground mines and show how these elements are specified and deployed in an underground installation.

Fibre-optic communication systems use pulses of light to transmit data. First developed in the 1970s, fibre-optic systems have revolutionised communications in our modern world. Massive amounts of data are successfully transmitted via fibre optics every day. From online transactions and internet searches to live HD video feeds transmitted around the globe, fibre-optic communication systems are at the core of the modern information age. The process of communicating over fibre optics involves only a few basic steps. First, the data must be converted to light. Second, the encoded light pulse is transmitted over the fibre-optic network. Finally, the light pulse is converted back into a conventional electronic digital signal. Transmitting and receiving optical signals is accomplished through readily available transceivers that use devices such as light emitting diodes (LEDs) and vertical cavity surface emitting lasers (VCSELs), a form of laser diode commonly used in fibre-optic transmission systems.

The fibre-optic network consists of several components including optical fibre, optical cable and optical connecting systems. Optical fibre is a very thin strand of glass that is used to carry the light pulses from the transmitter on the sending side to the detector on the receiving side. Optical fibre consists of three basic layers — the core which is the glass region where the signal travels; the cladding which is a glass region that traps the signal in the core; and a polymeric coating or primary buffer that provides a basic level of protection to the fibre while it is being further processed. Transmission of light through an optical fibre works through the principle of total internal reflection. By changing the index of refraction of the glass in the core compared to the index of refraction of the glass in the cladding, the transmission path the light takes as it travels through the fibre is prescribed. By controlling the angle at which the light is coupled into the fibre, the cladding can effectively act as a mirror and completely reflect any light that tries to escape through the cladding. Figure 1 illustrates this phenomenon.

Traditionally, underground mining networks have used multimode optical fibre. Multimode fibre, as the name implies, allows multiple modes of light to travel along its length. This type of optical fibre has a larger core diameter and accepts light coupled from a larger angle and from a broader spectral source, such as an LED. Multimode fibre offers plenty of bandwidth to support Ethernet protocols over short distances and is more than adequate for signalling for machine control and miner tracking over short distances. The core size of multimode fibre is commonly 62.5 micron or 50 micron versus approximately 9 micron for singlemode optical fibres.

Image supplied by: AFL


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SINCE UNDERGROUND MINES ARE GROWING DAILY AND NETWORKS ARE EXTENDING FURTHER AND FURTHER UNDERGROUND, MAINTAINING HEAD ROOM IN THE OPTICAL POWER BUDGET IS IMPORTANT.

The ability to transmit data over distance is commonly referred to as the bandwidth distance product. Because of the larger core size in a multimode optical fibre, the bandwidth distance product can present a limitation for very large underground networks. Additionally, multimode fibre has significantly higher intrinsic light attenuation, or the loss of the optical power, which is another limiting factor in large underground networks.

Measured in decibels, attenuation is described by the equation: -10log (Power Out/ Power In). In a typical multimode system using 62.5 micron fibre with an LED light source operating at 850 nm, the intrinsic attenuation of the fibre is approximately 3 dB per kilometre. Since attenuation is measured on a logarithmic scale, 3 dB equates to an optical power loss of about 50%. On the other hand, by using a VCSEL-based transceiver operating at 1300 nm, the intrinsic attenuation of the fibre is typically around 1 dB per kilometre. Singlemode fibre attenuation is typically less than 0.5 dB per kilometre. So far, the discussion of attenuation has been limited to intrinsic attenuation due to absorption and scattering of light within the optical fibre itself. It is important to understand that attenuation in optical systems can be exacerbated by external factors. Transmission loss in an optical fibre can be severely affected by improper handling, extreme stressors during installation or the operating condition of the cable.

For example, bending cables in a radius that is smaller than the specified value can result in macro bending attenuation. In this instance, light is allowed to escape through the cladding region of the optical fibre due to a change in the angle of incidence of the light ray travelling through the fibre. Additional sources of attenuation include micro bending of the optical fibre. This occurs when a lateral force is applied to an optical fibre such that the waveguide is deformed microscopically. The effect on the transmission path of light travelling within the glass is similar to that of a macro bend whereby the deformation causes a change in the geometry of the fibre structure allowing light to escape through the cladding.

In recent years, optical fibres have improved significantly, exhibiting lower intrinsic attenuation, higher bandwidth distance product and greater performance in bending. However, it is important for the network operator to understand the basic tenets of these issues in order to get the most out of the underground network. Since underground mines are growing daily and networks are extending further and further underground, maintaining head room in the optical power budget is important. To work properly in extreme environmental conditions found in underground mines, optical fibres should be packaged in robust cables that are capable of preserving these critical transmission properties.

Effective optical cable designs incorporate features proven to protect and preserve the optical budget for extended durations in extreme conditions. Factors affecting the cable such as tensile loading, bending, crushing, impact forces, moisture, chemical exposure, vibration and hot or cold temperature extremes need to be considered. Multiple test methods have been developed by a variety of industry standards groups to help determine appropriate performance specifications for cables. Many of these industry groups have focused on specific applications or installation environments such as typical telecommunications closets or structured cabling within commercial buildings. While these groups have developed standards that are excellent for qualifying cables for these applications, it is important to recognise that optical cables going into harsh environments, such as underground mines, may need additional performance attributes. Some in the industry have looked to military specifications as the ultimate in ruggedness. While these are certainly high-performing cables, in many instances a combination of specifications is more relevant. For example, as robust as military cables may seem, one important criterion that is commonly omitted from these cables is that of optical fibre strain.

In this article we've investigated the issues around transmission properties of optical fibre and discussed how cable systems

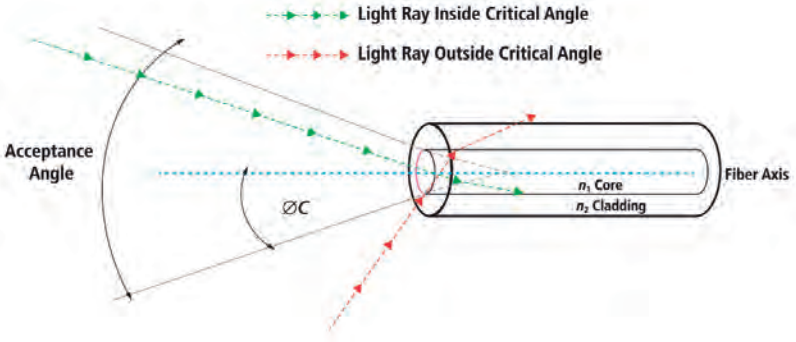

Figure 1. Make up of optical fibre showing total internal reflection. Source: AFL.

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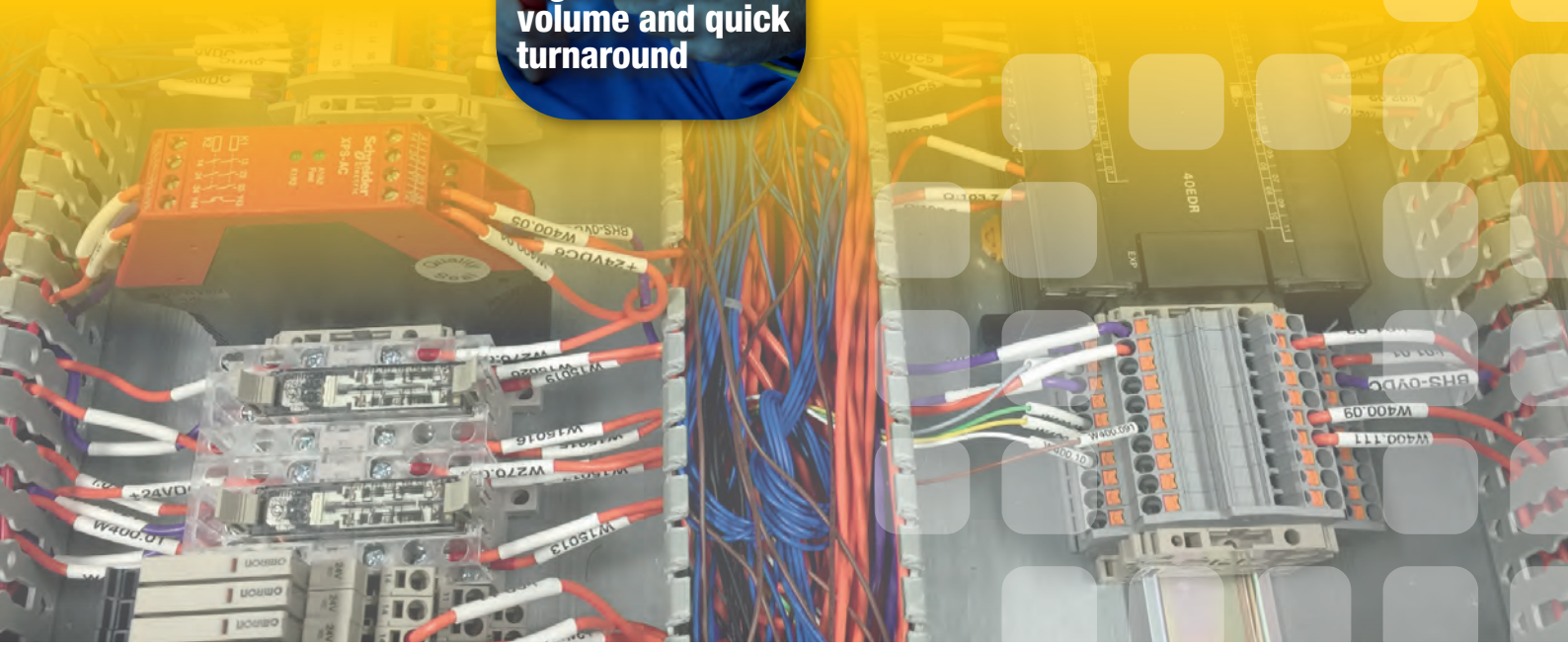

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> CABLE SYSTEMS SHOULD MEET THE LOCAL SAFETY REQUIREMENTS FOR FLAME SPREAD, SMOKE GENERATION AND TOXICITY.

can protect and preserve the optical budget used in underground networks. However, we have yet to touch on a key parameter affecting long-term reliability of optical fibre cable systems. Since optical fibre is made of glass, optical fibre strain must be considered in order to avoid premature failure due to static or dynamic fatigue. Strain is the word used to describe the deformation that occurs when an object is stressed. In this case, the optical cable may be stressed during both installation and operating conditions. Examples of cable stress include pulling under tension during installation, bending, self-supporting cable installations, wind load, ice build-up and even thermal stress caused by extreme temperatures. In these situations, the cable design must isolate the optical fibre such that the fibre strain is limited to specific values. In most cases, the recommended fibre strain threshold is less than 0.2% for residual loading of 100 kpsi proof tested fibre. Multiple studies have been conducted dating back to the 1990s demonstrating that long-term reliability of optical fibre can be achieved with this performance attribute designed into the system. Typical AFL cables deployed in harsh environments are depicted in Figure 2. Above and beyond all considerations in underground confined spaces where explosive gases may be present is that of human safety. Cable systems should meet the local safety requirements for flame spread, smoke generation and toxicity. In the United States, Mine Safety and Health Administration, or MSHA, approved cables have been validated by a third party to comply with these requirements. In many international locations, the International Electrotechnical Commission, or IEC, has established similar requirements.

Pre-terminated cable assemblies that have gas-blocked connectors are commonly used in underground mines due to the concern of explosive gas migration. In addition to safety, pre-terminated cable assemblies offer the added advantage of a plug-and-play modular network approach. Since mines are growing by the minute, plug-and-play modularity allows the network operator to easily and safely extend the cabling system to allow growth with the operation.

Application example

AFC Group, an AFL company based in Australia, worked with a Queensland-based coal company to tailor its industrial plug-and-play solution to meet the requirements of one of the harshest working environments in the world. As part of their longwall mining operation, the mine runs communications systems to the coal face for control, monitoring and safety systems. Generally using Ethernet-based protocols, the system had previously used composite cabling, which contained both the high-voltage and fibre-optic cable. The use of physical contact ST connectors in the underground coal environment led to issues with contamination, ultimately causing a high failure rate.

AFL's 12-fibre cabling solution was developed for the mine site based on tactical tight buffered cable, which is particularly suitable for installations where extreme environmental conditions are present. The cable was factory terminated with expanded beam connectors, designed to eliminate physical contact, vastly reduce the cleaning requirements and enhance the system reliability. The cabling system connects from the pump station to the distribution control board and is installed on the monorail with existing services. The flexibility of the tactical tight buffered cable means that the cabling system can be safely moved, recovered and redeployed during longwall retractions and longwall moves. The cables are simply uncoupled using the expanded beam connectors and reconnected in their new locations.

Overall, the fibre-optic cabling system provides the mine with a reliable and rugged system, well suited to the harsh environment of underground coalmining. Many other mine operations around the world are taking advantage of the benefits of fibre-optic systems including plug-and-play modularity, high reliability, exceptional bandwidth and intrinsic safety.

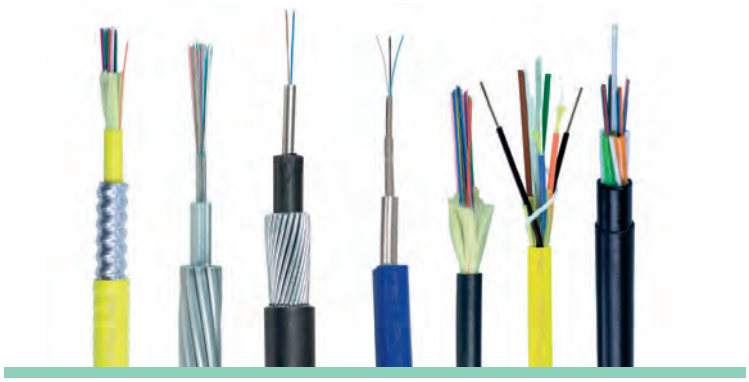

Figure 2. AFL's optical cables for harsh environments. Source: AFL.

AFL
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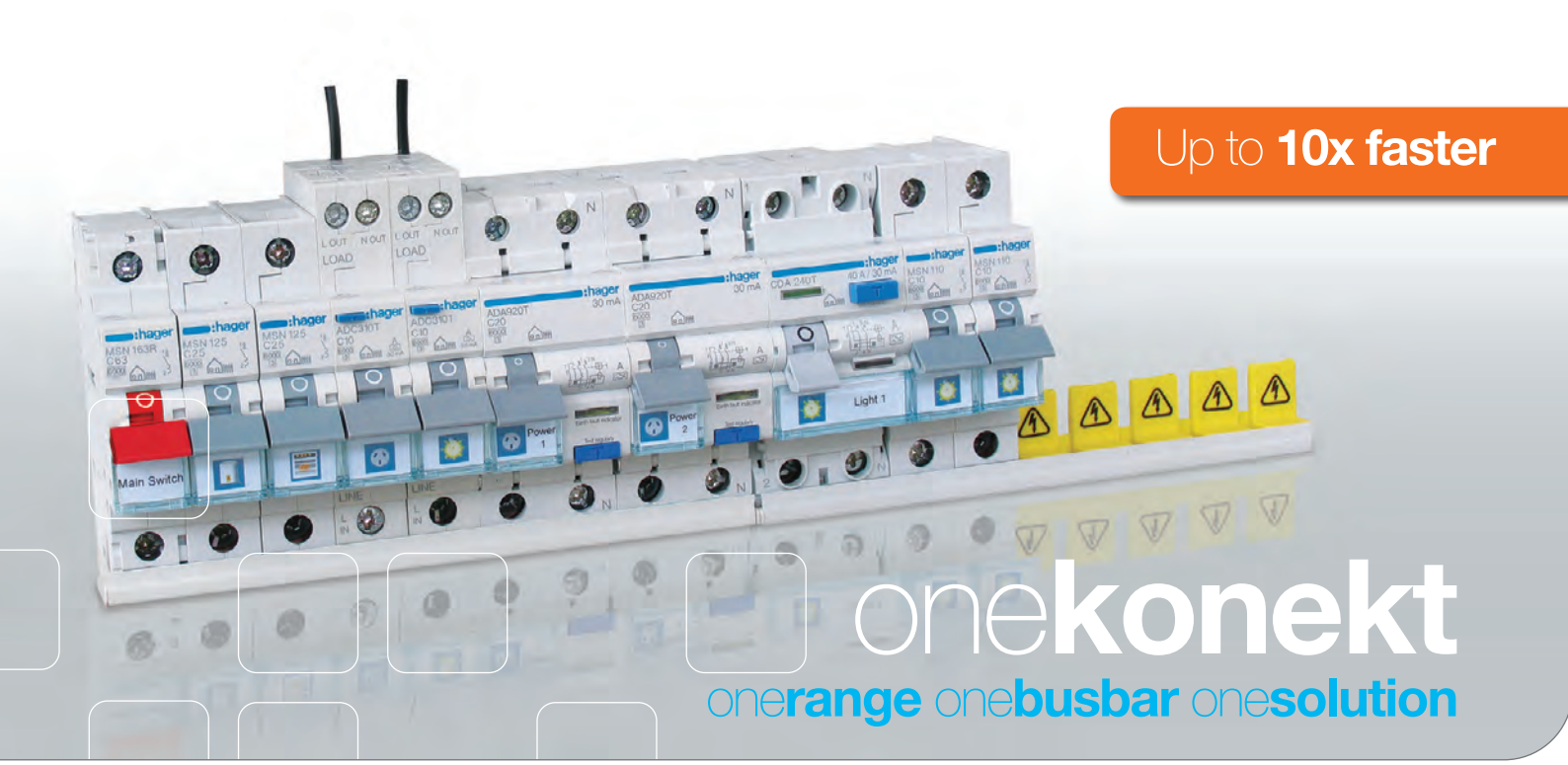

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*Sarah Bartholomeusz**

ARE YOU COMPLIANT?

