Electrical
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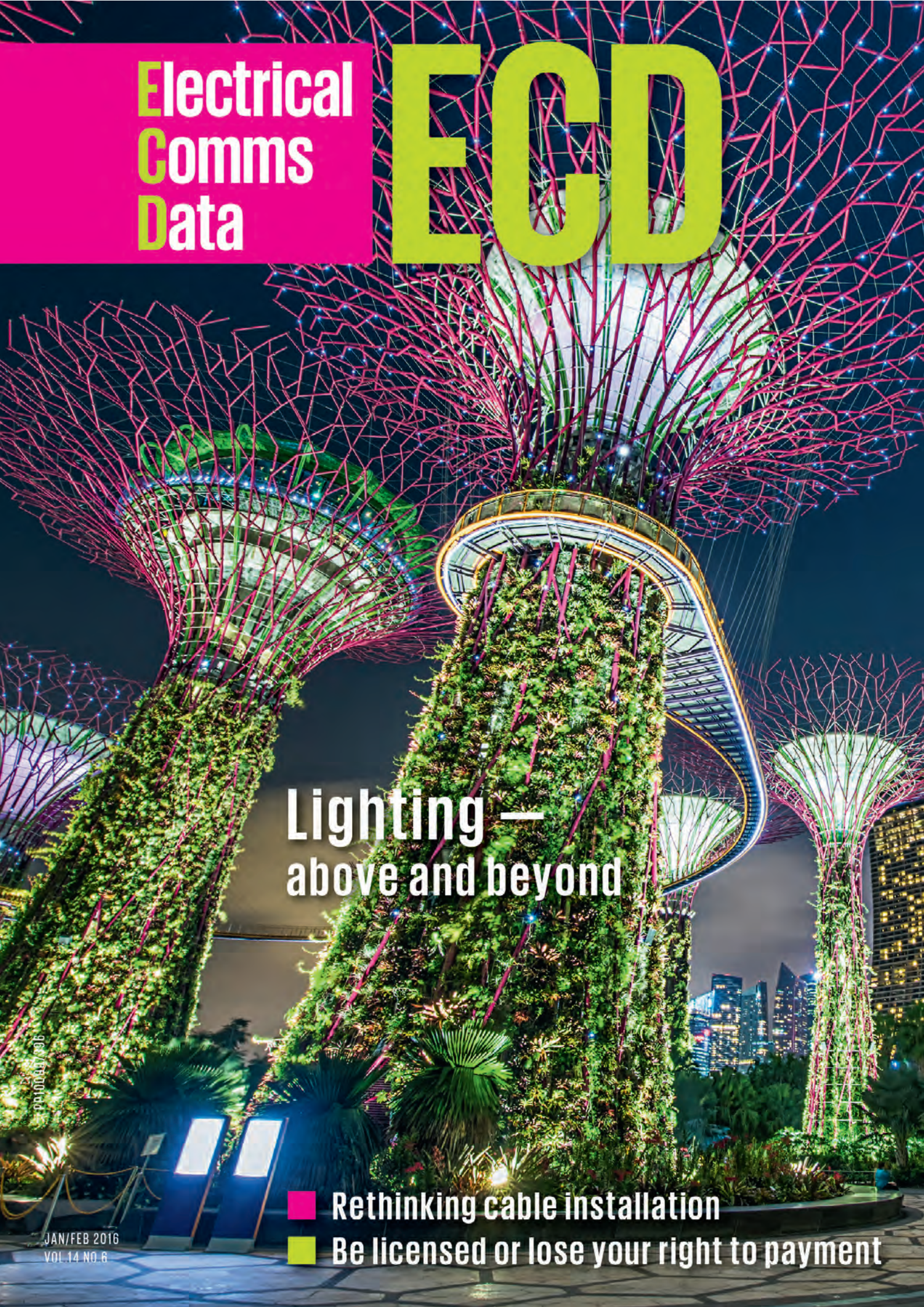

Lighting – above and beyond

- Rethinking cable installation
- Be licensed or lose your right to payment

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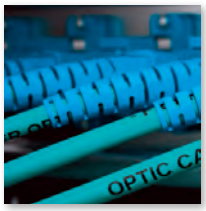

30 Electrical Distribution

FROM THE EDITOR

Welcome to 2016. The holiday season is well and truly over and it's time to get back to the grind.

2015 witnessed a massive technology-led disruption across all industries around the world. The effects of this disruption will continue to be felt throughout 2016. Electrical, data and communications contractors and engineers will face new challenges and opportunities in the era of convergence and digital disruption — we'll help them keep up to date with information about the latest products, trends and technologies. From this year, ECD will be strengthening its focus on the electrical, communications and data industries.

The lead article in this issue talks about how the evolution of technology is changing the way we generate, distribute and manage energy. Smart sensors and intelligent devices are facilitating the development of smart cities and grids that can be networked together to achieve efficiency and savings.

In an increasingly connected world, networks must not only become more reliable and powerful, but installation and maintenance need to become faster and simpler. Craig Buckingham, National Technical Manager, Reichle & De-Massari Australia, believes that the data requirements have increased significantly but the design and installation practices employed today haven't kept up with the times. He is calling on installers to follow the installations standards but adapt to changing data requirements.

As always, we've got some great new products and case studies. I hope you enjoy this issue.

Mansi Gandhi – Editor
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CONTRACTORS BEWARE

BE LICENSED OR LOSE YOUR RIGHT TO PAYMENT

*Ren Niemann, Tony Roccisano and Annie Pang**

If you contract to carry out work or services that you are not licensed to perform, your contract may be illegal and you may be prevented from obtaining payment under the BCIPA.

There is a range of building works, engineering services and electrical works that can only be carried out in Queensland by persons who hold the appropriate licences and accreditations. If you enter a contract to perform such works, or offer to perform them, or even in some cases just advertise for them, and you don't hold the appropriate licence or accreditation, the consequences can be severe.

Your contract may be illegal, you may not be insured for the work you do, you may lose your contractual rights to payment, and you may also lose any statutory rights to payment that you might have had under the *Building and Construction Industry Payments Act 2004* (Qld) (BCIPA). You could even be liable for a significant financial penalty.

A Queensland Supreme Court decision in September 2015 dealt with some of these issues. An electrical contractor company (Contractor) had been engaged by Agripower Australia Ltd (Agripower) to provide electrical engineering works for a powder hopper, granulation plant and conveyor at Agripower's site in Queensland. The Contractor exercised its rights under the BCIPA, and went to adjudication over money that it considered was payable under its contract with Agripower. The adjudicator decided in favour of the Contractor. Agripower then went to the Supreme Court to overturn the adjudicator's decision, and succeeded.

The court decided that the adjudication decision was void, and that the contract under which the Contractor had been engaged was illegal, because at the relevant times neither the Contractor nor its representative were licensed to carry out electrical works for the purposes of the *Electrical Safety Act 2002* (Qld) (Electrical Safety Act), and the Contractor's representative was not at the relevant time a registered professional engineer for the purposes of the *Professional Engineers Act 2002* (Qld) (Professional Engineers Act). It is worth noting that the Contractor's representative did have a bachelor's degree in electrical engineering technology.

The Electrical Safety Act has the express purpose of trying to prevent people being injured and killed, and property being damaged or destroyed, by electricity. It does this in a range of ways, including by licensing persons who perform electrical work. Specifically, section 56(1) of the Electrical Safety Act says that,

"[a] person must not conduct a business or undertaking that includes the performance of electrical work unless the person is the holder of an electrical contractor licence that is in force".

A failure to comply with the above requirement can result in a significant financial penalty. Section 56(2) of the Act applies this prohibition broadly, because it says that a person will be conducting a business or undertaking that includes the performance of electrical work if, among other things, the person:

"(a) advertises, notifies or states that, or advertises, notifies or makes a statement to the effect that, the person carries on the business of performing electrical work; or

(b) contracts for the performance of electrical work, other than under a contract of employment; or …"

There are some exceptions to the above prohibition. One such exception applies if the only electrical work that the person contracts to do is intended to be subcontracted to someone else who does hold an electrical contractor licence, and is authorised under that licence to perform the relevant electrical work.

The court decided that the Contractor's behaviour was caught by both sections 56(2)(a) and (b) of the Electrical Safety Act. The behaviour that triggered section 56(2)(a) was that:

- the name of the Contractor company implied that the Contractor performed electrical works;
- the Contractor's representative made statements to Agripower that the Contractor carried on a business of providing electrical engineering and electrical works; and
- the Contractor agreed to perform electrical works.

The behaviour that triggered section 56(2)(b) of the Electrical Safety Act was that the

> THE LESSON FOR ELECTRICAL CONTRACTORS AND ENGINEERS WHO CARRY OUT SUCH WORK IN QUEENSLAND IS TO KNOW WHETHER THE TYPE OF WORK YOU ARE PERFORMING REQUIRES YOU TO BE LICENSED OR SPECIALLY QUALIFIED UNDER THE RELEVANT LEGISLATION.

Contractor engaged a subcontractor to run Agripower's granulation plant in operative mode over two weeks, despite the fact that the subcontractor did not hold the required licence to do that electrical work. The Contractor tried to argue that the subcontractor was merely pressing the start and stop button at each local control station to monitor whether the motors were working correctly, operating the start and stop function through the PLC to ensure that the program was working correctly, and running the equipment in sequence through the PLC, among other things, and that this did not amount to electrical work.

The court disagreed. It said that these activities qualified as "...testing... an electrical installation", and this forms part of the definition of 'electrical work' in the Electrical Safety Act. In making this decision, the court thought it was relevant that this testing work took more than 100 hours, and was not a minor component of the overall work.

Consequently, the Contractor had breached section 56(1) of the Electrical Safety Act. While the Electrical Safety Act does not have any express provision that prohibits a person in breach from recovering any monetary or other consideration in circumstances where they are not licensed, the court decided that the Electrical Safety Act made such contracts illegal, given its important purpose of protecting the public against the harm that can be caused by electricity. Accordingly, there was an implied prohibition against recovering any payment.

The Professional Engineers Act prohibits someone from carrying out professional engineering services if they are not a practising professional engineer. There is an exception if the person carries out the professional engineering services under the direct supervision of a practising professional engineer who is responsible for the services.

'Professional engineering services' is defined to mean,

"... an engineering service that requires, or is based on, the application of engineering principles and data to a design, or to a construction, production, operation or maintenance activity, relating to engineering, and does not include an engineering service that is provided only in accordance with a prescriptive standard."

The Contractor argued that the engineering services were carried out in accordance with prescriptive standards, and therefore were within the exception to the definition of professional engineering services. The alleged prescriptive standards included the AS3000 wiring rules. This argument failed for two reasons.

First, the court concluded that significant areas of the work performed by the Contractor were not provided only in accordance with a prescriptive standard. Examples of these areas of work included:

- the Contractor specified shielded instead of unshielded cables in respect of some reassembled second hand switchboards;
- the Contractor prepared design drawings showing the location of conduits in the switch room that were to be installed allowing for a future connection to a transformer and the location of proposed cabinets;
- the Contractor prepared the design for the reassembly of second hand electrical switchboards so that they would be suitable for use in the switch room, and this design included the replacement of 110 volt wiring with 12 volt direct current wiring;
- the Contractor's electrical design included the installation of a programmable logic controller stop button which controlled part of the switchboard;
- the Contractor installed a level switch mounted in a powder hopper, with significant changes to the programmable logic controller's program code;
- the Contractor's design for the installation for two new conveyors for the granulation plant conveyor works included the power and control cables required for the conveyors; and
- the Contractor's design of the undersized hopper automation works included the automation of a valve on the bottom of an existing silo for undersized material, which included a junction box, a level switch and a light or bag change indicator.

Second, the court decided that AS3000 was not in all respects a prescriptive standard, within the meaning of the definition of 'professional engineering services' in the Professional Engineers Act.

This was because some of AS3000 required the application of professional judgment, including in deciding which part of AS3000 to apply. As a result of these decisions, the court concluded that the Contractor's contract with Agripower was also illegal because the Contractor was performing professional engineering services in breach of the Professional Engineers Act. Under that Act, there is an express prohibition against a contractor recovering payment.

Based on the above, the Contractor was not entitled to exercise rights under the BCIPA to be paid money in connection with its contract, and the adjudication decision under the BCIPA was void for jurisdictional error.

The lesson for electrical contractors and engineers who carry out such work in Queensland is to know whether the type of work you are performing requires you to be licensed or specially qualified under the relevant legislation. If it does, get advice as to whether there is an exception that might allow a way for you to have the relevant work done. If there is not, you should avoid that work, and be careful to avoid possibly breaching the law by merely tendering, advertising or offering to carry out that work.

This article summarises some important aspects of one court decision, but different factual circumstances, and the effect of other laws, can result in different conclusions. The law is also frequently changing; therefore this article is not, and should not be relied on as a substitute for, legal advice.

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**Ren Niemann, Partner, Projects Group. Ren specialises in the areas of construction, infrastructure and procurement and has advised clients on major projects in Australia and across the Asia Pacific region. He has more than 15 years of experience working across the transport, water, resources, social infrastructure, defence and logistics sectors.*
**Tony Roccisano, Special Counsel, Projects Group. Tony is a procurement lawyer. His clients are public and private sector entities who operate in various industry sectors, including infrastructure, health, aged care, not-for-profit and resources.*
**Annie Pang, Lawyer, Projects Group. Annie is a procurement lawyer working for a broad range of clients in the public and private sectors.*
For more information, please contact Ren, Tony or Annie on 07 3233 8888.

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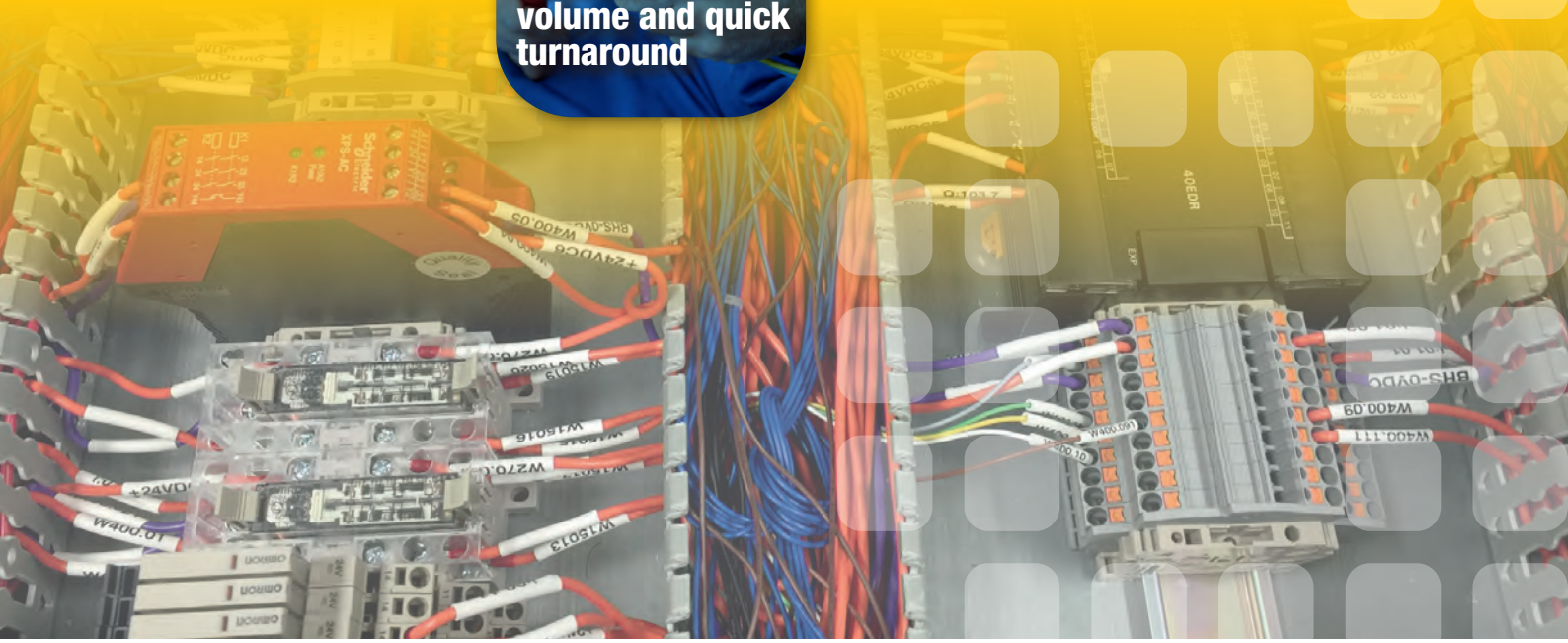

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FIVE THINGS YOU NEED TO KNOW ABOUT BUSINESS COMPLIANCE

Dominic Woolrych, Legal Product Manager

Minimising legal issues that may present themselves as your company grows not only in profit but in numbers is undoubtedly an imperative of a successful business.

While it is easy to avoid thinking about and addressing legal issues, confronting these issues head on is essential to the maintenance and success of your business in both the short and long term. This guide aims to clarify whether your business complies with legal requirements across key areas to save you from unnecessary legal complications.

In a recent report conducted by LawPath, analysing statistics taken from our legal health check service, issues stemming from three primary areas became evident for SMBs: online compliance, employment and business structures.

Online legal considerations

If your business operates online, there is no doubt that compliance with online obligations is essential to the legal health of your business. Getting your website's terms and conditions (T&Cs) in order are a crucial first step, and are an absolute necessity for anyone conducting business online.

Why are terms and conditions so important?

When supplying goods or services to customers, the first thing to focus on is getting the T&Cs of your website correct and tailored to your business. Having effective terms and conditions is important for three main reasons:

- Setting out your terms and conditions with clarity enables customers to understand the services in which you sell and the method that you use to provide the service.
- Online tech companies provide their T&Cs through a 'click and accept policy'. This allows customers to understand that there are T&Cs prior to making a purchase.
- A well-drafted set of terms and conditions enables your business to avoid liability to the fullest legal extent permitted by the Australian Consumer Law.

Although the clauses included in website terms and conditions will vary between businesses, every set should include: terms of payment; dispute resolution mechanisms; terms of delivery; and refund and return policies.

.A privacy policy is an essential element to make sure that your website is secure and trustworthy. It deals with the collection, management and storage of personal information. A privacy policy should be used where your business acquires any sort of personal data, for example, email addresses. For some business it is a legal obligation under the *Privacy Act 1988* (Cth). A clear and up-to-date privacy policy that explains how your website manages personal information will enable you to build customer trust and improve online business performance. An effective privacy policy depends on identifying your audience and keeping your policy plain and simple. It's also important to your privacy policy to the specifics of your business — this will help guide customers and hopefully result in an increase in transactions for your business.