Legislation and regulations change throughout the year and these have an impact on your business. Perhaps your company took on more employees or has a higher turnover? These are excellent indicators of growth and success but they also have the potential to attract new legal obligations.

This article features a list of commonly overlooked legal issues you should review to ensure that your company is compliant.

Corporate governance

Corporate governance rules apply to every company regardless of their size, and the Australian Securities Investment Commission (ASIC) will issue fines for failure to keep company records up to date. A fine may consist of a small 'slap on the wrist' or many hundreds of thousands of dollars for a significant breach.

Businesses should make sure all relevant documents have been lodged with ASIC, and the company register is complete. Consider whether your shareholders' agreement and constitution still reflect the nature and structure of your company.

The end of the year is also a good time to follow up with your directors to make sure they have disclosed any new conflicts of interest and share trading activities in the course of the year.

It is also important to remember that ASX-listed companies are held to a much higher standard than privately owned corporations. ASIC imposes heavy penalties for failure to comply with listing requirements and disclosure obligations, not the least of which is to have your listing suspended.

Intellectual property

Many companies don't begin with a trademark registration. They often mistakenly believe they are protected by the registration of a business name, or they are not yet ready to make an investment in intellectual property without any perceived value.

However, as your business grows it develops a reputation and builds brand recognition. It is important to review and carefully consider your intellectual property on a regular basis. A small investment in a trademark can save time and money down the track.

If you already have registered intellectual property, a yearly (or even more regular) review of your registrations is always a good idea. Are any of your trademarks coming up for expiration? Have any of your logos evolved or changed?

It can be useful to keep a simple register of intellectual property that can save time and make it simple for staff to see at a glance what the company's intellectual property is.

Privacy Principles

The *Privacy Act 1998* was subject to some amendments during 2015, and as a result some of the Privacy Principles were updated. Your Privacy Policy should follow suit.

If your company experienced growth and reached an annual turnover of more than $3 million it will now trigger the Privacy Act. There are also legislative triggers for smaller businesses who deal with personal information or sensitive health and financial information.

Once you trigger the Privacy Act, your company will be required to have a Privacy Policy that complies with the Australian Privacy Principles. Review your company's position and if in doubt seek some advice.

Finance arrangements

There is no one-size-fits-all finance solution, and companies often find that they 'outgrow' their finance arrangements, particularly during growth stages. When this happens facilities will need to be amended, updated and renegotiated.

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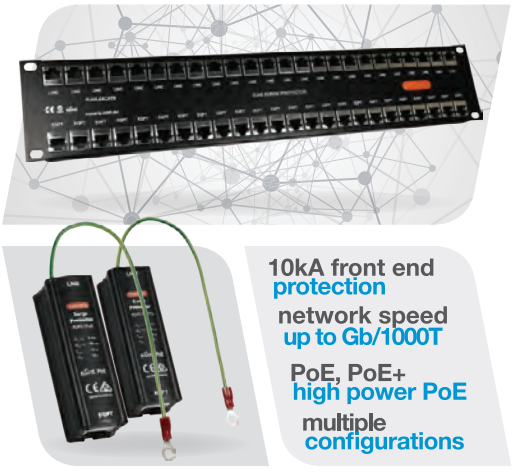

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TAKE SOME TIME TO REVIEW ANY AND ALL GUARANTEES YOUR COMPANY MAY HAVE GRANTED AND IF NECESSARY TAKE STEPS TO RELEASE ANY GUARANTEE THAT MAY NO LONGER BE APPLICABLE.

It is also important to make sure you are complying with all of your obligations under your finance facilities, particularly in relation to any security you may have offered to secure loans.

Finance facilities often include guarantees for the payment of debts; however, guarantees often do not automatically terminate when the agreement they relate to terminates. They often need to be separately released. Take some time to review any and all guarantees your company may have granted and if necessary take steps to release any guarantee that may no longer be applicable.

Contracts

Standard form contracts are a valuable resource used by almost all companies, particularly in the form of standard supply agreements or terms and conditions.

It is important to remember that changes to legislation can result in clauses, or even entire contracts, to be deemed unenforceable or illegal. A good example of this is the recent changes to Australia's consumer law, which make it unlawful to impose unfair contract terms. Being aware of what constitutes an unfair contract term is particularly important if you use standard term contracts which provide little or no occasion to negotiate. Take some time to review your standard contracts. It is not only a good opportunity to make sure they are legally compliant, but to also consider whether they still reflect your current business practices.

Insurance

Even if you currently use a broker, an annual insurance health check is essential.

Have your assets increased? Is your insured value enough?

Are you aware of any circumstances of which you need to notify your insurance company?

Most insurance policies and even certain laws mandate a time limit within which you are required to report an insurable event. If the time limits are not complied with your insurer may be absolved from its liability under the policy, leaving your company uninsured.

Employees

Your employees should be reviewed at least monthly, but they belong on this list because they are one of the most important elements of every business and because they bring with them a host of legal obligations.

Some legislation, such as Occupational Health and Safety Laws, imposes not only significant financial penalties, but also personal criminal liability. Take some time to consider whether your Occupational Health and Safety Policy is both sufficient and effective. Review any training programs, particularly if you have apprentices, and make sure both you and your staff have all necessary licences or trade certificates.

Legal compliance doesn't have to be complicated.

Spending a little time this month reviewing your contracts and refreshing your policies will allow you to focus on growth in 2016.

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**Sarah Bartholomeusz is a CEO, senior lawyer and an author. Sarah founded You Legal, a new category of law firm providing top-tier corporate and commercial legal services and resourcing to growing companies. She has over 12 years' experience as a lawyer. Sarah's first book, 'How to Avoid a Fall from Grace: Legal Lessons for Directors', was published in 2015 and ranked as a #1 bestseller on Amazon.*

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9 STEPS TO HOME AUTOMATION SUCCESS

David Gardner, Vice President

It's common knowledge that the rise in the adoption of automation technologies presents significant opportunities for the electrical industry. What is discussed less often, however, is the role electricians, electrical contractors and integrators play in guiding and educating consumers about their options.

Image supplied by Schneider Electric

Over the last decade, smart home technology has begun to gain speed with home owners, but there are still many misconceptions about what a smart home is and what the challenges of its implementation can be.

Contractors and integrators can take advantage of this knowledge gap and guide clients through the decision-making and installation process of smart home technology — and get a bigger chunk of work in the process. The good news is, you don't have to be an expert to help a home owner find the right home automation solution and, in fact, if you've installed a dimmer or ceiling fan with a remote control, garage door or motion sensor light you're already halfway there. Home automation manufacturers also provide training if you're interested, which means that as the industry becomes more competitive you can offer a superior service by staying up to date with the latest trends.

If you're looking to break into the home automation market, gain more work from your customers and pick up bigger budgets, here are nine simple stages of consultancy that you can use to guide the selection and installation process of a smart home.

Start the conversation

There are a number of ways to bring up a conversation with your customers about home automation solutions. Firstly, make sure you iron out the reasons for the installation of smart technology before you start talking products. Is it to make their lives more convenient? Increase property value? Or to make their home more suited to entertaining, raising a family or retiring? Some products and solutions will make marked difference to the value of a home like automated lighting, while other solutions like thermostat control are more of a lifestyle choice. Once you have an understanding of what your customer is looking for, you are free to present a variety of different options and upsell where possible.

Debunk myths

As an expert, you can offer technical support, which also means you can root out common myths that stop consumers from purchasing smart solutions. Home owners often think the barriers to automation are too high and automation technology is reserved for those with too much time on their hands or for new builds with a big price tag. We know this isn't always the case and by explaining they can start small and end big, contractors can get people across the line and showcase a manageable budget and investment.

New build vs retrofit

It's important to familiarise yourself with differences in home automation systems in a new build vs a retrofitted home. If a customer isn't sure if they want to go all in, they're likely to ask which products can and can't be retrofitted later. By knowing the benefits of installation during a new build, you're more likely to encourage them towards a big purchase. You can also use your knowledge to flag that technology like multiroom distributed audio involves routing cables through walls and ceilings, which can be a major inconvenience to do in hindsight. They also may not have considered the improved reliability of a wired system in a new build. But, remember not to push them if they're not sold on automation and let them know retrofitting is still a feasible option. Your reputation should be kept intact by letting them know there are many solutions designed to work around build constraints.

Develop a scope

Success requires adequate planning across budget, functionality, aesthetics, scalability and efficiency. Time is often a client's poorest resource, but as a professional, you'll be able to assist busy customers with your knowledge of how products will suit their specifications. By mocking up a choice of different electrical designs within different budgets, you can move home automation from the 'too-hard basket' to a fun and exciting experience.

Conduct a design audit

After the scope of work has been defined, it's important to undertake an audit of electrical infrastructure, including power points, electrical appliances, communication wiring, zoning and cabling. Having awareness of all the electrical products in the house avoids mistakes when it comes to implementation, and also allows you to take the time to think critically about how you can upsell and add value to your customer's home. It also allows you to consider the home as an entire 'ecosystem' so upgrading the technology, or adding to it later, is easier.

A design audit is also the ideal time to ask your customer about their wireless connection to ensure they've considered how all their products will run and fit together. Good Wi-Fi is the heart of any smart home and even the best technology can't work without a strong network. Recommend structured cabling as it's often the best option and leads to increased customer satisfaction in the long term.

Infrastructure installation

Thanks to the time you spent developing a design audit, the installation of infrastructure should be a straightforward process. Make sure your client isn't kept in the dark about what product does what. Over communicating with them throughout the infrastructure development will help keep things clear and ensure expectations are met. The infrastructure installation process is also the ideal time to project manage. Are you the system integrator? If so, help the designers, builders and contractors understand the exact requirements of the infrastructure and systems to be installed. Are you the electrical contractor? Manage up and open a dialogue about the best placement of products to ensure the home automation systems are implemented to the highest standard.

Product selection and installation

Often a new exciting product is the deciding factor that prompts home owners to seek home automation solutions; however, it's part of your job to advise your client to keep an open mind about which product and solutions they select. Especially when it comes to DIY products which can be limited in what they can achieve and offer the customer in terms of benefits, as well as being unreliable. Remind your customers once cabling is installed they are able to take advantage of more advanced technology such as electronic locks and security systems. This is also a good opportunity to upsell to bigger and better solutions that will create value for you and your customer.

Once products have been chosen, purchased and installed, it's time to make sure your client feels equipped to use them to their full capability.

THE MOST PROFITABLE BUSINESSES ARE THE ONES WITH A HIGH LEVEL OF REFERRALS AND THE BEST REFERENCE IS WORD OF MOUTH.

Handover

It's crucial to make sure home owners get the most from their home automation system. The most profitable businesses are the ones with a high level of referrals and the best reference is word of mouth. However, if clients can't successfully use their solutions it's unlikely they'll recommend your services to others. In addition to leaving product and user manuals for your customer to reference after you leave, spend some time teaching your client how to use their new system — and don't just explain it to them, ask them to show you how it's done to check their understanding. This is particularly important for new builds as clients might end up using the home differently to how they intended and you might need to tweak the solution. Not only will they appreciate the extra effort but it will save you time in the long run by eliminating future calls.

Maintenance and support

If something does go wrong with the automated system, you'll be the first port of call. Have some simple troubleshooting questions on hand so you can get to the crux of the issue quickly. Anticipate product and system updates and stay abreast of the latest offerings so when the question is asked you're in the best position to give a timely answer. Some systems can include a way of communicating to the customer, for instance, Push has a "contact us" section with details — also good if the home has been sold and the new customers don't understand the system! Maintaining an ongoing, customer-first relationship with anyone you have worked with will ensure you win extra work when they need it and are recommended to any of their networks too.

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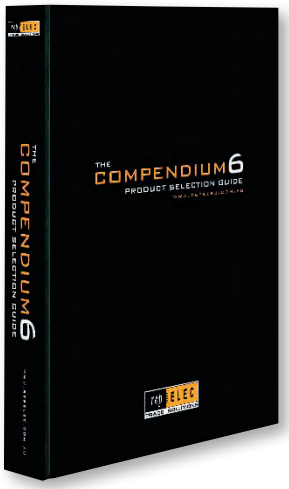
www.fluke.com.au

Product selection catalogue



Repelec has launched The Compendium 6, the sixth edition of a comprehensive product selection guide for the electrical industry.

This release has 47 additional product pages as well as hundreds of lines from supplier partners. The catalogue has six product categories including: hardware; lighting, electrical and ventilation; cable accessories; data and communications; test and measurement; and switchgear. Since the previous edition, the catalogue has incorporated a range of LED lamps and fittings, LED torches, and a portfolio of fastening systems, smoke alarms, heating and soldering tools and security floodlights from various manufacturers. The product guide is available in electronic and hard-copy versions.

Rushmore Distributors
www.rushmore.com.au

Domestic meter boxes

The Hager Electro range of domestic meter boxes is designed to conform to relevant state regulatory requirements for Qld, NSW/ACT and Vic. The VYMBQ enclosure for Qld complies with AS/3012, suitable for use as a temporary supply, and comes with the clear service link prefitted to the panel. The VYMBQ-P is a meter-only enclosure (no DIN section).

The products are 276 mm deep (75 mm behind panel), made with galvanised-steel, powder-coated RAL, and feature strong 1.6 mm steel hinges, a flush door opening mechanism and full UV stable cable entry cover. They also contain a patented cable retainer, a door tab and gravity door catch, and a knockout for a padlock tab.

There are two enclosures available for NSW/ACT — the VYMB66-U (undrilled) and VYMB66-D (predrilled) — while the VYMBNSW is available in NSW only. The VYMB66-U and VYMB66-D enclosures are 600 x 600 mm in size, are made with galvanised steel and come with a GD10T and three padlock locking points on the door. The VYMBNSW, by comparison, is a 24-pole DIN enclosure with a black panel and consumer N and E links. It is 276 mm deep (75 mm behind panel) and contains an earth stud and a padlock kit for the door.

The VYMBV and VYMBV-P enclosures for Vic can be used as a temporary supply and comes with a meter neutral link and fuse holder prefitted to the panel. The VYMBV-P is a meter-only enclosure (no DIN section). Both have similar features to the Qld meters but also contain rear Z rails for mounting on existing market poles, a left-side consumer duct and 100 A link set with RCD links.

Hager Electro Pty Ltd
www.hagerelectro.com.au

High-precision relay test set

Available to rent from TechRentals, the OMICRON CMC 256plus High Precision Relay Test Set verifies the settings and operation of protection relay systems.