Employment

Employment agreement

A well-drafted employment agreement could help safeguard against unforeseeable events, which is key to the longevity of your business. The agreement should clearly set out the expectations of employees and help avoid issues arising from disputes further down the track. These reasons illustrate the necessity of having a written employment agreement tailored to your business. Having a simple or complex

employment agreement largely depends on the nature and size of your business, although we always recommend getting this tailored to your business by an experienced employment lawyer.

Workplace policies

Having effective workplace policies is an additional and essential way for your business to safeguard against future liabilities arising from unforeseeable events. It is strongly recommended to include employment policies that help you deal with and resolve workplace issues. Although there are several available to employers, the key ones to ensure you have in order are: discrimination policy; workplace harassment and bullying policy; drugs and alcohol policy; and acceptable IT use policy.

Contractor agreements

If your online business decides to use contractors rather than employees it is imperative to know how these differ from one another.

There are some benefits of hiring contractors over hiring employees, such as:

- Reduction of costs: Contractors do not have the same benefits that employees have, such as superannuation, paid holiday leave and sick leave.
- Lower risk of legal action: Contractors are not protected by the workplace relation laws that protect ordinary employees. This effectively limits the avenues in which contractors can seek legal action, which is important when considering business liability.

One issue of operating an online business, especially in the tech field, is that copyright in material created by contractors remains with the contractor rather than with your company. This makes it highly important to draft a contract where intellectual property rights are assigned to your business. In order to avoid this 'legal trap' and protect all your valuable information and hard work, an assignment in writing of the copyrighted work from the contractor to your company is essential.

Compliance with business structures

Whether your business is structured as a sole trader, a company or a partnership, it is essential to comply with your structure in order to ensure that your personal income tax is kept at a minimum and to avoid any unwanted issues which may emerge.

Sole trader

A sole trader operates where one person is individually responsible for all aspects of business operations. While there are few complexities and tax formalities in operating as a sole trader, one of the disadvantages of operating as a sole trader is that a sole trader is personally responsible for any debts or liabilities. In regards to superannuation, sole traders are not legally required to contribute to their own fund, although sole traders can claim tax deductions from self-contributions.

Partnerships

A partnership exists where two or more people carry on a business with the view to profit. The basic tax arrangement for partnerships is that each partner will pay tax only on the profits which they receive, rather than the entirety of a partnership's profit being taxed on the whole.

Compliance with the legal structures of a partnership largely depends on understanding that if your business operates as a partnership each partner is jointly and severally liable for all the debts of the partnership. One issue stemming from this arrangement is that partners can be liable for liabilities that arise without their knowledge or authority. Understanding joint liability is vital for complying with a partnership as a business model.

Company

Although more expensive to set up and manage, a company is treated as a separate legal entity, affording the shareholders (owners) more legal protection and limited liability. A company is undoubtedly a more complex arrangement than both a sole trader and partnership; however, personal tax can be mitigated where that money subsists within the company. This, in conjunction with the small business incentives put forward in the 2015 federal Budget, including deductions being made available on individual assets purchased for less than $20,000, is a clear benefit of incorporating.

Compliance with the business structure of a company largely turns on the compliance of legal obligations under the Corporations Act. These include issues relating to administration as well as the roles and obligations of both directors and shareholders.

An additional obligation for most companies is the requirement to abide by the pay as you go (PAYG) requirements.

Conclusion

Compliance with the various mechanisms which your business depends on will undoubtedly help your business avoid the all too common mistake of simply ignoring legal formalities. Avoiding the common mistakes of the majority of SMBs will put your tech business ahead of the pack and ensure longevity of profit.

While this may seem daunting for a new business, it is key to establish compliance across all areas of your business to ensure you're reducing risks from day one. The last thing any business owner wants to endure is a legal dispute.

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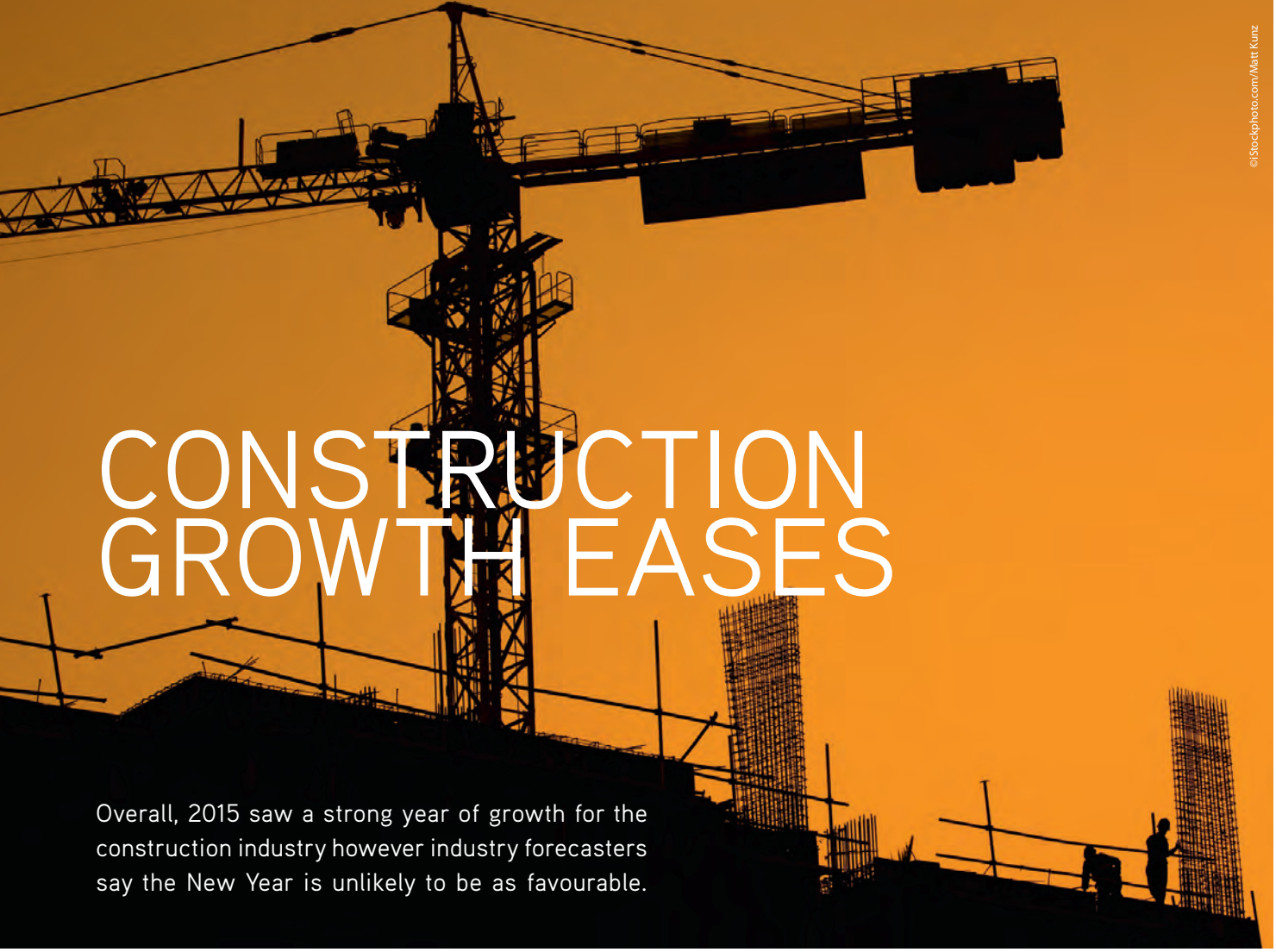

CONSTRUCTION GROWTH EASES

Overall, 2015 saw a strong year of growth for the construction industry however industry forecasters say the New Year is unlikely to be as favourable.

According to the Ai Group/HIA Australian Performance of Construction Index (Australian PCI), apartment building activity expanded solidly and at a rate that was only slightly below October's 10-year high level.

Across the four subsectors in the Ai Group/HIA Australian Performance of Construction Index (Australian PCI), apartment building activity expanded solidly and at a rate that was only slightly below October's 10-year high level.

"The continuing boom in apartment building saw a slight lift in the overall construction sector in November despite falls in house building and commercial and engineering construction. Both current activity and new orders in the apartment building subsector rose in contrast to the other three subsectors in which activity and new orders fell. With new housing approvals having fallen in recent months and with mining and energy-related engineering construction on the decline, the overall health of the construction sector in coming months is likely to depend on whether there is a lift in commercial construction and civil engineering work. In this context the decline in new orders in November is somewhat sobering," said Ai Group Head of Policy Peter Burn.

Despite the fastest pace of growth ever recorded during October in the 10-year history of the Australian PCI — essentially fuelled by an increase in apartment building activity — the construction industry only marginally increased throughout November, dropping 1.4 points to 50.7 (readings above 50 indicate expansion in activity, the distance from 50 indicating the strength of the increase). The continuing boom in apartment building was behind the slight lift in the overall construction sector due to falls in house building, and commercial and engineering construction.

Ai Group Head of Policy Peter Burn said the decline in new orders in November is somewhat sobering.

"Both current activity and new orders in the apartment building subsector rose in contrast to the other three subsectors in which activity and new orders fell," said Burn.