The unit's high-precision qualities make it a universal calibration tool for class 0.2 energy meters, measuring transducers, power quality measuring devices and phasor measuring units. The six current and four voltage output channels are continuously and independently adjustable in amplitude, phase and frequency.

Product features include: binary inputs and outputs; GPS option for synchronised testing; calibration level accuracy; and power system simulation.

A Panasonic Toughbook laptop is also included with this unit, preloaded with Test Universe software.

TechRentals
www.techrentals.com.au

CASE STUDY

University achieves 70% energy savings with PoE lighting system

Artist rendering of the Watt Family Innovation Center at Clemson University.

Philips has unveiled a 'first-of-its-kind, large-scale lighting installation' that uses Power over Ethernet (PoE) at a major university campus as part of Clemson University's Watt Family Innovation Center.

As a founding innovation partner of the centre, Philips implemented a PoE-based indoor lighting system combined with LED lighting to provide flexible work spaces that encourage collaboration between faculty and students, optimise space management and improve energy efficiency. This new lighting solution is expected to deliver up to 70% in energy savings compared to similar buildings using conventional lighting. The intelligent PoE system delivers energy savings by gathering historical and real-time anonymous data from each lighting fixture to determine when a room is being used. These occupancy sensors also trigger lights to turn on and off, saving additional energy.

The Philips EnvisionManager, an advanced lighting control system, enables all the lights to be controlled from a single, tailored software console. The system supports remote access and web-based control, letting occupants control their lights via any authorised computer, smartphone or tablet. This ensures the right amount of light is provided only when, where and how it is needed.

"This is the first time that a university in the US will benefit from a commercial Power over Ethernet connected lighting system which will be able to deliver more control, energy efficiency and cost savings directly to the centre. We are proud to be a founding innovation partner and help support the vision of the centre with these lighting solutions," Amy Huntington, president of Philips Lighting Americas, said.

The Watt Center also features the largest media facade installation in the United States using Philips iColor Flex LMX gen2, flexible strands of large high-intensity LED nodes with intelligent colour light. Installed outside the centre, the facade features a digital canvas and delivers messages to the campus to rally students, further enhance school spirit and provide a highly visual element that drives the innovative brand image of the university.

The installation includes more than 45,000 individually controllable light points designed for extraordinary effects and expansive installations. Without the constraints of fixture size, shape, or space, LMX gen2 is useful for a variety of applications from media facades, building facades, bridges, parks, plazas, retail and more.

"We have built a cutting-edge facility that showcases Clemson's academic enterprise in action. Philips has been an outstanding partner and their lighting solutions allow us to reach our sustainability goals while giving us the ability to better understand how the building is being used and the ability to adjust the space-flexible facility as needed," said Dr Charles Watt, Clemson alumnus and founding director of the Watt Family Innovation Center.

Philips Lighting Pty Ltd
www.philips.com

The facade of the Watt Family Innovation Center boasts the largest Philips Flex media installation in the United States.

Circuit breaker analyser system

The Megger TM1760 Circuit Breaker Analyser System, available to rent from TechRentals, offers technology that claims to achieve safe, efficient and reliable circuit breaker testing. It is suitable for timing measurements, coil current testing and dynamic resistance measurement.

This system includes a built-in PC and the patented DualGround method, which keeps testing safe and saves time by keeping the circuit breaker grounded on both sides throughout the test. Galvanically isolated inputs and outputs make it possible to perform all relevant measurements in one test, eliminating the need for new set-up and reconnections.

This unit includes three static and dynamic resistance modules with up to 220 A test current, a 3-channel dynamic capacitance module and a full set of required cables. Other features include: reliable and accurate test results in noisy high-voltage substations, high-level user interface including 8″ touch screen, and on-screen assistance with connection diagrams and test template Wizard.

TechRentals

www.techrentals.com.au

Motion detector with LED lights

The Hager motion detectors with LED floodlights or lamps come with an integrated detector that is sensitive to infrared radiation, ensuring automatic operation of lighting, day or night, from the approach of a person up to 12 m away.

Available in two models, the Floodlight with Twin comes with a 220°/360° detector and offers up to 60 W (equivalent to 300 W halogen), while the Decorative lamp comes with a 140° detector and offers up to 15 W. The LED floodlights with PIRs are suitable for commercial premises such as car parks or small warehouses. In comparison the LED lamps with PIRs deliver a decorative aesthetic solution for residential perimeters.

The products use LED energy-saving technology and can be installed to replace any existing lighting fixture. They are IP55 rated and can be adjusted with an EE806 IR remote control.

Hager Electro Pty Ltd

www.hagerelectro.com.au

SMART STREETS

Mansi Gandhi

With the convergence of lighting and the Internet of Things (IoT), today's outdoor lighting systems deliver benefits beyond illumination. They light up streets, parks and other public areas as well as provide connectivity and play a vital role in smart city initiatives.

Cities and councils around the world are replacing their legacy streetlights with LED streetlights. The upgrades help councils improve energy efficiency, safety and security, and reduce electricity consumption and maintenance costs. Intelligent streetlights can also provide several other benefits such as seamless mobile wireless 4G LTE connectivity, improved traffic monitoring and air pollution detection among others.

There are currently more than 300 million streetlights around the world, and the figure is expected to reach 350 million by 2025. LED and smart streetlights are projected to reach 84% and 37% of the total streetlight market, respectively, by 2025, according to research and consulting firm northeast group. In Australia, around 300,000 street lights have already been replaced. This amounts to around 2 million tonnes of greenhouse gas abatement.

To get some insights on the current status and future prospects of the street lighting market in Australia, *ECD* spoke to Alexi Lynch from Ironbark Sustainability, a specialist consultancy that has assisted many local governments to plan for and implement lighting changeovers for both council-owned and distributor-owned lights.

How many street lights are being replaced in Australia?

There are 2.3 million street lights in Australia, so while we've come a long way there are still over 2 million to be replaced. However, around 100 councils across Australia have now implemented energy-efficient street lighting projects so we've come an incredibly long way.

The vast majority of energy-efficient street lights changed over are in Victoria where 68 of Victoria's 79 councils have completed bulk changeover projects or will have completed them by June 2016.

NSW is also making significant progress in this area. The Western Sydney Light Years Ahead project is the new 'gold standard' for councils in NSW with an accelerated rollout of 13,000 LEDs throughout nine councils in the region already completed as the councils look at next steps.

In Queensland, Brisbane City Council has completed the biggest project for a single council by changing 25,000 lights to 42 W CFLs and they are now investigating plans to install LEDs on a large scale. Ipswitch has changed over 2000 LEDs.

In Tasmania, around 5000 lights are being changed in Hobart and Glenorchy. We could see some major changes with Tasmanian councils now able to access the Municipal Association of Victoria (MAVs) standing procurement panel of approved street lights. This will save Tassie councils hundreds of thousands of dollars and thousands of hours in internal procurement resourcing alone as they can fast-track purchasing of the LEDs themselves without having to go out to tender or quote. Essentially, this has already been done for them by the MAV and the Local Government Association of Tasmania (LGAT) on their behalf.

In South Australia, there have been no 'bulk changes' apart from the capital City of Adelaide, but councils are actively taking a more collaborative approach that has paid off elsewhere.

In Western Australia, several thousand have been replaced around Esperance and in the ACT the government is an active innovator and has been active in working with LEDs.

In a nutshell, the street lighting scene is set to change dramatically over the next five years.

How does Australia compare with other countries in terms of public lighting upgrades?

Many jurisdictions internationally are using smart controls, and some have installed controls for future use. This latter is more common where the application for smart control has not been delivered, but the technology has been enabled to allow future retrofitting. We are also seeing an increasing number of pilot projects.

Australia is different to many other countries in that the minimum lighting level for residential streets is very low, around seven times lower than the minimum level in the UK. Due to this, many different advantages of control technologies, for example dimming, available to other markets are not available in Australia.

The interest in smart controls has grown significantly in Australia in recent years. This is primarily because the industry's attention has started to move to LEDs for major roads, such as highways, freeways and arterials. There are several advantages of using smart lights on major roads, especially when it comes to controlling lighting levels. In contrast to residential streets, there is an opportunity to reduce lighting levels on major roads during off-peak periods. Additionally, major roads are often the areas where councils want to be able to increase lighting for major events or identify faults more promptly.

Your thoughts on the current state and the future of the Australian lighting industry?

It's an exciting time to be in the lighting industry with massive projects already completed and more exciting projects to come. Now that we have some real-world examples that demonstrate how large-scale LED projects can be implemented (eg, http://lightingtheregions.com.au, www.lightingthewest.com.au, http://wattsworkingbetter.com.au), we'll see more LED projects replicated throughout Australia and more states and councils wanting to jump on board. We'll see more LEDs and smart controls being used in the local market.

In regards to smart lighting and smart networks, anyone planning for a lighting replacement needs to ensure the technology is going to be compatible with a future smart network rollout (futureproofed) if not actually connected to a smart network straight away.

A number of attributes mean that street lighting is an ideal component within a smart city. Its physical location high on a pole means there is good ability for clear communication; its ubiquitous presence anywhere there are reasonable densities of people means the light can reinforce the network where the need for data is greatest; and the presence of power at the light means that connecting the smart networks communication device to electricity is easy.

The idea of smart cities and smart networks is one that is eliciting great interest from communities worldwide and while 2016 will see some great steps forward we'll also start to see the wheat being separated from the chaff. Some products and suppliers have the potential to be truly transformative and could start being piloted and even rolled out now.

However, councils, roads authorities and utilities should take any smart city sales pitch with a grain of salt because while there is some fascinating technology out there, in some jurisdictions the underlying architecture for fully integrated smart cities leaves a bit to be desired.

One project to keep an eye on in regards to smart lighting is the City of Melbourne's project to replace public lighting with more than 16,000 energy-efficient LEDs. While Melbourne will only be using proven street light technologies for this rollout, it will make provisions to allow for smart lighting attributes to be retrofitted (see www.cleanenergyfinancecorp.com.au/investments/case-studies/city-of-melbourne-sustainability-drive-focuses-on-leds,-solar.aspx).

As mentioned previously, the differences in lighting standards across the world means that you can't simply take international price or technology trends and apply them to Australia. The bigger impact has been seen through local trends and conditions and with a broader range of LEDs now being approved by utilities since late 2015 we have much greater local competition and can expect to see prices coming down.

What are some of the key challenges faced by councils when switching to LEDs?

In 2011, Ironbark Sustainability was commissioned by the Department of Climate Change and Energy Efficiency to consult with councils, distribution network services providers (DNSPs) and main road authorities around the development of a National Energy Efficient Street Lighting Strategy to drive change nationally.

As a part of the development of this strategy, Ironbark conducted a nationwide survey and collated information on challenges and

AS LEDs REQUIRE A LOT LESS MAINTENANCE COMPARED TO THE OLD INEFFICIENT TECHNOLOGY SUCH AS MERCURY VAPOURS, THERE ARE ALSO SIGNIFICANT MAINTENANCE SAVINGS TO BE MADE.

barriers to improving street lighting energy efficiency in Australia. The strong response (over 200 organisations) to the survey is consistent with the complex nature of the issue of energy efficiency in street lighting. The main barriers identified by councils were costs (most commonly capital cost); expertise and time to deal with the complexity of street lighting; and working with external stakeholders.

The capital cost barrier

The cost of undertaking a street lighting bulk changeover can run into the millions of dollars. However, over the last few years dozens of councils were successful in receiving funding through the federal government's competitive Community Energy Efficiency Program (CEEP), which matched council contributions. On top of this, there is further funding available in NSW through the Energy Savings Scheme (ESC) and financing options through the Clean Energy Finance Corporation. We've also seen costs come down dramatically through bulk procurement of materials and through more contestability in some jurisdictions.

The expertise barrier

As more projects are implemented, there is more knowledge on efficient lighting. Local councils and government associations around Australia now have staff whose only function is to deploy energy-efficient street lighting. Ironbark now has 15 staff members working on street lighting. With tens of thousands of lights already upgraded across different jurisdictions in Australia, the stakeholders are now more aware than before of the technology.

The relationships barrier

Collaboration works. Arguing doesn't. Every successful street lighting project in Australia has been the result of cooperative dialogue and relationship between councils, DNSPs and other key stakeholders. This is not to say there are no disagreements along the way but councils and DNSPs have put aside their differences and worked together to achieve a common goal. And councils and DNSPs have both benefited. In jurisdictions where key stakeholders are still fighting the only people who benefit are lawyers and consultants.

However, the traditional challenges faced by councils have been overcome in many jurisdictions. The local government sector has seen energy-efficient street lighting projects approved and implemented over the last few years.

How much can councils save through public lighting upgrades?

This totally depends on the council, the number of lights, the technology and the location (especially state and distribution business). Considering the vast majority of residential lights are 80 W MVs (which have a total wattage of ~96 W) and the approved replacements are 18 W (total wattage of ~22 W), pure energy savings are up to 77%. The lights don't have meters so the energy use is modelled, which essentially guarantees the savings — if you replace an 80 W with an 18 W you will definitely see the 77% electricity saving. As LEDs require a lot less maintenance compared to the old inefficient technology such as mercury vapours, there are also significant maintenance savings to be made.

What's your growth strategy?

Street lighting now is really about scale up and roll out. Initially, this means making sure the relationships are working effectively — that councils and electricity distribution businesses are collaborating effectively and that councils are the drivers of the programs. We're only interested in working on projects that offer benefits to councils. We were born out of the desire of councils wanting assistance to save money and energy, so this is where we'll stay.

We're keen on using the learnings from the successful projects we've been involved in and replicating successful residential LED street lighting projects in areas where there has been a lack of progress — especially in Western Australia, South Australia, Tasmania and Queensland. The opportunities for councils in these states to cut their energy bills is too good to miss. The 80 W mercury vapour street lights that are in use in areas where upgrades are yet to be implemented cost 437% more in electricity compared to LEDs. Even when you take into account the capital cost of the materials (new lights), installation costs, project management and other costs (such as residual value of old lights), these projects demonstrate high returns on investment and can pay themselves back in as little as five years. There's no excuse any more to be paying 437% of the electricity costs than neighbouring councils with LEDs are paying — it's time to move.

We're also keen on looking at the opportunities that emerging technology can bring to councils and their communities. Ironbark has obtained National Association of Testing Authorities (NATA) accreditation as an inspection body for street light luminaires, which means we can independently assess the latest street lighting technology and provide third-party advice. The advancement of smart technology and the convergence of wireless technology and internet-enabled devices will see massive changes to our cities into the future but the $64m question is around timeframes. We're already seeing 'local intelligence' programmed into individual LED controllers that are set to fixed and reconfigurable settings such as dimming or turning off at set times. Or a street lighting management system could be embedded within 'smart city' infrastructure where the LED modifies its standard lighting operation in response to an external sensor or control signal such as a detection of increased traffic or the presence of pedestrians. This is an area that we all need to know more about and is of great interest in the coming wave of replacements.

However, as mentioned previously, we're also aware that the architecture for fully integrated smart cities is not quite ready. Because of this gap, we are keen to continue working with councils to futureproof new lighting infrastructure so they can be ready for the smart cities of the future — and over the next decade we're keen on helping them make this a reality.

Wiring tool

The R&M VS Compact Wiring Tool features an extended reach and is suitable for use in FTTN installations. The 'extended' comfort tool is designed to simplify termination of wires on all VS Compact modules.

The longer shaft and hook allows for the technician to terminate and to remove jumpers while allowing for the splitter or the protective elements to remain in place. It has a metal tip and solid handle to ease operation and repetitive punching, as well as extra length to reach further into more tight spaces.

The tool is recommended for wire diameters of 0.8 mm. It also does not cause network disruption as technicians can work on the pairs while splitters are connected.

Warren & Brown Technologies

www.warrenandbrown.com.au

Digital micro-ohmmeter

Available to rent from TechRentals, the Megger DLRO200 is a digital low-resistance ohmmeter that measures resistances between 0.1 $\mu\Omega$ and 1 Ω at high currents. It is used to test circuit breaker and switch contacts, busbar joints and other applications where high current is needed.