"With new housing approvals having fallen in recent months and with mining and energy-related engineering construction on the decline, the overall health of the construction sector in coming months is likely to depend on whether there is a lift in commercial construction and civil engineering work."

According to Peter Jones, chief economist of Master Builders Australia, a 3.9% rise in October has bolstered the number of dwelling approvals which he states "remains at record highs" with the strong pipeline of work to keep builders busy well into 2016.

"Master Builders expects the high level of approvals to translate into 220,000 starts this financial year taking the cumulative total to more than 600,000 in three years, for an increase of 30% on the previous three years," said Jones.

Industry forecasters BIS Shrapnel revealed a similar outlook in its Building Industry Prospect Bulletin for May/June of this year, anticipating 200,550 in 2015/16 dwellings being commenced nationally. Although slightly down from 2014/15, the figures remain robust in comparison to recorded 162,088 commencements in 2012/13 and 181,632 in 2013/14 indicating that the continued strength in approvals and significant pipeline of identified projects will ensure building activity maintains its momentum in coming quarters.

Housing Industry Association Chief Economist Harley Dale said: "The Australian PCI is providing a very accurate 'read' on conditions within Australia's construction industry. The apartment (non-detached housing) component of the residential sector has some further momentum to it, while detached house building is holding up very well yet doesn't look to have any further growth to it. We need to be seeing evidence of a rebound in the non-residential sectors sooner rather than later. Governments could perhaps give some further thought as to how they might assist with that transition."

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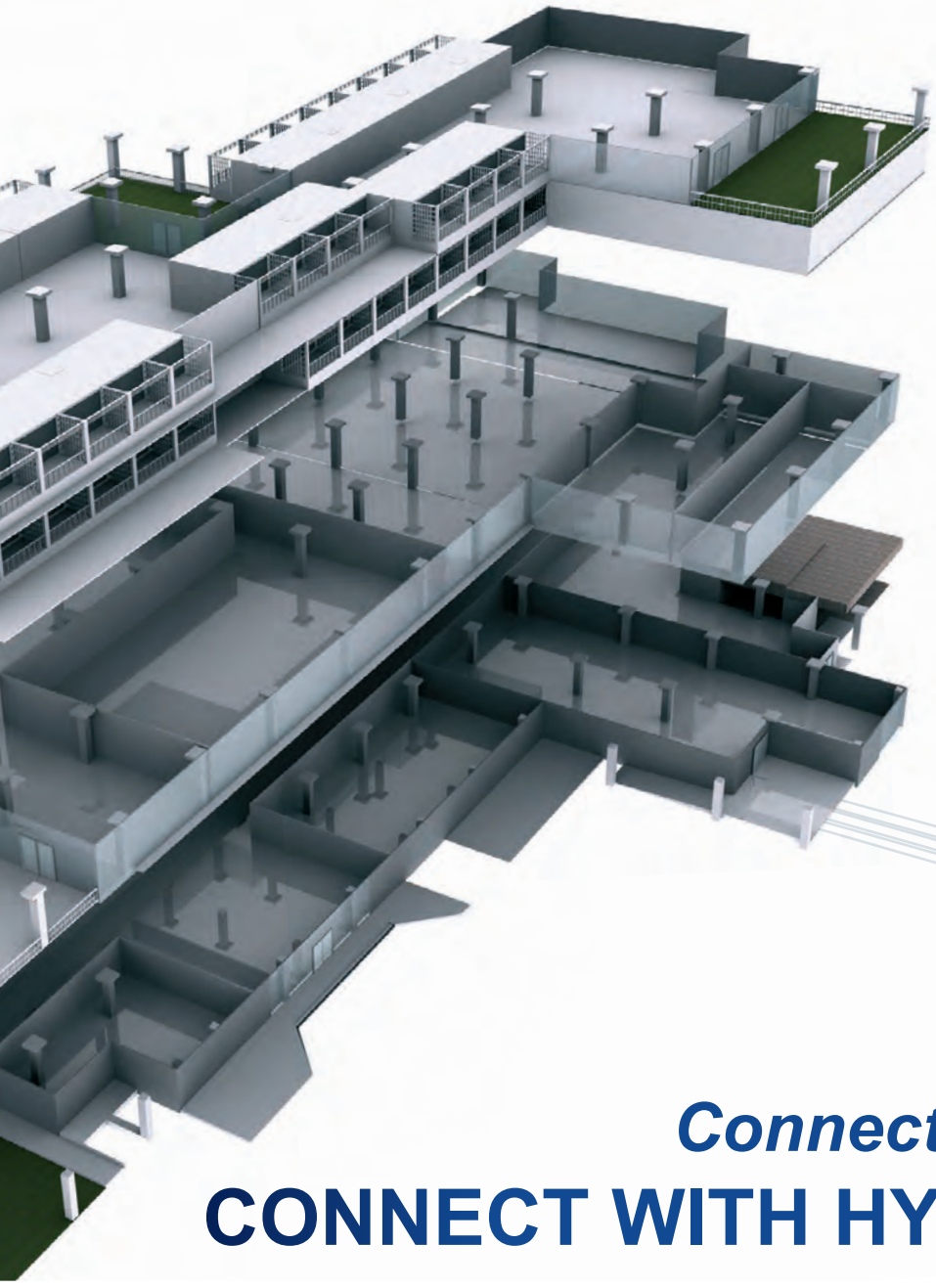

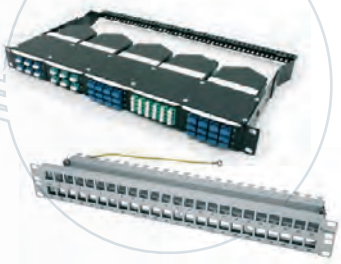

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PRYSMIAN ANNOUNCED AS AUSTRALIAN NBN'S 'SUPPLIER OF THE YEAR'

The Prysmian Group, which manufactures and supplies optical ribbon to nbn's national network, has been announced as Supplier of the Year for 2015 at nbn's strategic supplier summit.

The company was also recently awarded exclusive supply of all of nbn's copper cable requirements.

"We are particularly proud of this award as the cables we make for nbn are made here in Australia, in the Sydney suburb of Dee Why," said Danny Doyle, Prysmian commercial manager telecom — Australia and New Zealand.

"It's a truly outstanding achievement recognising the superlative contribution of many, many people in Prysmian.

"The nbn is Australia's largest infrastructure project, and the companies involved in building it are the best in the world at what they do. It is from this field that Prysmian has won this award. We are simply delighted that our long-term strategy to manufacture locally continues to be of significant value to our customers."

Prysmian's first cable contract with nbn was awarded in 2011.

"It was our responsiveness to the ramp-up in 2014, our continuous support in research and development and the close working connection our Production and Commercial teams that have allowed us to react quickly to the increasing nbn rollout demands," said Frederick Persson, Prysmian Australia CEO.

The company said next-generation networks (NGNs) are destined to become the infrastructure carrying the entire socio-economic system, as all services to citizens will be carried through the network, and predicts demand for high-quality optical fibre will grow in the next few years with the spread of NGNs.

OPTICAL FIBRE START-UP GETS CAPITAL BOOST

NEIF loan recipient and Brisbane resident, Brad Barr.

A former navy man from Brisbane has received a capital boost for his optical fibre start-up, Lightcore Tech, with funding from RMIT University.

Brad Barr is one of six to receive a $25,000 interest-free loan to help get their company off the ground from the university's $5 million New Enterprise Investment Fund (NEIF).

"I'm transitioning from the navy, and the support and assistance I've received from RMIT and the mentors in getting my pitch ready has been awesome," said Barr.

The NEIF provides much-needed funding to business start-ups from the university's student and alumni community and was established earlier in the year to provide the financial support, networks and advice necessary to turn entrepreneurial ideas into viable businesses.

Businessman and broadcaster Eddie McGuire, who chairs the NEIF board, said it was an inspired resource that would support the development of forward-thinking businesses, providing work opportunities for future generations.

"RMIT is renowned for being a world-class centre for education of technology and design," said McGuire.

"I can't think of a more perfectly positioned institution to train future business leaders and provide them with a platform to achieve their professional ambitions."

Frank Karalis

ANRITSU APPOINTS NEW COUNTRY MANAGER FOR AUSTRALIA

Test and measurement company Anritsu has announced the appointment of Frank Karalis to the role of country manager. Karalis replaces test and measurement veteran Ian Fraser, who retired at the end of 2015 after almost 20 years as country manager of Anritsu in Australia.

According to country manager designate Karalis, transitions in the industry present challenges for all suppliers of technology but Anritsu is well prepared for challenges — with an array of 5G and IoT solutions. Karalis has been with Anritsu for over five years. During that time, Karalis has been focused on further developing Anritsu's business in the telecommunications sector. The company will be seeking a replacement for Karalis's previous role in the near future.

In 2015, Anritsu Corporation celebrated the 120th anniversary of its foundation.

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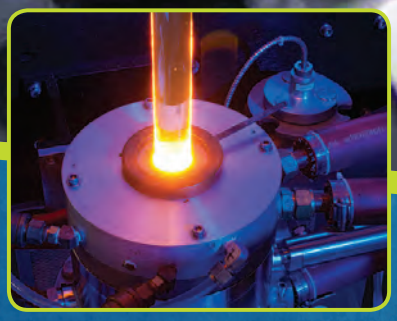

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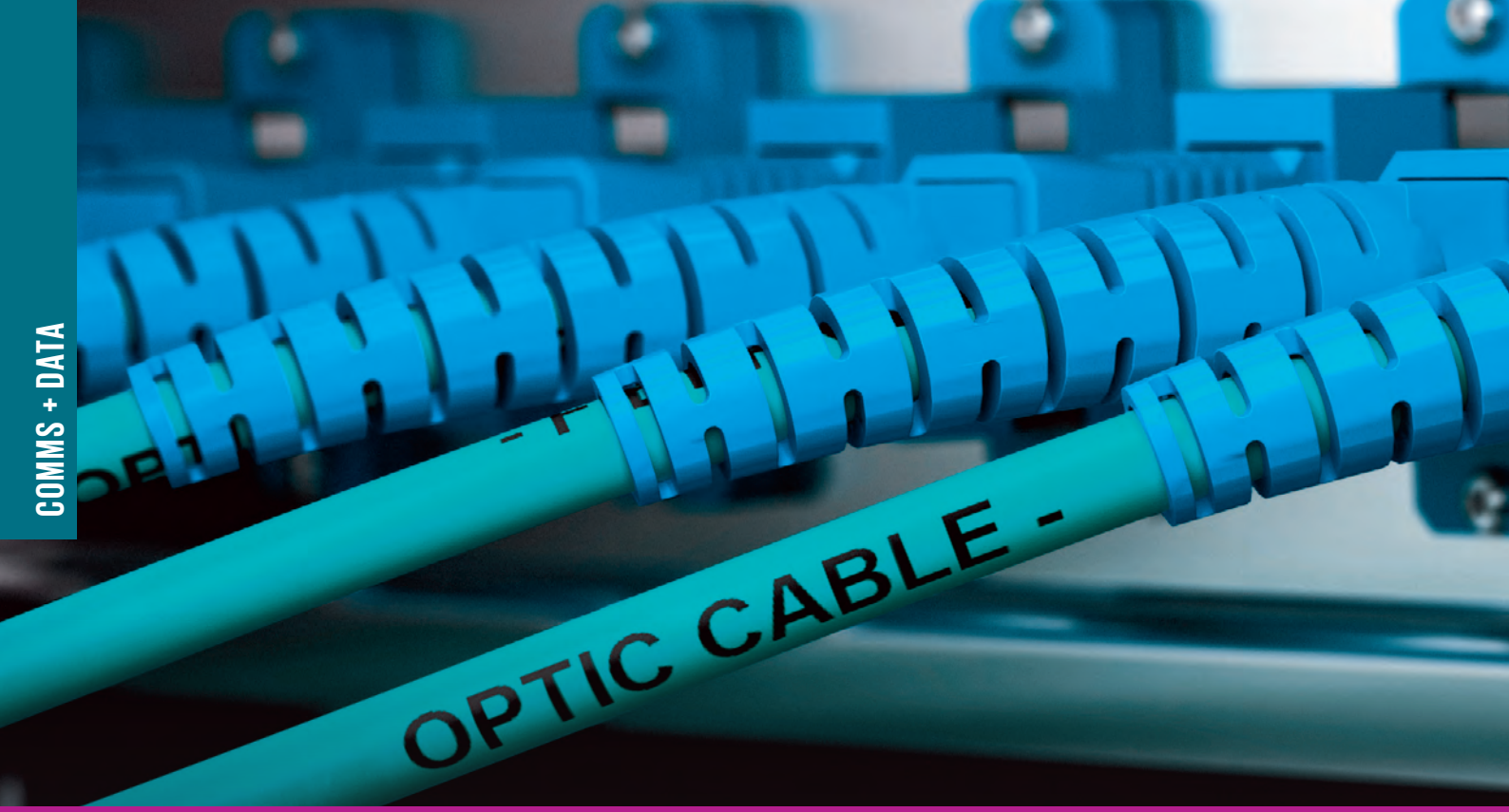


BREAKING AWAY FROM THE NORM

Craig Buckingham, National Technical Manager

In an increasingly connected world, networks must not only become more reliable and powerful, but installation and maintenance need to become faster and simpler.

Today's economic market conditions require a tangible increase in efficiency. Planners, installers and users expect pragmatic, secure and easily implementable cabling solutions for a variety of industries and applications, including data centres, office buildings, airports, hospitals, malls, sports stadiums and public broadband networks. In essence, the more demanding the data transmission, the simpler the cabling solution must be.

The practice we employ today, from design through to commissioning, is derived from two decades of trial and error, gradual and progressive standardisation, and advancements in technology. However, the ICT design is now so 'standardised', in both practice and documentation, that a once skill-laden profession is little more than a cut and paste industry. We have eliminated most of the technical thought by repeatedly using methods that were once cutting edge.

Get your priorities straight

According to the Top 10 CIO Technology Priorities survey conducted by Gartner, networking, voice and data communications was a number 10 priority. Ironically, the nine preceding priorities were related to applications and systems that depend on networking, voice and data communications systems. In an increasingly connected world with a growing impatience for latency and error, the very system on which we all depend is often given the least amount of thought when planning for all the utilities within a building. So how have we found ourselves in this position?

Most of the structured cabling designs created today are no different to those created in the late 90s. The components and their capability may have notched up a bit since then, but the topology hasn't. Even the active equipment in the switched environment is, for all intents and purposes, stagnant. If you take a look at other industries, such as lighting, AV, security and HVAC, you would be hard pressed to find the absolute resistance to change that we find in the ICT industry.

Despite ICT being the lifeblood of just about every industry and business, the communication network — as proven by the Gartner survey — is an afterthought, overshadowed by everything else. The communication network is often the first to be marginalised and squeezed on price. How important can it really be — as the cost of ICT is just around 7% of total CAPEX. While it is necessary to provide employees with an aesthetically pleasing, hi-tech and comfortable work environment, one could argue that the system that underpins the entire network is equally, if not more, important. It would be short-sighted and overly optimistic to expect the office layout to be altered to accommodate cabling changes and requirements.

Telecommunications spaces are often the first to take a hit in favour of a new requirement, such as a larger break area, restroom or meeting room. In the current day and age, ICT cabling should be designed and installed in a way that it requires less space and is fit

for purpose. It should support the business, not hinder it. However, the current design processes and standards do not support such radical thinking.

Conformance

In any cabling specification, the words 'must conform' jump out of the page. But what does must conform mean? The Conformance section (Clause 4) in the Generic Cabling for Customer Premises (AS/NZS 3080) offers three 'alternative' ways to comply. They are: channel performance by design; channel performance which contains a CP link or other components as detailed in the Standard; and the reference model. The reference model is the source of some of those numbers we all live by: 2, 5, 15 and 90 m, plus a few others. So why are we confined by these numbers? The text above the table that contains those values in the Standards document states that the table (Table 32 of AS/NZS 3080:2013) contains length assumptions of the mathematical model used to validate channel performance using components listed within the same Standard.

"They do not represent absolute restrictions on the implementation of channels and permanent links, but may be used for guidance in reference implementations," states the document. Yet these exact figures are adhered to vehemently in both design and implementation, even though length is not a Pass/Fail criterion (not including TIA).

Beyond the standard's length restrictions

The standard's philosophy is to have guidelines that cater for everyday installations and cover most technologies being used in a generic way. However, there are installation requirements that sometimes just fall out of the scope of the standard. One of those situations is when you need to connect a device to the network which has a channel length longer than 100 m.

So how to conform in this new age of discovery? Well, by using Clause 4 we have another option — channel performance by design. This simply says that if a link is installed and tested as a channel and it passes, then it conforms. Of course, the issue then becomes one of risk — there needs to be a way for a designer to know the extreme limits of the channel before it will no longer function as intended. The main testing issues when increasing the length are: insertion loss (attenuation of cable and connectors), delay skew and propagation delay. If any one of those fails, it will affect the performance of the transmission protocol, and in turn the network and user experience.

But why would there be a need to go over the limit? To deliberately design anything to the outer reaches of its capacity is not a wise move, but what if things change? For example, a permanent link that was once suitable is now on the very edge of current design practices because of the factors outside of our control. The floor distributor (FD) cannot be moved, and the idea of a second FD being introduced to provide for a handful of links would get laughed straight out at a project meeting. Fibre could be used, as long as there is space for additional power and media converters. But the rack layouts will have to be altered to allow for changes. Designers/installers can easily address the over-length issue by using quality components and cables and allowing for an extended channel. Interestingly, by using those same components the opposite is also true. The 15 m PL rule can become 2 or 5 m, thereby removing the surplus cable looms we are all used to seeing piled on top of pathways. These are explained in R&M's Installation and Testing Guidelines.

Something else worth noting within that same document is the one connector link. Current design practice is to allow for a telecommunications outlet (TO) and work area cord at each WAP or camera location, which limits the PL to 90 m under current design practice. The use of the increasingly popular field installable RJ45 plug allows for a couple of things: reduced on-site labour due to the removal of the need for a TO and more flexibility in regards to the TE's final resting place. The extended links should be regarded as a 'get out of jail free' card as it is anticipated that in any given design, only a small percentage will need to use this solution, but the cost implications should be immediately evident. The short links and one connector method can be used in any design, provided you're willing to embrace change and revisit existing practices.