The device can operate in three modes: in continuous mode it will monitor a resistance over a period of time; in normal mode it will test a current at the push of a button; and in auto mode, once the desired current is selected and leads are connected, it will start testing, suitable for testing busbar joints.

The product provides test currents from 10 A to 200 A DC and includes a 5 m lead set with 2 x 50 mm^2 current leads and 2 x potential leads (with clips). It also comes with onboard memory for up to 300 test results and notes, and an RS232 port to download stored results or for real-time output to a printer.

TechRentals

www.techrentals.com.au

Cable identifier kit

The Megger Cable Identifier (CI) Kit, available to rent from TechRentals, is designed for the clear identification of electric cables prior to cutting, mounting or fitting.

The lightweight unit comes with single- and three-phase operation, providing reliable cable identification for both energised and non-energised cables. It can generate pulses on 415 V three-phase cables and active impulses of up to 100 A. The kit also makes the process of cable identification safer by eliminating incorrect selections that can be potentially fatal for the operator.

When operating, a flex clamp is used to measure the selection signals. The processor of the unit evaluates the impulse shape, amplitude, as well as frequency before producing an absolute and reliable statement.

The product comes with two 1.5 V AA batteries with an operating time of 50 h.

TechRentals
www.techrentals.com.au

Sustainable 1 kV electrical cable

Prysmian has expanded its Afumex Green line of cables with the Afumex Green 1 kV cable, suitable for powering machinery, equipment and lighting in commercial and residential buildings.

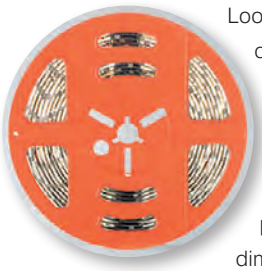
The safe and sustainable cable is designed to replace the traditional petroleum-derived polyethylene used for insulation with biopolyethylene (green polyethylene or green PE). This material is visually and functionally identical to ordinary plastic, but is developed from sugarcane, and is 100% renewable, has international certification and also reduces CO_2 emissions.

The product features an overall jacket (cover), ensuring there is additional mechanical protection for various installations, such as directly buried, in open trays, in dry-wall constructions, as well as traditional conduits. It is also flexible with a double layer, is resistant to temperatures up to 90°C, does not contain lead or other heavy metals and has metre-by-metre marking.

The product does not propagate flames in the event of fire, has very low smoke emissions and has zero toxic gases. It is also certified to NBR5410 and NBR13570 standards for electrical installations in areas with high concentrations of people and in confined environments.

Prysmian Cables & Systems Australia Pty Ltd
www.prysmian.com.au

Dimmable LED strip light



Loomi has released the continuous Loomi Dimmable Strip Light, a deep-dimming LED strip light that uses Tru-Colour technology which incorporates more colours on the visible spectrum.

The product can be cut to size or extended as needed, and features smooth dimming capabilities (flicker-free down to 5%) as well as a 9.5 W/m operating power. It also comes with 3000 K warm white colour temperature and 840 lm/m, including three different driver options for good dimming capabilities from 1–15 m.

The strip light is designed with a flexible form and a sealed silicone casing that makes the product water resistant and simple to clean. It comes with a 30,000 h lifetime and a 3-year warranty.

Brightgreen Pty Ltd
www.brightgreen.com

Pole street lighting system

CITY ELEMENTS by Hess is a versatile pole lighting system for urban environments, suitable for integration with both modern and older architectural settings.

The modular lighting system comprises tubular elements in two diameters, which can be configured for various public space design applications from area and street lighting to accent or security lighting. The slimmer variants are 180 mm in diameter and can be used for local streets, while the thicker variants at 230 mm with heights up to 9 m are designed with plazas and pedestrian zones in mind.

The lighting system accommodates CCTV security cameras, ensuring safety in public spaces, as well as speaker or Wi-Fi systems. Constructed from aluminium tubing and PMMA, the top element features double lighting units that are configurable with rotationally symmetric or asymmetric area or street optics. The element height is 900 mm and has space for two 70 W lamps.

All of the top and intermediate elements turn with the assistance of an inner mechanism through 360° on their vertical axes to provide the required adjustment. Optional spread lenses, shielding or colour filters may be added, while the base elements may also serve as power or water sub-distribution. The lights can also be ordered fully assembled (up to three segments) to speed up installation.

Form and Light Pty Ltd
www.formandlight.com.au

Lighting control systems

Clipsal by Schneider Electric has introduced its DALIcontrol Solution range, allowing electrical contractors to pull together simple lighting control systems using out-of-the-box, pre-programmed elements.

The range comes in Native, Simple or Advanced Solutions offering multiway switching and dimming, occupancy detection and light level detection. The Native Solution can be easily installed and scaled for use in a single room or entire building.

The Simple Solution offers more advanced lighting control and, when combined with the Native range and other DALIcontrol system products, it can be used to achieve distinctive assignment of individual switches or sensors. By comparison, the Advanced Solution is an extension of the previous offerings and involves integrating other building systems to create an intelligent building-wide control architecture that delivers good functionality for facility managers. The key to all three offers is the DALIcontrol 30 Series Mech range, which includes the 30 Series Master Switch; the Occupancy Detector that uses passive infrared (PIR) technology to detect occupancy within a 5 m range directly in front of the sensor lens; the Light Level Detector that measures the ambient light level directly in front of the sensor lens; Ceiling Mounts which can be used in ceiling tiles or panels and have optional conduit knockouts; and a Slave Input device, which is matched to the 30 Mech Master Input device to provide additional control of the lighting load, such as two-way switching, variable dimming, toggle on/off, dimming level, nudge up/down and delay timing.

Schneider Electric Clipsal Partner

www.clipsal.com

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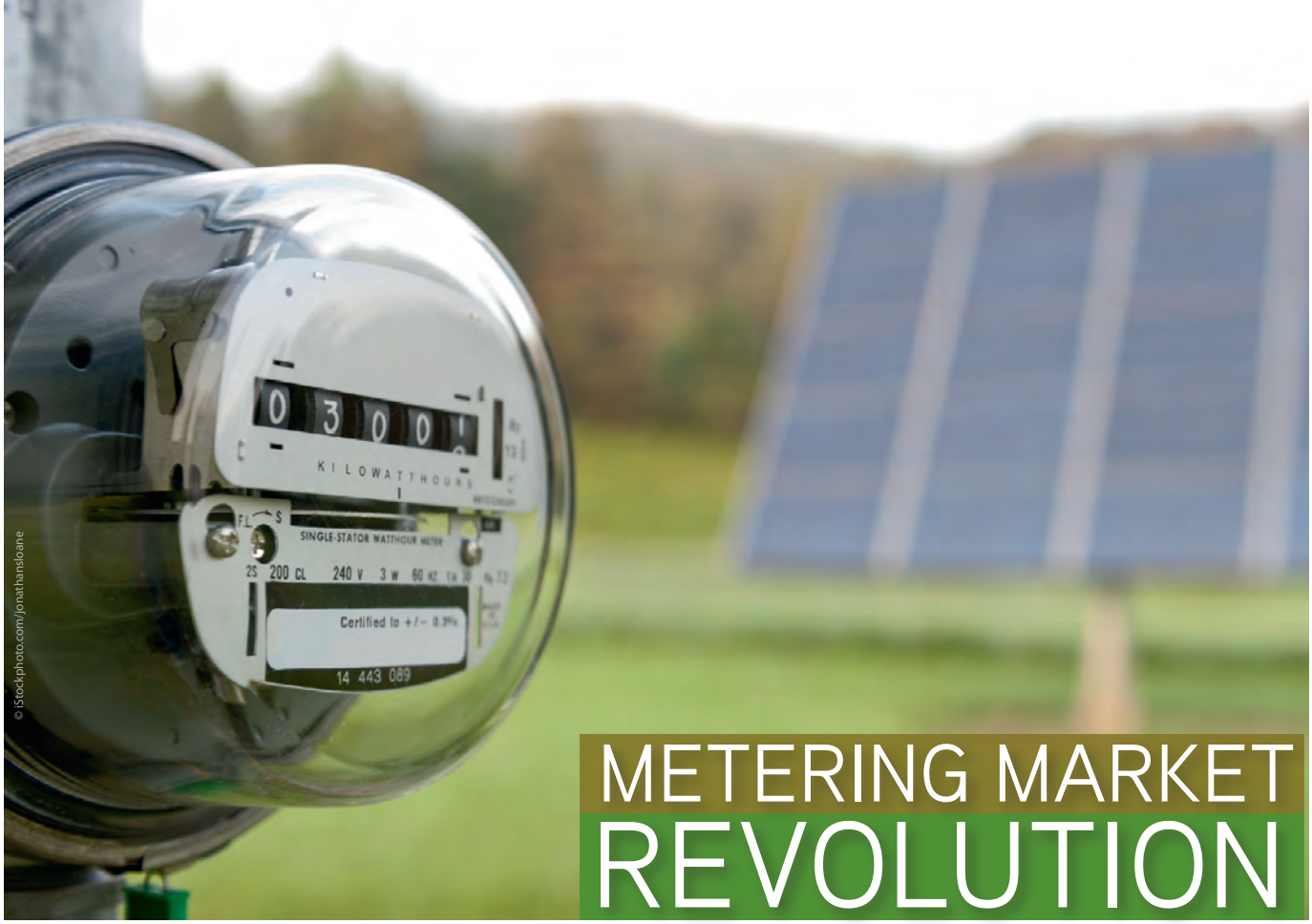


METERING MARKET REVOLUTION

Interview with Chris Boek, Chief Technology Officer, Metropolis Metering Services.

Q In the past, metering services, including the rollout process, customer relationship management and meter asset management, have been managed by distributors in competition with outsourced metering service specialists such as Metropolis. The AEMC's rule change is designed to open up the metering market to new players to bring more competition to this space. It has said the rules will probably be implemented in mid-2017. Do you think the rules will work to achieve their objective?

We are already seeing electricity retailers develop new energy services and product offerings. The first tentative steps toward retailer-led smart meter deployments have been taken. And new metering service providers have entered the market.

The AEMC rule change process has created competitive certainty. The market is no longer concerned about mandates and monopolies. Part 8A of the Nationally Electricity Law has been repealed and we are able to focus on developing the market with confidence. We'd have to say that the AEMC has already achieved its objective.

Q. A few of the distributors in Victoria are about to set up dedicated metering service companies. Both AGL and Origin also have dedicated metering service companies. Do you think the metering service industry is well suited to these players?

The metering services industry is suited to any company that has a capability to deliver cost-effective and innovative metering and data management services. We are pleased to see the market open to competition among different services providers.

Q. Tell us a bit about your business?

Metropolis was accredited in 2006 as the first independent metering services provider operating in the National Electricity Market. Our focus has always been on meeting the needs of electricity retailers.

We own and operate a meter network that covers over three million square kilometres from far north Queensland to southern Tasmania, and from Ceduna in South Australia across to Mallacoota in Victoria, with 80% of our installed meter base servicing mass market customers. Metropolis is noted for having been the first metering services company to deploy residential smart meters in each state.

Q. A number of utilities are now outsourcing their metering services, which has created opportunities for companies like Metropolis. If retailers take on the metering coordinator role, presumably they would also outsource the servicing. What can they expect from the outsourcing deal?

Retailers have different perspectives on how to fulfil the metering coordinator role and each will, over the course of the next few years, determine what model best suits them. Outsourcing and insourcing are both reasonable options.

But regardless of which option they choose, retailers will always own the customer relationship and have the final say on what is and isn't appropriate for their business. An outsourced metering coordinator will always work in strong partnership with the retailer to achieve the retailer's objectives.

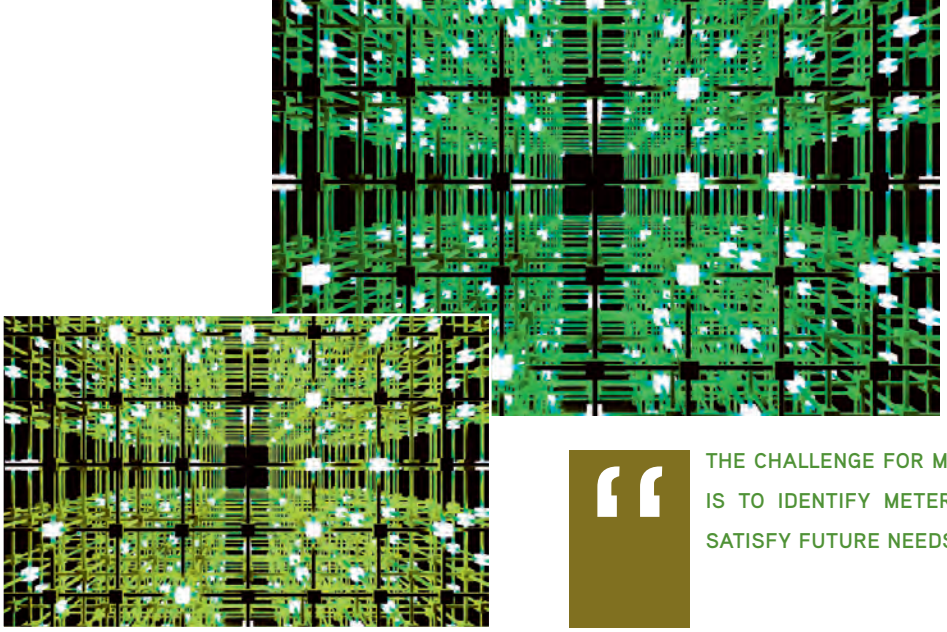
Q. Can you see entirely new players, such as telcos, entering the outsourcing market, assuming they were properly certified?

Any player that feels they have something to contribute is, and should be, free to enter the metering services market. It is ultimately up to the user of those services which provider or providers they choose to utilise and if more choice is available that can only lead to better market outcomes.

Q. What sort of feedback do customers give you regarding the meters? What are your views on the quality and functionality of smart meters being used around Australia? Have you noticed that metering managers are seeking new ways to differentiate their metering product and services from their competitors?

Customers don't care about meters. The best case outcome is that customers are completely unaware of the metering technology but totally engaged with the energy products and services enabled by them.

Metering asset managers understand that the available metering determines the range of energy products and services available. Basic metering means basic and indistinguishable energy products and services. Smart metering means smart and diversified energy



> THE CHALLENGE FOR METERING ASSET MANAGERS IS TO IDENTIFY METERING PRODUCTS THAT WILL SATISFY FUTURE NEEDS.

products and services. We expect that retailers will increasingly demand product and service differentiation as the market moves away from basic metering.

The challenge for metering asset managers is to identify metering products that will satisfy future needs. Buying meters is much more than a purchasing decision. It's a long-term investment decision. The quality and functionality of the smart meters must be of the highest standard. But even more than that, meter suppliers must be prepared to work collaboratively with metering services providers, over the long term, to secure that investment.

Q. Do you have any input into AMI-related customer portals? I hear that they are generally not being used by customers.

Our experience is that customers do not engage with consumption data alone. Information needs to be easily digestible and action oriented. Tools, such as portals, need to analyse information for energy consumers and present the results, suggesting options on which they can act to achieve a desired outcome, such as lower prices.

Q. If you had three bits of advice for utilities that are preparing for a large-scale AMI rollout who want to avoid an expensive infrastructure rollout disaster, what would be top of mind?

The next few years are a period of discovery for electricity retailers as they learn to adapt to new ways of doing business. Firstly, we advise not to think in terms of large-scale rollouts, but to consider strategic deployments where it makes sense to provide selected customers with smart meters, either because it benefits the customer or the retail business, or both. Retailers will gain more knowledge and experience from well-considered, smaller, demographic deployments than from rolling out large numbers geographically.

Second, remember that customers with smart meters are immediately mobile. They can switch retailers within weeks if dissatisfied. Deploy smart meters to the right customers but in the wrong way and you will quickly lose them to your competitors. Customer engagement is essential.

Third, the metering services providers of tomorrow are being selected by your competitors today. As customers are acquired they will increasingly have smart meters serviced by different providers. Retailers must consider how new energy products and services will be consistently delivered in this environment to ensure customer satisfaction.