Summary

As expectations grow, budgets shrink and opinions on ICT cabling remain indifferent, it is up to the ICT industry professionals to force the industry into the limelight by adapting processes and designing truly integrated, flexible and cost-effective networks. This article intends to create fresh thought over a discipline that has moved swiftly from one with a dedicated skillset to one that can be documented with minimal keystrokes. Of course, if you really are looking to change the game you could always look at Passive Optical LAN.

Reichle & De-Massari Australia P/L
www.rdm.com

Data centre connectors

Switches Plus Components' CEEform (IEC) power connectors are available in multiple configurations, from the standard 3-pole 16 A or 32 A 230 V plug and sockets, through to 5-pole 63 A 400 V switched interlock devices.

Data centres are often built using internationally recognised products, and the requirement for power is usually handled by CEEform connectors built to IEC60309 standards, rather than the usual Australian industrial power connectors.

Switches Plus Components' switched interlock products capture the plug in the 'on' position ensuring that accidental disconnection cannot occur. For added safety, the products are also rated to IP67 — the connectors are waterproof and the locking ring that is integral to the IP67 rating provides additional protection from accidental disconnection, especially if the power connectors are suspended from the ceiling to the racks below.

Switches Plus Components Pty Ltd

www.switchesplus.com.au

String combiner boxes

Phoenix Contact has launched the SCB Compact string combiner boxes with inline fuses that are even smaller, more flexible and powerful than its predecessors.

String protection is achieved outside the control cabinet, which reduces the thermal stress inside the connection box, since it allows the fuses mounted on the outside to release their waste heat into the environment. The inline fuse and all other components in the string combiner box, such as the circuit breaker, surge protection and monitoring system, are exposed to lower operating temperatures. Over the long term, this means better performance and longer service life for the entire system and also allows operation at higher ambient temperatures.

Moving the fuses to the outside makes the design of the connection boxes significantly smaller. The lower volume reduces transportation and storage costs, while the product's light weight means that a single person can install it.

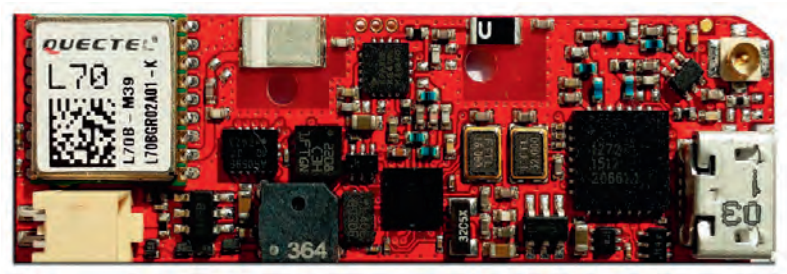
Phoenix Contact Pty Ltd

www.phoenixcontact.com.au

GPS/GPRS track-and-trace module

KCS BV has extended its TraceME product line with the TM-900/N1C1 track-and trace module based on LoRa technology.

The GPS track-and-trace full version module is designed to track and trace a variety of objects and is equipped with different technologies for traceability, eg, GPS/Glonass, LoRa, Bluetooth LE, ANT/ANT+ and proprietary RF, which can all be combined depending on the application. Compared to traditional track-and-trace modules, the device is not equipped with GPRS/SMS, which eliminates telecom operational costs.



The combined LoRa and 2.4 GHz RF technology offers tracing of the module over a wide area up to 20 km. The rough tracing from 20 km down to 300 m is made possible by LoRa, while the short-range tracing is achieved by the proprietary RF technique, offering accurate indoor and outdoor tracing up to 1.5 m.

The product features multiple onboard sensors (temperature, humidity and acceleration) and buzzer, LEDs, I/O functionality with a push-button, enabling the integration into a variety of custom specific (M2M) applications, such as Internet of Things and smart wearable electronics. It also comes with a battery lifespan of more than 10 years, solar-powered functionality and optional lightweight keyfob housing.

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www.trace.me

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CASE STUDY

Solution for rapid data centre expansion

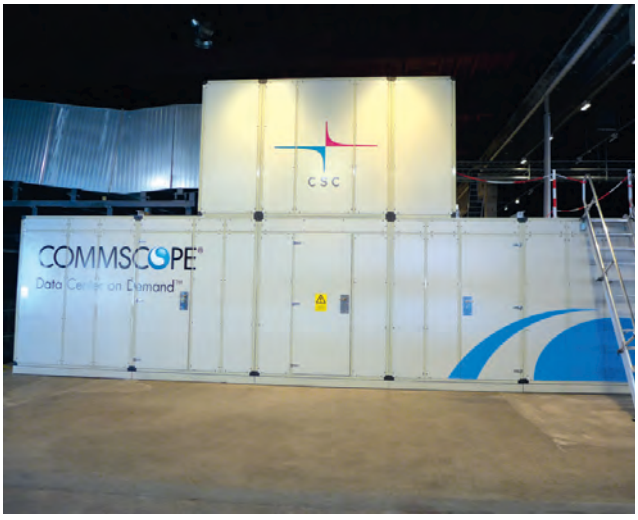
With growing demands on its IT infrastructure, the Finland-based CSC – IT Center for Science needed to expand its existing modular data centre facility in a way that could meet its requirements of fitting within a certain budget, having a short time to deployment and featuring a robust design that would withstand Finland's harshest temperatures.

To solve this problem, CSC deployed CommScope's modular, purpose-built data centre solution Data Center on Demand (DCoD). CSC deployed its first CommScope modular data centre in 2012, adding a second at the end of 2014.

In less than three years, the solution delivered significant bottom-line benefits to the organisation, including:

- **Sustainability:** Significantly reduced energy consumption and costs, compared to a traditional brick-and-mortar data centre, demonstrate CSC's commitment to leading-edge technologies that reduce its carbon footprint and complement its ecological credentials.
- **Water usage effectiveness:** One DCoD at CSC consumes approximately 120 m^3 of water each year — less than a typical household in Finland (164 m^3). The water usage effectiveness of the DCoD greatly offsets the extensive energy required for typical data centre chillers.
- **Power usage effectiveness (PUE):** While the average PUE for a typical data centre varies from 1.8 to 2.9, the DCoD installation at CSC averages 1.03 to 1.06. This is all the more significant noting that summer-winter temperatures swing from +30˚C to -35˚C.
- **Seamless expansion:** The DCoD is an expansion of the existing data centre, forming a single expanded facility. Installation and integration had to be achieved without causing any interruption to the existing IT services.

"The concept of a data centre has fundamentally changed. When considering the requirement for the physical space, traditional brick-and-mortar facilities may not be appropriate for all project scenarios," said Ciaran Forde, vice president, Global Data Center Solutions, CommScope.



"The CSC project is a perfect example of where an organisation requiring more capacity was able to expand in phases. The modular approach of Data Center on Demand enabled a phased capacity expansion from an engineering and economically sound perspective."

"IT technology and applications are changing very fast. So our data centres need to be able to adapt to those changes in a scalable and cost-efficient way. Customers, suppliers, owners and personnel alike must feel certain that we will fulfil our commitments and promises in an ethically sustainable manner," said Tero Tuononen, director ICT Platforms, CSC.

"Right-sizing and delivery strategy are key factors when planning for data centre capacity, which is why we decided on CommScope's Data Center on Demand solution."

Data Center on Demand is globally available to CommScope customers and is supported through CommScope's extensive PartnerPRO Network.

CommScope
commscope.com

Test instrument app

The Fluke Connect app works with over 20 different Fluke test tools and allows maintenance technicians to capture, identify and diagnose problems quickly while securely storing and sharing data with their teams from the field. The app also allows users to share with other users remotely using the ShareLive video call.

Other features include a troubleshooting function, which enables technicians to monitor intermittent problems with TrendIt graphs to identify and stop problems before they happen; and an EquipmentLog history, which helps users save time reporting by organising measurements by asset in one location. Data can be measured once with AutoRecord measurements and can be protected through the Fluke Cloud storage.

The app can be downloaded at the App Store or on Google Play.

Fluke Australia Pty Ltd
www.fluke.com.au

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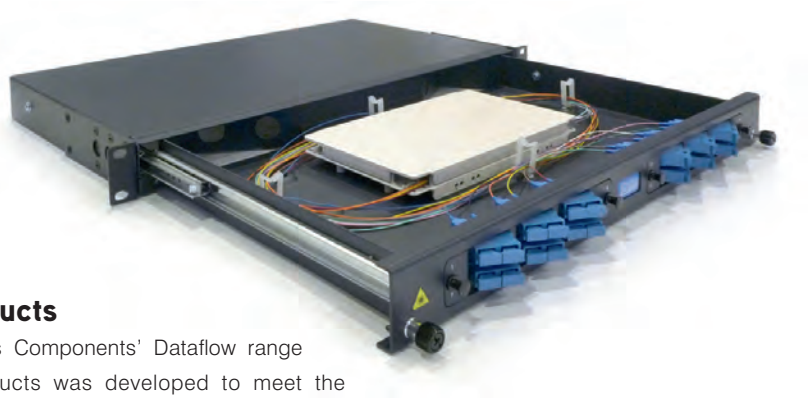

Data products

Switches Plus Components' Dataflow range of data products was developed to meet the stringent requirements and technical expectations of the Australian market.

Dataflow's Australian manufactured Loose Tube Fibre Cables are drum tested and can be supplied pre-terminated to suit project requirements. The patch cords feature bend-insensitive fibre manufactured by Corning.

The fibre-optic break out trays (FOBOTs) are available in a range of configurations including wall-mounted and rackmount enclosures. All FOBOTs can be pre-configured and pre-loaded with custom splice cassettes, pigtails, adaptor plates and through adaptors to meet project requirements.

Switches Plus Components Pty Ltd
www.switchesplus.com.au

Optical transmission solution

The SkyLaser line from ComNet consists of a pre-packaged point-to-point kit to establish a fully symmetrical gigabit free-space optical (FSO) connectivity link.

Two kits are available, supporting transmission distances up to 600 or 1500 m. Unlike the diminishing throughput of an RF wireless system, the units support full-duplex gigabit throughput up to the maximum operating range. There is also no degradation in system performance due to external noise or radar transmission.

The lightweight and industrially hardened units, with Gigabit Ethernet interfaces, can be powered by a PoE switch or the supplied mid-span power injector. Due to low latency and high bandwidth capability, which is suitable for last-mile scenarios, links can be used to interconnect ethernet switches with zero degradation to network integrity. This allows FSO links to be used as a true alternative to optical fibre, with multiple topologies available based on the switch configuration and FSO transmission distance.

The product offers licence-free operation globally.

ComNet Europe Ltd
www.comnet.net

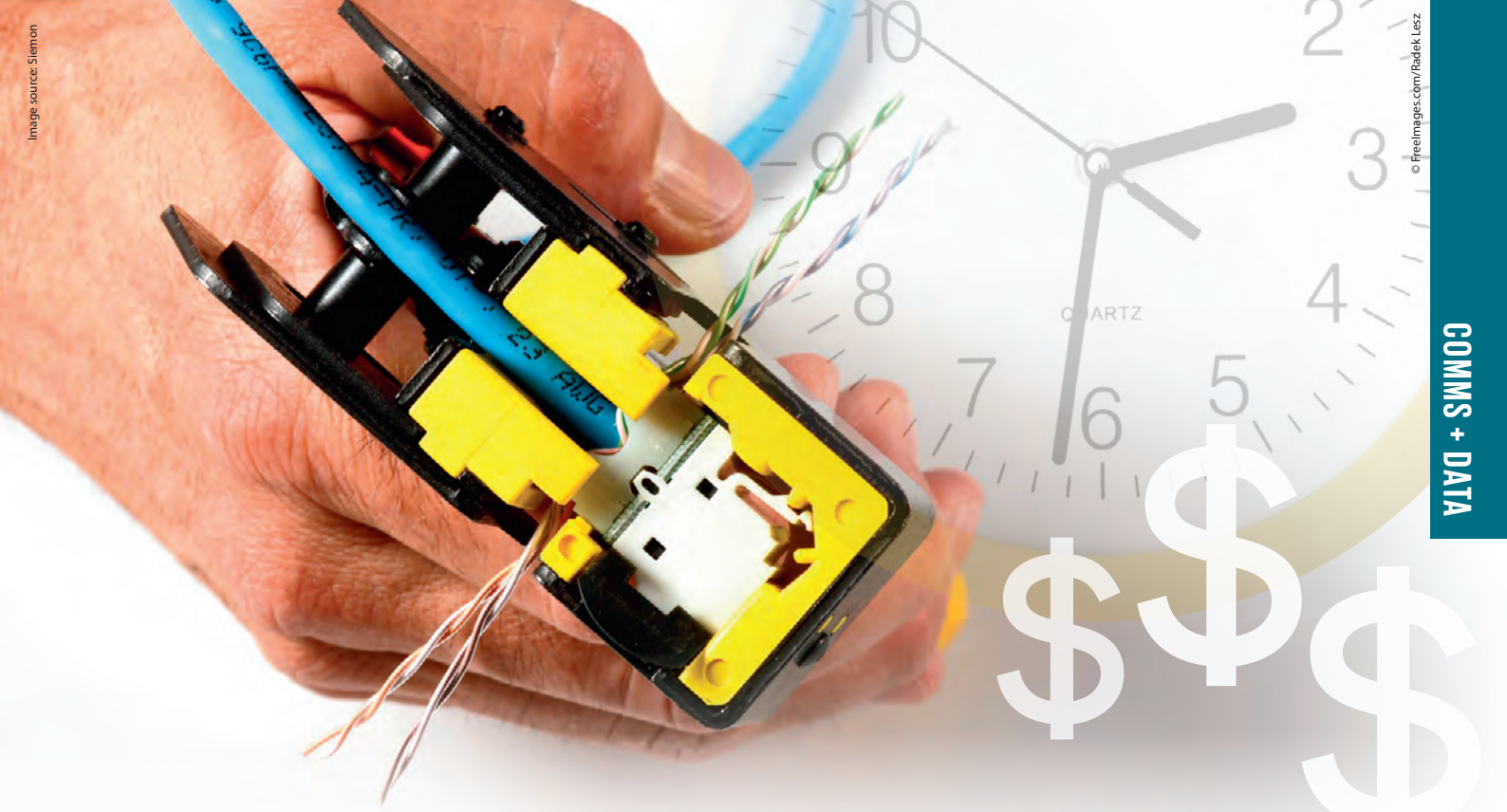

Image source: Siemon

REDUCE TERMINATION TIME AND IMPROVE PROFITABILITY

As a network cabling contractor, you need to keep an eye on product costs. When it comes to the cabling products you choose, you're balancing your customer's needs against what works for your bottom line.

It is important to remember that not every bottom line benefit can be measured in the product cost on the invoice. Sometimes, a product's ability to make the contractor more efficient can outweigh the purchase price.

One such example is termination speed. Labour costs are a major piece of a cabling project — an area where customers may look to cut their own costs. So, if contractors bid lower labour costs than their competition, they stand to win more business. Of course, they can't just go in there and slash labour costs below the point of profitability.

The key is driving labour efficiencies that give the breathing room to profitably bid lower labour costs — simply put, contractors need to be able to get it done faster. If contractors can do the job faster than their competitors, they can bid lower, win the job and still turn a decent profit.

Let's look at an example of a basic Cat 6 UTP job and how termination times impact profits. In this sample, we're looking at a theoretical 1000-drop Cat 6 job. To make it easier, we're just looking at the terminations, not pulling cable or testing — just terminating jacks. Obviously, this is a very simplified look at just one aspect of a project, but it does a good job of showing how the amount of time saved per jack can add up to significantly better profits and better chances of winning for you. Let's start with actual termination times.

Outlet A can be terminated in one minute, outlet B in two minutes and outlet C in three minutes. When it's time to calculate a bid, you're not going to base your labour estimate on the exact termination time — that would leave no margin for error and would be totally impractical in the real world.

	Outlet A	Outlet B	Outlet C
Actual termination time per outlet	60 seconds	120 seconds	180 seconds

Let's say you add two minutes to the actual termination time for each outlet to calculate your bid estimate (as you can see in the table below). While you're estimating a lower labour cost on the bid for outlet A than for B or C, you are in fact giving yourself more room between your actual termination time and your bid estimate. For outlet A, your bid estimate is 3x higher than your actual time. Outlet B cuts it to 2x and outlet C leaves just a 60% cushion. That extra room can have a real impact on your profitability.

	Outlet A	Outlet B	Outlet C
Actual termination time per outlet	60 seconds	120 seconds	180 seconds
Estimated termination time for bid	180 seconds	240 seconds	300 seconds

The potential benefits to your bottom line become clearer when you start putting it to hours and dollars (as in the table below, which continues the previous scenario). For outlet A, you calculated your bid on a 50-hour labour estimate, based on 1000 outlets at three minutes each. At, let's say, $90 an hour, that's $4500. That's a good deal lower than both B and C — so you're putting yourself in a strong position to win. But if you look at your actual termination time, the job may only take a little under 17 hours. It would take you two and three times as long with outlet B and C. Even though you bid your labour significantly lower with outlet A, you are actually way more profitable, making around $270 an hour vs $180 and $150 for outlets B and C. By the time it is all said and done, you made as much money (and maybe more) with outlet A, but bid lower and won the job.

	Outlet A	Outlet B	Outlet C
Actual termination time per outlet	60 seconds	120 seconds	180 seconds
Estimated termination time for bid	180 seconds	240 seconds	300 seconds
Total hours, bid estimate	50	66.67	83.3
Bid at $90/h	4500	6000	7497
Total hours, actual term time	16.67	33.33	50
Actual hourly rate	270	180	150

While the previous example might get you thinking about the benefit of faster terminations, what if you could terminate that Cat 6 jack in just 30 seconds? Under the exact same scenario as before, the ability to terminate outlet A in just 30 seconds doubles your profitability. You're making $540 an hour and absolutely killing your competitors. You're doing the job in a little over 8 hours compared to 50 hours for the poor guy who chose outlet C.

	Outlet A	Outlet B	Outlet C
Actual termination time per outlet	30 seconds	120 seconds	180 seconds
Estimated termination time for bid	180 seconds	240 seconds	300 seconds
Total hours, bid estimate	50	66.67	83.3
Bid at $90/h	4500	6000	7497
Total hours, actual term time	8.33	33.33	50
Actual hourly rate	540	180	150

At this point, you may be thinking that estimating 30 seconds per jack is a bit on the aggressive side. Aggressive? Absolutely. Impossible? Not at all. In fact, Siemon offers two separate Cat 6 outlets and termination methods that come in under that 30-second benchmark. Using Siemon's Z-MAX 6, cabling contractors have clocked terminations times as low as 23.5 seconds (www.siemon.com/zmaxchallenge/winners). Based on the exclusive Z-TOOL, the Z-MAX line innovates the entire termination process, starting with the lacing process, which is typically the most time-consuming part of a termination.