Clarion Events Pte Ltd
www.clarionevents.asia

EPR safety mat

The Lightning Protection International EPR Safety Mat is designed to keep workers safe against electrical discharge events, a significant hazard to personnel and equipment from earth potential rise (EPR). EPR can be caused by faults in electrical substation, power plants, high-voltage transmission lines or lightning strikes.

The mat has a three-layer design to mitigate Step and Touch volt hazards, which each have different roles. The central electrically conductive layer equalises the electrical potential across the mat, while the upper layer insulates. The lower layer is an electrically conductive elastomer that protects the central layer while providing electrical continuity to it.

The product's layers are flexible to enable the mat to be rolled out where electrical repair work is to be carried out, and can also be joined electrically to create longer versions as required.

JT Day Pty Ltd
www.jtday.com.au

Protective clothing

ELEVEN Workwear has launched its Stove Pipe Pants range, including the Combat Cargo and Super Easy Stove Pipe Pants, designed to offer tradesmen modern styling with workwear fabrics and functionality.

Both styles are slim fit with a built-in stretch fabric (polyester/cotton fabric with stretch 63/34/3–290 gms) that is prewashed for comfort. They feature contoured legs; a lower waist with internal draw cord; multifunction pockets, including a deep pocket for a mobile phone and internal zip pocket for wallet; and a triple-stitched crotch gusset. The pants also have reinforced slanted back hip pockets, strong belt loops and double-layer knees.

The Combat Cargo is available in khaki, navy and charcoal while the Super Easy Stove Pipe Pant is available in black. Both garment styles are rated 50+ UPF and AS/NZS 4399:1999 for sun protection and AS/NZS 1020:1995 for static control.

RSEA
www.rsea.com.au

The Future of Energy Management Building Blocks has arrived.

BFM II

SATEC's next generation of Branch Feeder Monitor, "BFM II" provides a modular design approach. The BFM II provides energy, demand, data logging, tariff metering for up to 54 circuits along with 72 pulse inputs for water and gas. This makes the BFM II perfect for residential, commercial and industrial projects.

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ENERGY STORAGE CONFERENCE

Event details
What: Australian Energy Storage Conference and Exhibition
When: 1–2 June 2016
Where: Australian Technology Park, Sydney
Register: www.australianenergystorage.com.au

The 2016 Australian Energy Storage Conference and Exhibition, taking place in Sydney on 1–2 June, will offer two days of innovative and intelligent energy solutions for the changing energy storage landscape, including an impressive line-up of around 40 international and local speakers.

The first international speakers to be announced for the event include John Jung, president and CEO of energy management company Greensmith, who will present on 'Grid-Scale Energy Storage & Grid 2.0', and Catherine Von Burg, president and CEO of SimpliPhi Power, a global distributor of clean energy storage and management systems. She will present on 'Micro Grid Deployment — Maui Brewing Company: Safety, Accessibility & Power Security in the Age of Climate Change, Cyber Attack & Political Uncertainty'.

During his presentation, Jung will discuss a Greensmith case study of a 1 MW, behind-the-meter, solar-integrated storage system on the island of Puerto Rico. Von Burg will look at a SimpliPhi Power Maui Brewing company microgrid installation and how the microgrid concept is able to address the integration of geographically dispersed energy resources, for both the local community and/or the utility. With the theme of 'Thinking Smart about Energy Storage', the event's multistream conference will offer other case studies of innovative energy storage solutions on buildings, in homes and in communities, as well as large energy storage sites to manage demand at the fringe of the grid.

A full day will be dedicated to utility-level solutions, both local and international, showcasing the move to Grid 2.0 and beyond, while day two will lead with a session on how intelligent energy storage systems define the future.

A key session will also be held on transforming the business models of the major energy companies to take advantage of storage technology.

SOLAR 2016

Event details
What: Solar 2016
When: 4–5 May 2016
Where: Melbourne Convention and Exhibition Centre
Register: www.solarexpo.com.au

The energy industry is undergoing a massive transformation, creating significant opportunities for the electrical industry.

If you want to learn more about how the ongoing transformation affects your business and the industry, then The Australian Solar Council's 54th annual event Solar 2016 Exhibition & Conference is the event for you.

Solar 2016, to be held on Wednesday 4–5 May 2016 at the Melbourne Convention and Exhibition Centre, will feature top industry experts who will provide insights on: the energy market in transition; solar and storage business model innovation; energy innovation and the new economy; why utilities should love solar; the grid of the future; internet of energy; and cracking the code on commercial solar. "We are on the crest of an unstoppable wave… a technological wave that will link renewable energy, batteries and smart energy systems. For the first time, consumers rather than power companies will be at the heart of the energy system," said Solar Council Chief Executive John Grimes. The conference will include three free industry streams: Energy Storage; Market and Technology and Professional Development. Speakers include: John Hewson, Martin Green, Ric Brazzale, Tim Buckley, Simon Corbell, Oliver Yates, Christine Milne and Finn Peacock. Complementing the high-level conference streams will be a show floor packed with industry exhibitors whose displays will feature the latest solar and energy storage products and services from Australia and overseas.

The expo and the conference will feature delegates from Australia, China, Japan, India, the US and Europe. It provides industry professionals an opportunity for valuable face time with key players, distributors and manufacturers in the solar and energy storage sectors.

Solar 2016 is a must-attend event for battery and panel manufacturers, inverter innovators, commercial and residential PV installers, large-scale developers, technicians, trainers, trading certificate agencies, policymakers, bureaucrats, builders, architects, consultants and academics.

Variable speed drive

The NHP MODdrive HVAC ECO is a variable speed drive (VSD) for HVAC applications, suitable for designers looking to optimise the performance of fans and pumps and therefore enable operational efficiency in modern buildings under any condition.

Available in IP66 up to 11 kW and IP55 up to 45 kW, the product is a 'low harmonics' VSD that uses technology to reduce total harmonic distortion of the incoming mains power supply typically created by nonlinear loads when using standard VSDs. It also incorporates a film capacitor design which offers increased efficiency and longer shelf life compared with standard variable speed drives.

With a large OLED display, which allows a fuller viewing angle, high contrast, quick navigation, as well as faster set-up, the product also includes fire mode operation, useful in smoke extraction systems and stairwell pressurisation applications.

The device also comes with in-built BACnet MS/TP and Modbus RTU, enabling it to easily be integrated into HVAC building management systems.

NHP Electrical Engineering Products Pty Ltd
www.nhp.com.au

24-port enclosure

Siemon has launched a 24-Port MAX Zone Unit Enclosure designed to support zone cabling in a variety of enterprise workspaces by enabling shorter, easy-to-manage connections to work area or equipment outlets.

The product accepts up to 24 ports using Siemon copper or fibre MAX outlets, Z-MAX Category 6A outlets or TERA Category 7A outlets to support a range of horizontal copper and fibre applications. Featuring foam gasketing to minimise vibration and prevent dust ingress, the product also includes knockouts to facilitate routing cables in and out of the enclosure.

Designed to meet UL's plenum rating requirements, the enclosure can be easily mounted under a raised floor, in the ceiling or on the wall. The cover is removable for improved access to connections, while integrated labelling facilitates port identification.

Siemon Australia
www.siemon.com.au

LED safety light

Narva has launched the Blue Spot LED Safety Light, designed to warn pedestrians and drivers of an approaching forklift truck in busy industrial environments where alarms can get lost amongst the noise.

The safety light produces a concentrated 'blue spot' beam approximately 500 mm wide projected up to 5 m onto the floor ahead, warning others of the intended driving path. It is particularly valuable to anyone crossing from a blind angle ie, in between racking in front of an oncoming vehicle.

The 9-110 V light features two XP-E 3 W LEDs and has a low current draw (0.4 A at 12 V and 0.2 A at 24 V) with a long service life. The product can be mounted to the forklift's protective roof frame, as well as other similar equipment used in materials handling applications.

Stainless steel mounting hardware is also included as standard, while the product comes with a 5-year LED Narva warranty.

Brown & Watson International
www.narva.com.au

LED overvoltage protection

The Optotronic 4DIMLT2 product family of LED drivers from Osram offers overvoltage protection for street and urban lighting, industry or other outdoor applications in luminaires with IP>54. There are four different types with varying output power classes including 40, 60, 90 and 165 W. The range provides high surge protection with up to 10 kV (1 pulse)/8 kV, in protection class I or II, and provides protection through double isolation between mains input and LED output. Four integrated dimming functions (4DIM) are also offered in one device (StepDIM, AstroDIM, MainsDIM, DALI).

The LED drivers have low luminous efficacy tolerance through low output current tolerance of ±3% and a current output range of up to 1050 mA. They have good flexibility due to a wide operating temperature range of -40 up to 60°C with overtemperature protection via external NTC.

The devices also allow energy saving in twilight phases, have constant lumen function and have a standby power consumption of <0.5 W.

Osram Australia Pty Ltd

www.osram.com.au

Cat6 and PoE RJ45 surge protection range

Control Logic now stocks Novaris's network protection products specifically designed for the protection of twisted pair Ethernet systems, with a combination of rugged and fine grain protection elements.

Common mode surges are dissipated easily with the range employing a 10 kA gas discharge tube per signal pair, and featuring low impedance secondary protection while retaining network speeds up to Gigabit/1000T.

Suitable for PoE, PoE+, high power PoE and beyond, the Novaris PoE protection devices have been designed to handle up to 1000 mA of current per signal pair at up to 80 VDC. This combination allows for Gigabit PoE systems with 4 pair power up to 160 W.

UTP and STP cabling compatible, the range has been designed with shield pass through connectors and metal bodies to allow for uninterrupted shielded network spans. With multiple configuration options, the RJ45 range is available as singular units, as well as 8-, 16- and 24-way 2RU rackmount configurations.

Control Logic Pty Ltd

www.control-logic.com.au

Circular hybrid connector

TE Connectivity has launched a circular hybrid connector (CHC), which combines power supply and data into a single connector allowing for increased design flexibility. It is suitable for use in controllers for hydraulic and pneumatic valves.

The CHC has eight power and four data contacts, designed for real-time machine automation applications that require a high-performance data connection and power up to 10 A. The connector claims to offer reliable connection technology to meet the demanding durability and quality requirements of real-time Ethernet applications in industrial automation. Using a retrofit platform, the product also offers optional inserts with 11 contacts plus PE (protected earth).

The connector meets the VARAN standard (Versatile Automation Random Access Network), the Industrial Ethernet-based protocol used in factory automation. Typical applications include welding, stamping, milling and injection moulding operations eg, it supports fast changeover times of moulds in moulding machines, while simplified cabling reduces installation time.

TE Connectivity

www.te.com

Indoor LED downlight

The Cree KR series LED downlights feature TrueWhite Technology, which delivers high-quality light with efficacy up to 77 lm/W. Designed for indoor applications, the series is available in a variety of colour temperatures, round and square trims with anodised aluminium reflector finishes and a sloped ceiling adapter.

4″ and 6″ models are available with Cree SmartCast Technology, a self-programming wireless lighting-control system, while the series also features Cree Sunset Dimming Technology, which provides warm light that transitions from 2700 to 1800 K as naturally as an incandescent source.

Other features include: light output of 683–8000 lm; input power 13–118 W; CCT 2700, 3000, 3500, 4000 or 5000 K; dimming triac of 0/1–10 V with Cree SmartCast Technology; and minimum CRI of 90.

Cree Inc.

www.cree.com

7 HIDDEN COSTS OF EMERGENCY LIGHTING

It's not just the upfront luminaire cost but the ongoing cost of maintenance and testing that should be considered when choosing emergency lighting solutions. Australian lighting company enlighten provides a summary of the key operating cost areas often overlooked.

1. Whole fitting replacement at point of battery failure

Industry practice has traditionally been to replace the whole emergency batten fittings when the light fails the six-monthly test. It is believed that this is a cheaper alternative than undertaking further investigations that would result in having to isolate the circuit to replace the faulty component, which is typically the battery. This often results in emergency light fittings being replaced every three to four years.

Solution: Choose an emergency light that has features such as easy removal for repair and upgrade and/or an accessible battery drawer so that battery replacement can be simply undertaken without isolating the mains power.

2. Coordination of emergency light testing

To prepare for the six-monthly emergency test, building managers and owners need to advise all building occupants of disruption to normal activities in areas where emergency lighting systems are being tested, which typically involves isolating mains power to that lighting circuit. A range of stakeholders need to be coordinated, including external contractors who typically conduct the test after hours, as well as security staff to supervise contractors who have access to tenanted areas in the building after hours.

Solution: While monitored emergency lighting systems conduct the mandated six-monthly battery discharge tests without disrupting power, this comes at a system cost premium of 30–40%. Similar self-test functionality, however, is now available in stand-alone luminaires, which conduct battery discharge while maintaining normal light operation. The test status is visible via an LED indicator. This testing takes place without disrupting the normal operation of the light, which avoids the cost of notifying occupants and coordinating contractors and other service providers.

3. Fixing faults in emergency lighting electrical circuits — a stab in the dark!

In cases of emergency lighting electrical circuit trip or failure due to thermal overload, short circuit or moisture ingress, fault-finding can be complicated, time-consuming and costly. Often it involves the removal of light fittings and examination of electrical wiring up and down the line to isolate the fault.

Solution: Emergency lights with a smart connect base that allows for simple removal of the light fitting enables lighting to be simply replaced with time-consuming fault-finding done offline.

4. Pressure to certify buildings can result in higher than normal luminaire replacement costs

Building managers and owners are required to submit emergency lighting certification to local authorities in a timely manner. This results in time constraints for six-monthly test reports to be provided and subsequent repairs to be undertaken for failed lights. Often these time constraints result in a premium being paid.

Solution: If the luminaire design allows for simple battery changeover, you can stock spare emergency battery packs and provide them to the testing contractor, reducing the pressure during this critical period.

5. Cleaning lights

Cleaning is vital to lighting efficiency. Light levels can decrease over time because of dirt on luminaries and a build-up of insects inside the light. These factors can reduce total illumination by 30% or more, potentially falling below minimum required lighting levels. Furthermore, Australian Standard AS 2293.3 requires that all emergency lights have their light-emitting surfaces cleaned annually.

Solution: Beyond a simple wipe-down, a light fitting that is easy to remove for further cleaning if required reduces ongoing cleaning and maintenance, as well as time and costs. In addition to a simple clean,

many light fixtures require holes to be drilled for cable entry points and these are often an entry point for insects. Lights that connect to a separate base do not have this problem and therefore will not need to be opened and cleaned.

6. Drop in light output quality (lumen depreciation) over time

For maintained emergency lighting systems where light output in non-emergency mode is part of the area lighting, this light output will need to meet relevant area lighting level compliance requirements. Many emergency light fixtures have either older technology fluorescent lamps, which need constant replacements, or poor quality LEDs that cause light output to depreciate quickly. Often light upgrades result in 'energy efficient' lights selected that are underpowered, resulting in lower wattage luminaire replacements with light output not sufficient to meet local building code requirements.

Impacts include a reduced amenity for the occupants and creation of a liability for the building owner. This can result in tenants leaving and insurance companies not covering claims in non-compliant areas following an accident, both of which are very expensive.

Solution: Understand the light level requirements for your building or ask someone who knows ie, your electrical contractor or lighting suppliers. You will need to demonstrate compliance to claim government rebates. Look for a luminaire with a broad range of light outputs to give you the flexibility to suit the light to match the area. Also, check the quality of the LEDs. Luminaire datasheets will list LED chip sources where there is a reputable brand used. Look for emergency luminaires that are "approved for use" by state government energy-efficiency scheme administrators as they will need to have supplied LM80 test reports to support LED performance.

7. Keeping monitored emergency lighting systems up to date

Commissioning of monitored emergency lighting systems is complex and requires specialist contractors to wire and program all light connection points into the system. When any system changes are needed, there is no simple addition or subtraction of lights. The high call-out rates for any programming or wiring changes from the contractors that work with the proprietary systems can be a source of complaints from building managers. Additions or changes to emergency lights in tenanted areas of commercial office buildings are often not incorporated into the base building's monitored emergency lighting system. This reduces the accuracy for emergency light testing status and cannot provide the building manager with 100% trust in the system reports.

Solution: Given that a visual inspection of each emergency light is required under Australian Standard 2293:3, non-monitored stand-alone emergency luminaires can now provide the functionality to display the test status via a multicoloured LED indicator. This results in the visual inspection being undertaken at the same time to determine the compliance status, eliminating the need for an expensive monitored system.

enLighten Australia Pty Ltd
www.enlighten.com.au

MASTER ELECTRICIANS AUSTRALIA

Safety is in your hands

Malcolm Richards, CEO

After losing count of the number of hoverboard (or 'segway') products to be recalled over the past two months or so due to the potential fire risks, it is becoming clear that until we experience a large loss of life, our decision-makers will not take any action to clamp down on the flood of dangerous products entering our market from overseas.

While the United Kingdom's National Trading Standards consumer watchdog actively enforced its electrical safety laws by confiscating 32,000 dangerous hoverboards (under various brands) in less than two months prior to Christmas alone, exporters of dodgy equipment have now found even more incentive to turn their attention towards Australia, as we continue to accept all manner of goods, no questions asked.

We have earned ourselves the unenviable reputation as a dumping ground — the perfect place for overseas companies that manufacture copies of legitimate brands at a greatly reduced price to offload their wares. The loopholes in our legal framework have made it all too easy for them to leave out costly, quality elements from their products, use rubbish ingredients that cost very little and to completely overlook any need for independent testing. Because they know we will take their goods regardless.

Australian businesses are forking out big dollars to make sure their products are in line with our safety standards, and yet foreign manufacturers are not subject to any of these checks and balances — which are designed to keep consumers safe. They exploit loopholes in our legislation, and are using short-term channels to offload non-compliant goods at an unprecedented rate.

With the electrical industry now awash with products like faulty laptop chargers, cabling with sheathing that breaks down prematurely, solar panels fitted with dodgy isolators and washing machines that keep spinning until they catch fire, it's abundantly clear that while our elected officials refuse to take action, it's now up to each one of us to ensure we are doing the right thing by installing only compliant products in our customers' homes and businesses.

And we are not alone. Other sectors of the construction industry are calling on their tradies to do the same, as the quantity of dangerous products installed in Australian buildings grows ever higher.

At New Year's Eve we saw images of a Dubai skyscraper engulfed in flames. It turned into a spectacular fireball as at least 20 storeys went up in no time at all. But this fire was all too similar to one at Docklands in Melbourne in late 2014. When Melbourne's Lacrosse apartment building went up in flames, the fire spread at an alarming speed — jumping 13 storeys in as few as 10 minutes. It's a miracle nobody was killed.

Initial reports suggest the Dubai building had been fitted with non-compliant, highly flammable cladding — just like the Lacrosse building. Since the Melbourne fire, authorities

have discovered that as many as 50 large buildings in Melbourne's central city could be fitted with similar cladding — putting thousands of people's lives at risk. And that's just in one area.

Melbourne's Metropolitan Fire Brigade (MFB) fire safety director Adam Dalrymple told a Senate Inquiry late last year that the use of this kind of cladding over the last decade means our cities are filled with "ticking time bombs" — an analogy I've used dozens of times when discussing the 40,000 or so km of Infinity cables installed in properties across Australia. Mr Dalrymple told the inquiry that MFB held grave concerns about the potential for a disastrous loss of life — a stance we support unequivocally.

He detailed how the Lacrosse fire had irrevocably changed firefighting methods in Australia, warning that due to the flammable cladding, anyone trapped inside a blaze might not be rescued as firefighters may have to be withdrawn for their own safety.

Coupled with the dozens of other products that have now been flagged in the construction industry, including reinforcing and structural steel, concrete, timber products, glass, plumbing products, insulation materials and coating products, we too hold grave concerns for public safety.

As we all continue our fight for swift and decisive action to stop these products at the border, by closing the loopholes in our legislation that are enabling this practice to flourish, we are calling on every contractor to do their bit to ensure the long-term safety of Australians, by always choosing safe, compliant and reputable products.

Master Electricians Australia
www.masterelectricians.com.au

CASE STUDY

Siemens' intelligent infrastructure pays off

After installing the Siemens Demand Flow energy optimisation system, Robina Hospital on the Gold Coast in Queensland is already exceeding targets and is now on track to save enough electricity in its first 12 months to run MCG light towers for a year.

The upgrade is the first Australian installation of Demand Flow, part of Siemens' intelligent infrastructure solutions, which uses variable pressure curve technology that optimises chiller plant control systems to reduce total plant energy consumption of between 20 and 50%.

The hospital has reported a 24% reduction in total consumption of the chiller plant, reducing energy consumption by 367,154 kWh, more than 65% ahead of the set target for the period (221,314 kWh).

(L-R) Gold Coast Health Maintenance Coordinator Barry Walker with Nigel Hoy and Siemens Building Engineering and Maintenance Manager Shane Berryman. Image: Siemens.

According to the hospital, the first month saw an overall 7.04% reduction in total energy consumption for the hospital.

Gold Coast Health Senior Director Operational Support Services Nigel Hoy said the health service was delighted by the initial savings delivered by Siemens.

"We were looking for ways to reduce the hospital's energy consumption and were impressed by the results Demand Flow had achieved in hospitals around the world," said Hoy.

"In addition to significant energy savings, the work Siemens carried out at Robina provided the opportunity for us to consolidate chilled water infrastructure from three separate chilled water plants into one. This has resulted in a reduction to the ongoing maintenance requirements and costs for the facility."

Siemens Executive General Manager Building Technologies Stefan Schwab said the upgrade is well on track to achieve the annual target of reducing energy usage by 792,091 kWh, and the resultant $95,051 cost saving.

"Given that we have already achieved 367,154 (46.35%) of the annual guarantee figure of 792,091 kWh in just four months, we are confident of hitting the guaranteed payback period of 3.3 years in an even shorter period," said Schwab.

"Demand Flow is one of the most innovative examples of Siemens energy optimisation I have seen. It's the latest example of how Siemens harnesses innovation to provide lowest total cost of ownership," he added.

Siemens Ltd
www.siemens.com.au

Programmable AC/DC power supply

IDRC has launched the DSP HD/HR, a 1U programmable AC/DC power supply device with LXI interface. It is suitable for ATE for QC testing, energy, R&D, satellite communication, factory automation, semiconductor manufacturing and solar applications.

The DSP HD/HR unit uses a modern digitalised design with a high resolution D/A (16 bits) setting for output voltage/current, as well a high resolution A/D (24 bits) measurement for output voltage/current. Up to 104 models with 6–600 V and 1–400 A are available for selection, including upgrade options up to five units in parallel and two units in series, meaning users can select higher voltage and current based on an application's requirements. A five-digit current and voltage meter also gives users the confidence they are tuning the correct output.

The unit can store up to 16 sets of memories, which can be recalled manually in the front panel or by external recall control. A standard GPIB and RS485 interface with optional LXI interface also allows user to configure the device remotely.

Triplepoint Calibrations Pty Ltd
www.triplepoint.com.au

Field-mountable Cat 6A connectors

R&M has expanded its range of field-mountable RJ45 connectors with the Cat 6A solution. The high-performance FM45 Cat 6A connector is used for the flexible installation of Class EA channels in accordance with the ISO/IEC 11801 standard. It meets all the requirements for demanding network operation with 10 Gb Ethernet.

The FM45 Cat 6A is not only suitable for structured LAN cabling in offices and for Power over Ethernet Plus (PoE+) use, it has many different applications. Industrial Ethernet, bus and data connections in building automation, security and communications technology and home networks are also among the FM45 connector's areas of application. Retrofitting of WLAN access points for better radio coverage both inside and outside buildings can easily be carried out using field-terminable FM45 connectors. The FM45 connectors are also used as practical supports for servicing and maintenance, temporary installations or when repairing networks.

The connectors can be mounted without the use of tools. Shielded and unshielded stranded and solid cable with diameters of up to 8 mm can be wired in just a few easy steps. Firstly, the installer inserts the copper cable's eight conductors into the wire guide in line with the coloured label and cuts off the excess length with side cutting pliers.

The tin-coated IDCs guarantee gas-tight, vibration-resistant and corrosion-protected wiring with tensile strength and long-term stability. R&M's IDCs show transmission values which are four times better than the requirements stipulated in the IEC 60352-4 standard. A further step involves the housing being pushed over the wire guide and fixed using a box nut. This completes the termination of the connector.

As an option, coloured coding elements or IP protection sleeves can be attached. The basic version complies with the requirements of the IP20 protection index and the shielded version with all requirements of the IP67 protection index.

Reichle & De-Massari Australia P/L

www.rdm.com

A MODULAR APPROACH

Gordon Makryllos, Managing Director - Australia/New Zealand

Designing and building a data centre to meet future needs can often be an expensive and wasteful exercise in over-engineering. Taking a modular approach allows for capacity to be be implemented to meet today's business demands but readily extended in the future as those demands grow.

With technology and business evolving rapidly, trying to predict an organisation's IT requirements is almost impossible and can lead to the acquisition of more equipment than is actually required. For this reason, data centre design needs to be modular.

Modular design is particularly important when it comes to data centre power infrastructure. Here, a modular approach means implementing UPSs that can scale for added capacity as well as deploying extended battery modules to support backup runtimes. The design should also incorporate plug-and-play power distribution as well as room-level wiring using row- or rack-level modules.

A building-block approach

Adopting a modular approach to data centre design used to require adding greater numbers of components, which, in turn, created more risk of failure. Today, however, modular designs allow users to add, remove or redeploy building blocks to create variations of an original function or process. This allows expansion to occur without increasing overall risk. Taking such a building-block approach allows an organisation to pay only for the functionality it requires in the short term while also being able to expand as required without requiring an entirely new platform.

Distributed UPS architectures

In the past, many data centre operators tended to choose a centralised power protection strategy in which a large, standalone UPS powered the entire facility. This approach works when growth can be accurately forecasted but proves difficult as business demands increase. More recently, many data centres have adopted a zoned strategy, where the facility is divided into zones and each powered by its own UPS. As well as being more scalable, it also prevents a single UPS outage from affecting an entire data centre.

In a modular centre, the zone concept can be taken even further to where each rack or set of racks has its own UPS. This approach has a strong appeal for colocation and hosting providers where they can segment customers and scale out only when there is an increase in demand.

What to look for in a modular, distributed UPS

While it's traditional to think that taking a modular approach increases component numbers and therefore risk of failure, this is not actually the case when it comes to UPS devices. Using a bank of 12 kW and 50 kW UPS modules instead of a larger, stand-alone unit improves availability and serviceability while also helping to meet budget constraints and constant changes.

When selecting UPS units for this type of deployment, it's important to ensure they meet a number of key criteria. These include having a small footprint and high power density, together with the ability to fit into your existing racks. They should be able to share space with any existing power distribution equipment and have swappable components for ease of replacement and upgrading.

Battery back-up is another item for consideration. While centralised UPS units may need multiple dedicated battery cabinets to achieve even a minimum acceptable runtime, in a modular UPS internal batteries can provide sufficient system runtime without adding additional footprint or complexity.

Power distribution

When shifting to a modular data centre design, another consideration is the power distribution infrastructure that will be required. With higher consumption per rack, it's important to understand how to deliver the required power in the most effective way.

Modern rack PDUs can be installed in many locations and can also be removed and redeployed as needed, making it easy for IT teams to support moves, adds and changes in the data centre. Using PDU tools, it's possible to monitor and manage network-connected power distribution components at the rack level via a single web-based interface.

Straightforward and budget-friendly software is available to aggregate power data from a virtually unlimited number of rack PDUs and UPSs on an IP network into a cohesive, enterprise-wide view. Going modular doesn't have to compromise visibility. In fact, it extends visibility further to the edge of the distribution system.

Flexibility for the future

Taking a modular approach to the design and installation of a data centre's power infrastructure will make it easier to support scalability and future changes in demand. When evaluating components to use in the infrastructure, it's important to ensure they support modular expansion and future redeployment.

There are now more options than ever on the market that can allow businesses to make use of modular architectures to tailor a data centre power system to meet their particular requirements. Taking this approach can meet the operational needs of today while also providing the flexible platform needed for the future.

Eaton Industries Pty Ltd
www.eatonelectric.com.au

Warren & Brown Technologies

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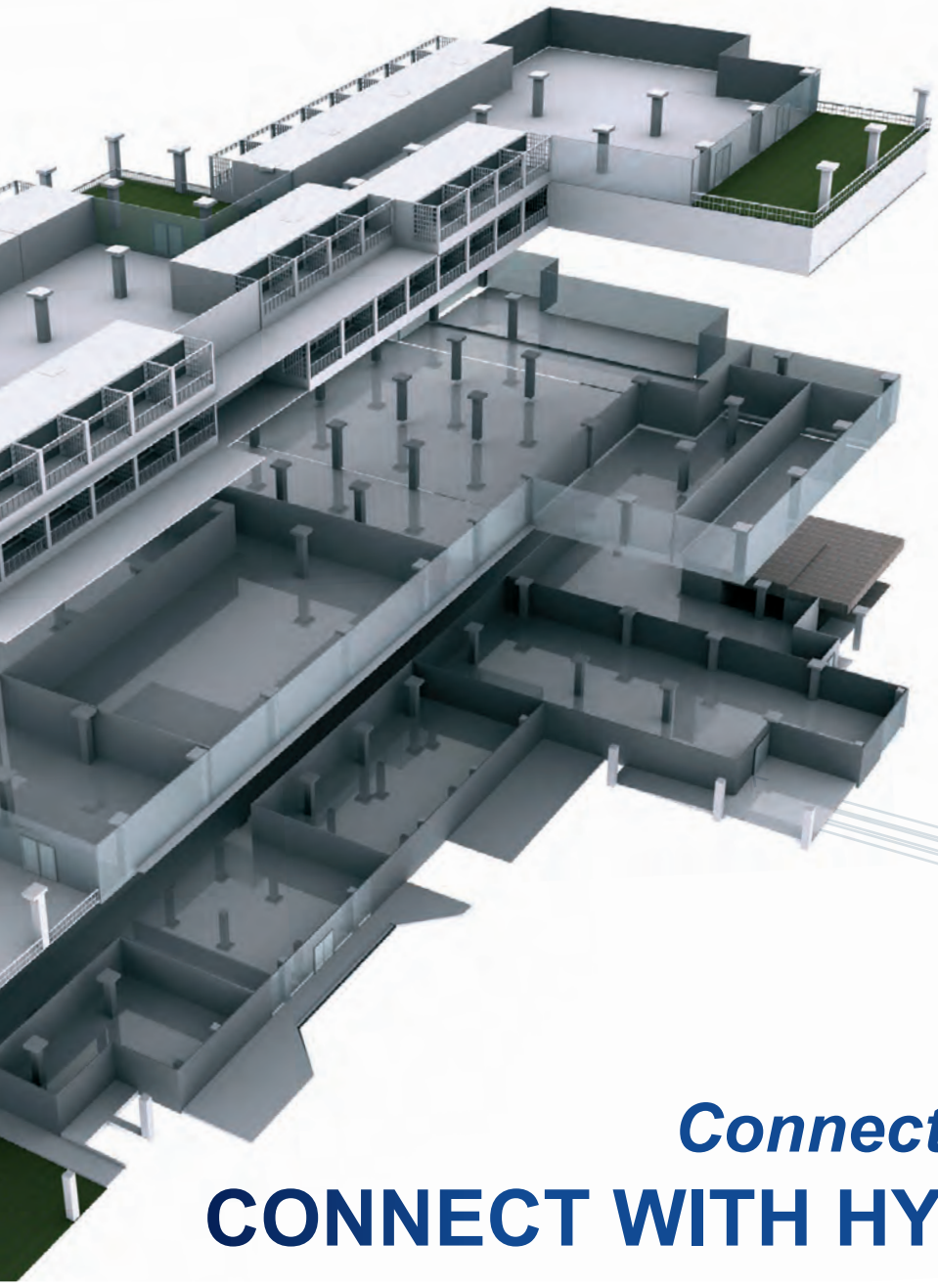

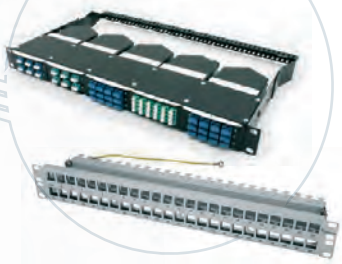

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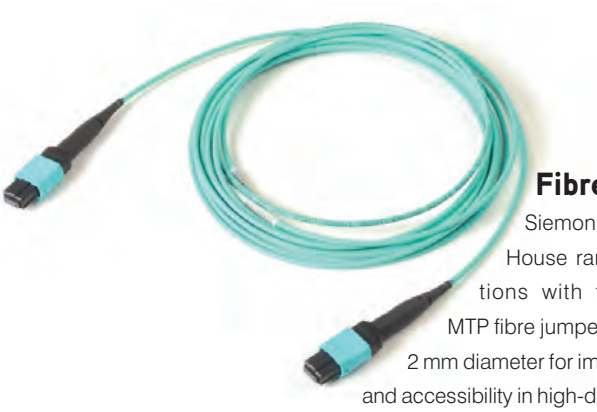


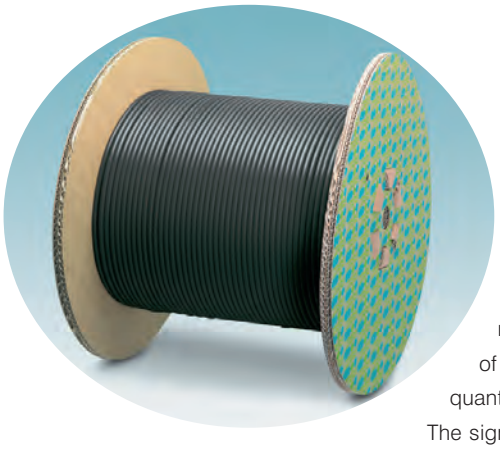
Fibre jumpers

Siemon has added to its LightHouse range of fibre cabling solutions with the release of 12-fibre MTP fibre jumpers, which feature a smaller 2 mm diameter for improved pathway fill, airflow and accessibility in high-density fibre patching areas.

Suitable for connecting MPO/MTP backbone trunk cabling to active equipment in 40/100 gigabit fibre applications, the jumpers feature the compact design of the MTP connector footprint and Siemon's smaller 2 mm RazorCore cable. The jumpers are available in both B (straight-through wiring) and C polarity for flexible deployment with a variety of MTP backbone trunks and configurations while ensuring proper polarity throughout the channel.

The MTP 2 mm jumpers come with either male or female connectivity to support easy migration from 10-gigabit cassette-based MPO/MTP channels that use female-to-female trunk assemblies to 40/100 gigabit applications that typically deploy male-to-male trunk assemblies. The jumpers are available in OM3 and OM4 multimode fibre types and plenum, riser and low-smoke, zero halogen (LSOH). The low-loss version has a loss of just 0.2 dB for good performance and improved flexibility in 40/100 gigabit fibre applications.

Siemon Australia
www.siemon.com.au



Signal lines

Signal lines on cable drums from Phoenix Contact are now available in addition to cable rings of up to 100 m. The company is offering signal lines of up to 500 m on cable drums in small quantities.

The signal lines are available in a wide range of sheath grades, such as PUR or PVC, various wire cross-sections with different numbers of wires or cable colours. Shielded and unshielded cables are also available. The cable drum can be self-configured and the length can be individually determined, between 110 and 500 m, or as small as 10 m increments.

To connect these cables a comprehensive range of connectors for assembly is available as M8, M12 or valve plugs, with optional solder, screw-clamp, spring-cage connection or fast insulation displacement connection technology.

Phoenix Contact Pty Ltd
www.phoenixcontact.com.au

Ethernet switches

Antaira Technologies has expanded in the industrial networking infrastructure family with the LMP-1002G-SFP and LMP-1002G-SFP-24 series. The 10-port industrial gigabit PoE+ managed ethernet switches feature 48–55 VDC high-power input (LMP-1002C-SFP) support and 12–36 VDC low-voltage power input with a built-in voltage booster (LMP-1002C-SFP-24). The product provides 48 VDC PoE power for any low-voltage power source or mobile PoE application environment.

Each unit is designed with eight 10/100/1000Tx fast ethernet ports that are IEEE 802.3at/af compliant (PoE+/PoE) with a PoE power output up to 30 W per port and two dual-rate 100/1000Tx SFP slots for fibre connections. The series supports jumbo frames up to 9.6 KB and provides high EFT, surge (2000 VDC) and ESD (6000 VDC) protection.

All units have a dual-power input design with reverse polarity protection and a relay warning function to alert maintainers when any ports break or power failures occur. This makes it suitable for industrial automation applications in harsh environments, such as high-density traffic control equipment within ITS applications; remote PoE wireless radios; security surveillance systems; GigE vision systems; and quality inspection systems within factory automation.

The units are IP30 rated, compact, fanless and DIN rail/wall mountable. They are built to withstand industrial networking hazards like shock, drop, vibration, EMI and extreme temperatures.

Antaira Technologies
www.antaira.com.tw

PROTECTING CABLE FROM OIL DAMAGE

*John Gavilanes**

Oil can inflict molecular damage on the compounds used for cable insulation and jacketing that will ultimately result in cable failure, downtime and replacement costs. Lapp USA explains how this happens and how to prevent it.

Of all the chemical exposures that can affect the life and performance of electrical cables, oil is one of the most damaging. Used as a coolant and lubricant in many industrial and infrastructure settings, oil can inflict molecular damage on the compounds used for cable insulation and jacketing. If ignored, oil damage to cables can be severe and will ultimately result in cable failure, downtime and replacement costs.

Awareness of oil damage has been on the upswing in recent years, thanks to regulatory changes and the increased performance characteristics in renewable energy, automotive assembly and other advanced production facilities.

Fortunately, there are cables that have been designed from the ground up to resist the effects of cooling and lubricating oils. Here's a closer look at how oil degrades cables, how to diagnose oil exposure problems and how to select cables that can stand up to oils over the long haul.

Degradation mechanism

Not all polymer compounds offer equivalent performance, even if they have the same family name. This is true for many physical properties, including oil resistance. For example, some PVC compounds have a higher degree of flame resistance, while others have better oil resistance. Still others demonstrate improved flexibility characteristics. PVC formulations vary greatly, depending on the desired properties and applications.

Oil can cause polymers, such as those used for cable insulation and jacketing, to degrade and crack. Selecting an oil-resistant cable is the best way to avoid this failure mode.

With oil resistance in particular, all wire and cable insulations are not created equal. Electrical, environmental, mechanical and chemical attributes will vary depending on the individual compound formulations. Insulating compounds contain a specific amount of plasticisers in their individual formulations, which help promote flexibility and resistance to fatigue. When compounds are exposed to lubricating and coolant processing oils, the material either absorbs the oil or the plasticiser will diffuse from the compound.

When oil is absorbed, it causes severe swelling and softening of the compound that results in degradation of tensile properties. When the oil causes diffusion of the compound plasticiser, hardening will result and all flexibility and elongation properties are lost.

In short, oil attacks the cable jacket, where it will become virtually ineffective in its primary role as an effective insulator. This action can create a possibly hazardous situation, not only to human life, but also to the overall function of the industrial machinery to which it is connected. This results in very expensive downtime, costly repair and, in the worst-case scenario, entire replacement of the machine.

Application conditions matter

The specific application will determine if oil is used as a lubricant, coolant or both. Acting as a lubricant, oil might be applied to a gear system driven by motors to prevent premature weardown and ensure smooth operation. Acting as a coolant, oil might be applied during the machine lathing process to keep metal from becoming too hot.

Oil exposures can happen in infrastructure applications as well as in factories. In wind turbines, for example, cables high up in the nacelle can potentially see constant exposure to lubricating and cooling oils for very long periods of time. Temperature extremes and other chemical exposures can exacerbate the damage caused

THE OIL RESISTANCE OF CABLES HAS NOW BECOME A CRITICAL PERFORMANCE PARAMETER WHEN ELECTRICAL CONTRACTORS, ENGINEERS AND INSTALLERS SPECIFY CABLES.

by oils. Wind turbine applications, for example, subject cables not just to oils but also to temperature extremes.

Oil rarely makes up the sole threat to cables. Instead, it works in concert with other degradation mechanisms, including temperature. In general, the greater the intensity of the oil exposure and ambient temperatures, the faster oil will start the deterioration process.

Avoiding oil damage

Once it gets underway, oil damage is not reversible, but it can be prevented by selecting cables with inherent oil resistance. Without a deep knowledge of the specific polymer compounds used in the cable you're considering, it can be difficult to know which products can stand up to oils.

That's why testing is so important. To avoid oil resistance problems, engineers should pay close attention to UL tests, which help determine how a cable will react in the industrial oil environment.

These tests are more commonly referred to as the Oil Res I and Oil Res II tests, which involve continuous immersion of the cable samples in IRM 902 oil at elevated temperatures for a specified period of time. Passing results are determined by the evaluation of mechanical properties and observations of physical damage caused by the oil exposure. In 2000, Lapp approached UL about creating tougher standards, which resulted in the creation of AWM style 21098, which takes oil resistance to a new level.

The oil resistance of cables has now become a critical performance parameter when electrical contractors, engineers and installers specify cables. As time moves forward, superior oil-resistant cables will become standard rather than the exception.

John Gavilanes is director of engineering at Lapp USA. For more information, please contact Robin Pearce, Bishop & Associates, via email at rpearce@bishopinc.com.

TOP INTELLIGENT BUILDING TRENDS

*Ispran Kandasamy**

On average, people spend around 20 hours each day inside residential or commercial buildings, according to The Royal Institute of British Architects. As the world's population continues to expand beyond the current seven-and-a-half billion people, so will the number of buildings. Intelligent buildings can improve efficiency, cut costs and help attract and retain tenants and staff.

The Internet of Things (IoT), sensors networks, Category 6A and fibre technologies were hot topics in 2015, particularly in the building industry. Below is a summary of key trends that will influence intelligent buildings in 2016.

Seamless connectivity

With the number of active mobile connections (GSMA Intelligence) globally now exceeding the the world population, and with the vast majority of mobile connections originating or terminating within a building, it is indisputable that people expect to be able to perform much of their normal business via cellular or Wi-Fi based wireless connections. This need is driving network design to cover: using Wi-Fi technology and supporting network infrastructure based on the latest standards (IEEE standard 802.11ac (wave 2)); deploying dedicated in-building wireless technology through distributed antenna systems or small cell solutions to optimise cellular coverage across the workplace.

Connectivity in buildings should be thought of in the same way as any basic utility like water and gas; this means the IoT infrastructure must be planned and designed at the building design stage.

Power

Power loads in commercial buildings are increasing, primarily due to the proliferation of active field devices such as: wireless access points and in-building wireless antennas; IP network cameras and VoIP phones; LED light and environmental controllers. Understanding how to power these devices efficiently and effectively in a building is a growing challenge. Traditionally, the power supplied to buildings has been alternating current (AC) power, which is then stepped down or converted to direct current (DC) using transformers/rectifiers in order to power devices inside buildings. However, with governments demanding that carbon dioxide emissions associated with buildings be minimised, attention has now turned to improving the efficiency of low-voltage power distribution networks inside buildings.

In most instances, active devices in buildings are Internet Protocol (IP)-enabled devices driven by the need for convergence. For these devices, power can be provided via low (or extra low) voltage direct current (DC). For decades, Ethernet cabling deployed for data network connectivity in buildings has also provided DC power. This approach has the benefit of being standards based. IEEE Power over Ethernet (PoE) 802.3af and IEEE Power over Ethernet Plus (PoEP) 802.3at are the current standards. An IEEE taskforce is now discussing the next evolution of the PoE standard (IEEE 802.3bt) with a stated aim of 49 W minimum power levels and a likely maximum of 100 W. Power over HDBase-T (PoH) is another approach developed by an alliance of consumer electronics manufacturers that offers a maximum power level of 100 W. As DC power levels continue to increase, different IP devices will emerge, driving the need for even more efficient low-voltage DC power in buildings.

Improving the employee/tenant experience

In a globally competitive world, businesses need to offer 'best in class' work spaces that positively influence health/wellness and productivity in order to attract employees and tenants. To improve an environment, it's important to measure environmental, space and energy metrics. Embedding increasingly sophisticated sensor technology into the fabric of a building enables this data to be instantly collected, processed and acted on. This approach offers the following benefits: capability to automatically and efficiently manage shared spaces; management of ambient room/building conditions, including light level, temperature and humidity; ability to help minimise a building's carbon footprint by real-time energy optimisation, reducing operating costs and also improving corporate social responsibility indices. Integrated Workplace Management Systems (IWMS) and other software platforms will feed off this type of data to help create a better workplace.

Integrating devices on a common network infrastructure

The Internet of Things (IoT) is a tangible phenomenon. The reduction in costs, sensor miniaturisation, plus advances in device connectivity capability have led to a rapid proliferation of connected devices in commercial buildings. However, as the number of connected devices increases, so do the challenges. A few years ago, commercial buildings used multiple, proprietary subsystems for their various management systems. The dominance of IP networking and associated global standards (like IEEE 802.3) across almost all aspects of technology has allowed all building management systems and associated devices to be interconnected through common wired or wireless infrastructure.

There is a myriad of connected devices, but are they communicating? The lack of a generally accepted protocol for device-to-device communication leads to inefficiencies. This communication 'failure' means that buildings are 'dumber' than they should be. Interoperability standards are progressing with the AllSeen Alliance and the Industrial Internet Consortium being two of the larger groups working on standard development. Devices that speak the same language and use the same network infrastructure can aggregate and process real-time data about their immediate environment in a highly efficient way.

THERE IS A MYRIAD OF CONNECTED DEVICES, BUT ARE THEY COMMUNICATING? THE LACK OF A GENERALLY ACCEPTED PROTOCOL FOR DEVICE-TO-DEVICE COMMUNICATION LEADS TO INEFFICIENCIES.

In 2016, organisations will tackle the challenge of not just gathering the data, but analysing it and using it to improve building efficiencies and workplace productivity.

**Dr Ispran Kandasamy (Ish) is Global Leader, Enterprise Building Solutions, Commscope. He leads a team of segment specialists and technical architects, located around the world, who are focused on helping customers design and implement their intelligent/smart building strategies. Ish has over 30 years' experience in R&D, manufacturing, sales and marketing within IT, telecom/carrier and general communications industries. He holds a doctorate of philosophy (PhD) in materials science and physics relating to optical devices from Brunel University (now University of West London), England. He is also the co-author of a number of patents.*

CommScope
www.commscope.com

Round sealing system

Available from J.T. Day, the HRST round sealing system range from Hawke Transit System is designed for a single cable or pipe. It is simple to install, and due to the supplied open frame can be retrofitted to existing cables and pipes.

The round sealing system does not require any insert blocks, which facilitates a much larger sealing range, allowing the systems to accept larger cable and pipes ranging from 4 to 170 mm. On-site modifications are also eliminated.

The range will fit and seal within standard pipe sizes. In addition, the HRST 2H and 4H are frames designed to seal two or four different small cables in the same round penetration ie, the HRST 40 – 4H D12 allows users to seal four cables with diameters between 8 and 12 mm.

JT Day Pty Ltd
www.jtday.com.au

Rackmount fibre connectivity system

The FiberExpress Ultra HD System from Belden is a high-density, rackmount fibre connectivity system, designed to offer simple installation and maintenance. It provides designers with the flexibility to architect a fibre connectivity solution to adapt to the varying port count needs in data centres and LANs, including top-of-rack configurations with low-to-medium port counts, and end-of-row configurations with medium-to-high port counts.

The system allows for a reduction in required rack unit space, which means more active equipment per rack and increased revenue per square foot for data centre operators. It also reduces the space required for LAN equipment, reducing OPEX for end users.

Key features include: 1, 2 and 4U configurations; pre-terminated cable support and flexible field termination options; and ultrahigh cabling density (up to 72 LC Duplex or 72 MPO adapters per rack unit). The product is available in an FX UHD Housing or an Entry-Level FX UHD Fixed Shelf.

Belden Australia Pty Ltd
www.belden.com

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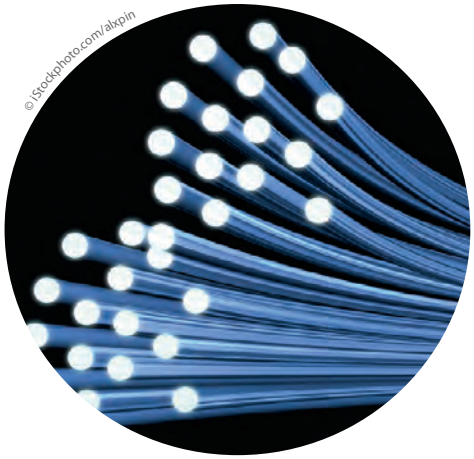

Fibre monitoring security solution

Allied Telesis has released Active Fiber Monitoring, an alternative security measure to encryption or sensitive light meters, which can prevent eavesdropping on fibre communications. The technology can detect when a cable is being tampered with and will raise an alarm to warn of a possible security breach.

Fibre-optic links are used for long-range data communications and within the LAN environment. One of the perceived advantages of fibre is that eavesdropping on traffic within the cable is not possible. However, devices which can eavesdrop on traffic on fibre cables undetected are now readily available and easy to use.

The monitoring technology to combat this threat detects small changes in the amount of light received on a fibre link. When an intrusion is attempted, the light level changes since some of the light is redirected by the eavesdropper onto another fibre. When this happens, the monitoring technology detects the intrusion and raises the alarm. The link can either be shut down automatically or an operator can be alerted and manually intervene.

Active Fiber Monitoring is built in to all Allied Telesis 'x' Series switches and firewalls running the latest AlliedWare Plus Operating System firmware. It requires the use of DDM-capable optical modules.

Allied Telesis International (Aust) Pty Ltd
www.alliedtelesis.com.au

Encapsulated chassis

Schneider Electric has released the Encapsulated Chassis, an enclosed busbar system that reduces potential hazards for electrical maintenance workers by providing additional barriers and protection.

The product complies with Australian Standard IEC 61439-1 and IEC 61439-2 and is adaptable for use in industrial and commercial applications. It is also a feature of Schneider Electric's MB and MD distribution boards.

The encapsulated chassis has a 250 A enclosed current rating and is available in 2, 3 or 3Ph+N phases system to suit all standard Schneider Electric circuit protection MCBs and RCBOs. It comes in various sizes from 12 to 108 poles, in 18 or 27 mm or hybrid chassis. Coloured phase identification labels of single feed chassis are not attached, allowing users to choose whether they opt for top or bottom installation.

The product fits all Acti9 Circuit Protection and is available in single and dual feed. It is also a direct substitution for the MSC Chassis.

Schneider Electric
www.schneider-electric.com

Tactical cable

The AFL Tactical Tight Buffered fibre-optic cables are suitable for use in installations where extreme environmental conditions are present and require a solution that may be retrieved for later use.

Designed to be deployed and retrieved in the field, these cables are resistant to damage caused by repetitive impact or harsh conditions. Broadcast deployable cables are available with optional 500 μm high-performance acrylate coated optical fibre or standard 250 μm based building blocks. Features include: cut-resistant, flame-retardant polyurethane outer jacket; flexible construction allows for multiple deployments; all aramid strength members; performance in wide temperature range.

The cables are suitable for use in: high traffic areas; security and sensing applications; temporary installation of critical communications lines where quick retrieval and re-use is necessary; field deployment in abusive environments; broadcast deployments — electronic news gathering applications; and sporting and media events.

AFL
www.aflglobal.com

Installing server rack into Project Natick vessel. © Microsoft.

MICROSOFT SUBMERGES DATA CENTRE IN OCEAN

A 17,000 kg container was placed on the ocean sea floor by Microsoft and remotely monitored for three months by staff at the Microsoft campus in Washington. Not something you'd typically hear concerning the computing giant's activities, but the endeavour was all part of the company's vision to manufacture and operate an underwater data centre.

Project Natick, the name of Microsoft's research project, involved the deployment of a 3x2 metre cylindrical vessel — containing a data centre that consumed computing power equivalent to 300 desktop PCs — about one kilometre off the Pacific coast of the United States from August to November of 2015. The project, the company said, reflects Microsoft's ongoing quest for cloud data centre solutions that offer rapid provisioning, lower costs and high responsiveness, and are more environmentally sustainable.

It is hoped the knowledge gained from the three months this vessel was underwater could help make future data centres more sustainable, while at the same time speeding data transmission and cloud deployment. Perhaps even enabling the possibility of a future where seabed data centres are commonplace around the world.

While the technology to submerge sealed vessels underwater with computers inside isn't new, the Microsoft researchers believe this is the first time a data centre has been installed under the ocean's surface. Deploying a data centre underwater is thought to solve several problems: by introducing a new power source; by greatly reducing cooling costs; by closing the distance to connected populations; and also by making it easier and faster to set up data centres.

Ben Cutler, the project manager who led the team behind this experiment, said his team applied science and engineering to the concept of submerging a data centre. A big challenge involved people, since people keep data centres running. However, there is a logistical problem deploying people underwater — they take up space, need oxygen and light, food and water, as well as a reasonably comfortable environment to work in. Eventually they'll need to go home at the end of the day.

So the team moved to the idea of a 'lights out' situation. A simple place to house the data centre — compact and self-sustaining. The team chose a round container. According to Cutler: "Nature attacks edges and sharp angles, and it's the best shape for resisting pressure," he said. That led the team towards working out how to make a data centre that didn't need constant, hands-on supervision.

The experimental prototype test vessel would only be launched about one kilometre offshore, so it was reportedly able to be linked into an existing electrical grid. However, it was discovered that being in the water meant that using the hydrokinetic energy from waves or tides was also possible for computing power. This could make data centres work independently of existing energy sources, located closer to coastal cities, powered by renewable ocean energy.

Cutler added that half of the world's population lives within 120 miles of the sea, which makes an underwater data centre solution so appealing; one of the big advantages is it reduces latency by closing the distance to populations and consequently speeding data transmission.

This project also shows it is possible to deploy data centres faster. Building the vessel that housed the experimental data centre reportedly only took 90 days. While data centres built on land have different needs and are done so according to building regulations, and varying environments and terrains, it is thought these underwater containers could be mass produced for very similar conditions underwater. Another key advantage is it is also colder the deeper you go under the surface. Cooling is an important aspect of data centres, which can be rather costly when operat-

Project Natick vessel being deployed.

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ing chiller plants to keep the computers inside from overheating. The cold environment of the deep seas automatically makes data centres less costly and more energy efficient.

Remotely monitoring the vessel using cameras and sensors, the team recorded data concerning temperature, humidity, the amount of power being used for the system or the speed of the current.

The team is still analysing data from the experiment, but so far, the results are promising. They are reportedly now planning the project's next phase, which could include a vessel four times the size of the original container with around 20 times the compute power. The team is also evaluating test sites for the vessel, which could be in the water for at least a year, deployed with a renewable ocean energy source. Peter Lee, corporate vice president of Microsoft Research NExT, said the project has given them plenty of data to analyse. "We're learning how to reconfigure firmware and drivers for disk drives, to get longer life out of them," said Lee.

"We're managing power, learning more about using less. These lessons will translate to better ways to operate our data centres. Even if we never do this on a bigger scale, we're learning so many lessons."

Fusion splicer

The Fujikura 62S fusion splicer is an active core alignment splicer that provides good splice loss performance and minimised splice time. The product is suitable for fibre-optic network installation, FUSEConnect connector installation and optoelectronic device manufacturing in a variety of industry applications.

With a conventional flip-open wind protector and non-motorised tube heater, the complexity of the splicer is reduced without compromising total cycle time. The product ensures a high level of productivity with 23 s shrink time using standard splice sleeves, while the transit case also doubles as a built-in or mobile workstation. Its ruggedised features for shock, dust and moisture, as well as a mirrorless optical system and impact-resistant monitor, also enhance the device's durability. Additional features include: auto-start; a 5000-splice electrode life; Li-ion battery with 200 splices/shrinks per charge; 5 mm cleave length for splice-on connectors or small package needs; sheath clamp or fibre holder operation; and internet software upgrades.

AFL

www.aflglobal.com

Test module

The VeEX UX400 is a multi CFP form-factor high-speed OTN, SDH/SONET and Ethernet test module that offers up to 600G traffic generation for development, verification and commissioning for demanding speed requirements. Its modular architecture allows for up to six independent test modules and up to six concurrent tests or combinations of tests, while multiple users are also able to access and operate different test modules at the same time. Other product features include: up to two CFP 100G or 40G modules; up to six QSFP+ for 40GE and OTU3; supports STL256.4 and STM-256/OC-768; full 100G/40G bidirectional testing; Service Disruption measurements; and traditional BERT and throughput testing.

The device also allows for OTN testing for OTU3 and OTU4, advanced multi-step OTN Mapping/Multiplexing with SDH/SONET and PDH/DSn payloads, and Ethernet over OTN, ODU0 and ODUflex. Tandem Connection Monitoring, overhead monitoring and byte decoding, as well as Payload and Line through monitor modes can also be conducted.

TelecomTest Solutions

www.telecomtest.com.au

Data line surge protectors

Times Microwave Systems has added to its Times-Protect line of surge protection devices with the Data Line surge protection product family. The range now includes the LP-DOE-1G, LP-POE-1G and LP-PAE-100, which address surge protection for twisted pair cat 5e and cat 6 applications, and offer a high level of data integrity and overvoltage protection.

The company claims the three devices have been tested against extended RFC2544 test methods including difficult tests consisting of two protection devices separated within 100 m of Cat 5 conductors over a broad temperature range. The tests measured throughput, latency, packet jitter, frame loss and back to back.

Product features include: LP-DOE-1G 1000 Base-T (Ethernet data only), suitable for indoor applications with all data pins protected to chassis ground; LP-POE-1G 1000 Base-T (Power over Ethernet) with up to 60 VDC injector and all pin pairs protected to chassis ground; and LP-PAE-100 (Power over Ethernet) 100 Base-T with all pins protected to ground. Data pin pairs are (1-2) (3-6) and DC pin pairs are (4-5) (7-8).

Rojone Pty Ltd

www.rojone.com.au

Fanless surveillance system

Backplane Systems Technology has launched the Nuvo-3616VR, a surveillance platform that integrates 16 PoE+ ports, an i7 CPU and RAID in a compact, fanless chassis. It is designed to meet requirements of a stationary or mobile surveillance system, and is capable of video recording as well as high-end video analytics.

A typical surveillance system uses an NVR to connect IP cameras and record video streams on its disk array. Similar to an NVR, the product features 16 PoE+ ports and built-in disk array for video recording, while each of its 802.3at PoE+ ports can supply 25.5 W to power a bullet, dome or PTZ camera. As electrical power is passed along with data on a single CAT5/6 cable, the product reduces the cost of deployment for a surveillance system supporting up to 16 cameras.

The system also incorporates four built-in drives with a RAID 0/1/5/10 storage system to offer up to 1 GBps disk access and 8 TB capacity. The product also comes with a quad-core i7 CPU, which delivers good computing performance to facilitate advanced video analytics algorithms.

Key features include: Intel 3rd-Gen i7 Quad-Core Performance; easy-swap trays for HDD replacement; -25 to +60°C fanless operation; 8~35 V wide-range DC input with built-in ignition power control; and per-port power on/off control for each PoE+ port.

Backplane Systems Technology Pty Ltd

www.backplane.com.au

RJ45 patch cords

R&M has expanded its range of RJ45 patch cords for LAN environments with the Easy Line (EL) series of unshielded and shielded copper cables.

The cables come in four lengths (1, 2, 3 and 5 m) and seven different colours, suitable for use as basic equipment that complies with valid standards in generic cabling systems for commercial or residential buildings in applications up to 10G Ethernet. The products are tested to ensure they achieve the transmission values for the Cat6 and Cat6A categories. All cords are labelled with their length, category, cable type and item number. Customisable products are available where length, wire design, shield termination and cable types as well as cable jacket labeling can all be individually configured.

The patch cord design has a high level of crosstalk reserves, where the shield termination is 360° around the cord and contacts every strand of the braided shield, ensuring protection against electromagnetic interference. The largest possible separation of conductors in the connector bodies also helps minimise crosstalk, while the position of the contacts remains constant, regardless of which type of conductor and wire cross-section is terminated. The assembly procedure is designed to ensure that there is no movement of, or damage to, the gold-plated contacts during crimping.

The Insulation Displacement Contact technology developed by the company ensures robust wire termination and low contact resistance.

Reichle & De-Massari Australia P/L

www.rdm.com

Jacks for PoE applications

Siemon has launched the Z-MAX, MAX RJ-45 and TERA jacks, which offer reliable jack-plug connection for support of PoE applications.

The jacks feature a curved contact shape designed to improve the electrical and mechanical performance of traditional modular jacks. The products also offer high transmission performance and eliminate the risk of permanent contact deformation due to mechanical stress, as well as provide support for remote powering applications.

Unmating a jack-plug connection under a PoE load produces an arc that erodes the gold-plated jack-plug contact surfaces at the arcing location. When this erosion occurs in the area of the fully mated position, the result is an unreliable connection that can cause degraded network performance and bit error rates. Erosion on either the jack or plug contacts results in an unreliable connection. The crowned contact geometry on the jacks, however, places arcing damage, to both the plug and jack contacts, away from the fully mated position, allowing users to connect and disconnect to PoE applications with zero risk over the lifetime of the system.

The jacks have been third-party tested and certified to be in full compliance with IEC-60512-99-001 standards that specify the maximum allowable resistance change that mated connections can exhibit when subjected to insertion. They are suitable for use with Siemon's Category 6A and 7A shielded cables that are qualified for mechanical reliability up to 75°C to ensure good heat dissipation in remote powering applications.

Siemon Australia

www.siemon.com.au

LIFTING APPRENTICESHIP COMPLETION RATES

A shift from time-based assessment of apprentices to competency based progression has demonstrated a positive impact on engineering trade apprentices and their employers, according to a report by the Australian Industry Group.

The latest individual apprentice completion rates are a disappointing 56% for trades occupations, and these are expected to improve if apprentices are able to progress more quickly through their training under these competency-based arrangements, said Ai Group Chief Executive Innes Willox.

"However, despite this and other benefits, and even though the industrial award required employers to agree with the RTO's assessment before an apprentice could progress, few registered training organisations (RTOs) had strategies to involve employers in the competency progression.

"To address this, Ai Group conducted The Engineering Excellence Project, on which this new report is based, to develop a system which RTOs can adopt to enable employers to play a key role in confirming when apprentices are competent.

"The Engineering Excellence Project was established under the Accelerated Australian Apprenticeship Program for trades within the Manufacturing and Associated Industries and Occupations Award 2010.

"Ten RTOs across the nation participated in this comprehensive project for over two and a half years, and a great deal of useful resources have been developed for RTOs as a result.

"The project outcomes included: implementation of tailored training plans to enable the development of skills in the workplace; agreed processes for teachers to seek confirmation of competency from employers; development of work-based activities for employers to use with apprentices; assistance to employers to develop internal processes to manage these arrangements; and addressing internal administrative processes that act as barriers to change."

The report makes some key recommendations:

- State training authorities should develop mechanisms to help RTOs to provide opportunities for employers to ensure apprentices reach workplace standards;
- Governments should develop and implement a professional development strategy for RTOs about competency-based progression and completion;
- Governments should further analyse the Modelling Vocational Excellence survey generated by the project; and
- There should be further analysis of the relationship between industrial awards and institution-based qualifications with competency-based progression and completion arrangements.

"Because this model change is so significant, it will take time to become fully established. Given the important contribution apprentices and their employers make to our workforce and economy, this is a challenge we must overcome," Willox said.

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Audited Media Association of Australia cab

September 2015 Total CAB Audited Circulation
(Aust + NZ) 6,461 (61% personally requested)

ECD Solutions: ISSN 2201-2702
Printed and bound by SOS Print & Media

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