Siemon Australia
www.siemon.com.au

OTDR

The AFL FlexScan is a pocket-sized, handheld OTDR that provides fast fibre-optic network characterisation and fault location.

Combining SmartAuto data acquisition with event analysis and intuitive LinkMap display, the product enables technicians to quickly and easily troubleshoot faulty optical networks or completely characterise newly installed networks.

The unit's SmartAuto technology automatically selects the most appropriate OTDR settings to detect, locate, identify and measure network start, end, connectors, splices and macrobends. The LinkMap technology applies pass/fail limits to detected events, displays the network using colour-coded icons to highlight faults, and recommends corrective action to resolve faults. It alerts users to live fibre and poor launch conditions.

FlexScan comes in 1310/1550 or 1550 nm versions. The OTDR has integrated VFL and optional OPM/OLS ports and Bluetooth/WiFi communications.

Australian Tel-Tec Pty Ltd
www.teltec.com.au

CASE STUDY

Prefab data centre for ageing IT infrastructure

Isaac Regional Council, located halfway up the Queensland coast, opted for a prefabricated data centre from Emerson Network Power to replace its ageing IT infrastructure that had reached capacity. The critical infrastructure provider designed and deployed the data centre that has already improved the council's ability to deliver government services by cutting system outages by as much as 40%.

The council builds and maintains its own wide area network (WAN), which supports more than 300 IT users across seven regional towns. With a steady growth in the number of its employees combined with major IT initiatives, the council's ageing IT infrastructure could no longer cope.

"In 2014, the council's two existing data centres had more than reached capacity, had no room for expansion and suffered shortfalls in business continuity," said Robert Kane, chief information officer, Isaac Regional Council.

The council worked with Resolute Information Technology and Emerson Network Power to develop a solution. The standalone, prefabricated data centre was chosen because it could be deployed quickly and securely.

"It was pre-built and commissioned in Brisbane and transported 1000 km to site just 12 weeks from placing the order," said Kane.

The data centre houses four server racks, two air-conditioning racks and one rack of monitoring equipment with remote capability, giving the council's IT manager remote access to the building's critical equipment for intelligent and proactive maintenance, helping to prevent any system breakdowns.

Mo Kandeel, channel director, Emerson Network Power in Australia and New Zealand, said gathering a group of specialist data centre engineers to remote locations can be costly.

"The advantage of the prefabricated data centre is that Emerson installed and commissioned all the electrical infrastructure, switchboards, cabling and pipe work off-site in Brisbane. This means no air-conditioning technicians are required to go on-site; we only needed one engineer to commission the generator on-site," said Kandeel. "The flexible design allows for both increases in compute power — without increasing heat — and future growth."

Images courtesy of Emerson Network Power

Emerson Network Power said the whole process took just four months. The council now has a modern primary data centre with its own backup power generator and fire suppression system, as well as enough capacity to cater for future growth.

Emerson Network Power
www.emersonnetwork.com.au

Rackmounted network switch

Oring has launched the layer 3 high bandwidth rackmounted switch RGPS-R9244GP+-P for use in network backbones and high data flow applications.

Distributed in Australia via Ethernet Australia, the 9000 series rackmounted switch features layer 3 functionality, high data flow and POE (Power over Ethernet), fulfilling the stringent requirements for a core network switch.

The switch offers four full 1/10G SFP Ports and 24G RJ45 ports, each offering full 30 W POE. With its 128 Gbps bandwidth and layer 3 features, the switch suits applications such as automation plant control, industrial ITS core architecture, IP camera network distribution, network backbone and layer 3 network aggregation.

Ethernet Australia
www.ethernetaustralia.com.au

IP surveillance cameras

D-Link has released the Vigilance line of IP surveillance cameras which include the Vigilance Full HD Outdoor Dome Network Camera (DCS-4602EV) and the Vigilance HD Outdoor Mini Bullet Network Camera (DCS-4701E).

The DCS-4602EV is an indoor/outdoor dome camera with a 2.8 mm lens (96° field of view) offering Full HD 1920x1080 resolution, integrated LED infrared illumination with viewing up to 18 m for seeing in complete darkness, and a rugged housing that is rated for both weather and vandal resistance (IP66 and IK10 rated). Other features include: 3D noise filtering for enhanced low light performance; PoE (Power over Ethernet), allowing for convenient single cable installation; video motion detection; and ONVIF compliance for third-party VMS and NVR support.

The DCS-4701E is an indoor/outdoor mini bullet camera with a 2.8 mm lens (96° field of view) that offers HD 1280x720 resolution, integrated LED infrared illumination with viewing up to 27 m in complete darkness, and an integrated cable management bracket for additional protection against vandalism (IP66 rated). Other features include: Low Light+ technology, which dramatically increases low light performance; video motion detection; and ONVIF compliance for third-party VMS and NVR support.

D-Link Australia Pty Ltd
www.dlink.com.au

Flameproof enclosures

Marechal Australia has introduced the TECHNOR EJB series of flameproof enclosures, which provide Ex-d IIB or IIB+H2 modes of protection. The range is suitable for use in harsh conditions, such as inside or outside an industrial plant.

The range can be fully customised to suit individual electrical and mechanical requirements. It is compatible with the TECHNOR PL series of push buttons, PSRC series of rotating switches, PL series of signalling lamps, potentiometers, SRC -1 or -0 rotating handles, measuring instruments, electric and electronic equipment, and tempered glass windows.

Accessories for the range include external mounting brackets, drain/breather values, hinges, door handles and internal anticondensate painting.

Marechal
www.marechal.com/en/

SENSOR DETECTS CABLE FIRE BEFORE IT STARTS BURNING

Novel hybrid sensors can now detect the risk of fires before they can even be noticed by smell or discolouration of cable insulations.

Fires are frequently caused by smouldering cables. A smouldering cable can be detected with a little luck before it starts burning — the plastic coating changes colour, there is a smell of burning.

The sensors, developed by scientists at KIT and Karlsruhe University of Applied Sciences, now help detect such smouldering fires at an early stage by analysing the plastic vapours released by overheated insulating cables. The sensors consist of four areas with different metal oxides. They change their temperature-dependent electric resistance when they come into contact with gases.

These hybrid sensors combine measurement processes with data evaluation and might detect the risk of cable fires even before they are perceived by eyes and nose. They detect the gases released from the plastic coating due to heating and reliably identify and analyse the gas mixture and its concentration. In addition, they can also detect interfering gases, such as propene or carbon monoxide, and, hence, exclude false alarms. To this end, the hybrid sensors do not only possess a gas-detecting sensor chip, but also the computation capacity and algorithms needed for evaluating measured data.

"The combination of a smart evaluation process with physical measurement is the basic idea of this development," said Dr Hubert Keller, simulation and measurement project head of KIT's Institute for Applied Computer Science.

The highly sensitive and very reliable hybrid sensors might increase safety in cable ducts. In addition, their capability of finding gas mixtures and determining individual gas concentrations might be useful for detecting toxic mould gases during food control, explosive gases in fertiliser silos or leaks of natural gas pipelines.

"Hybrid sensors can be used anywhere as separate systems or in a network. They may also be combined with classical safety technology, such as infrared cameras," said Keller.

"For the development of the sensor, we use the effect that various gases react in different ways with gas-sensitive metal oxides as a function of temperature," said Professor Dr Heinz Kohler of the Institute of Sensor Technology and Information Systems (ISIS) of the Karlsruhe University of Applied Sciences. "This effect is the basis of a self-heated, temperature-controlled sensor chip with four sensors, ie, a sensor array. The sensor array is heated cyclically and cooled down again. Simultaneous measurement of electric resistance or conductance yields four specific conductance signatures, the evaluation of which provides information on the composition and concentration of the gas."

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Ethernet media converter

Available from Interworld Electronics, the B&B Electronics Elinx EIR Series of Ethernet Media Converters is designed to convert twisted pair copper signals to fibre-optic signals. LANs can be extended beyond the normal 100 m limit up to 2 km with multimode fibre and up to 20 km with singlemode fibre, and since data travels via fibre, it is protected from ground loop problems and electrical interference present along the cable run.

The series provides single channel media conversion between 10/100BaseTx and 100BaseFx. There are three models allowing Single-mode (SC), Multi-mode (SC) or Multi-mode (ST) fibre cable to be converted to RJ-45 copper Ethernet cable. DIP switches can configure link-fault-pass-through, fixed speed, full/half duplex and a link down alarm, while a relay output (dry contact) is provided for triggering an alarm if a power failure or a port link down condition is detected.

Dual 10 to 48 VDC power inputs allow a backup redundant power source to be connected. The series also operates in a temperature range of -34 to +74°C, housed in a rugged DIN rail metal case.

Extension of LAN distances enables communication with remotely located Ethernet-enabled devices. The application can be used for receiving data from one end of the warehouse to the other, tying two buildings together, enabling communications on a tank farm, monitoring remote surveillance cameras or monitoring a SCADA system.

The product is certified by UL with ISA12.12.01 Class I, Division 2 for use in hazardous locations and meets NEMA TS1/2 Environmental requirements for traffic control equipment.

Interworld Electronics and Computer Industries

www.ieci.com.au

Fusion splicer

The Mini 4S Active Clad Alignment Splicer from Fiber Fox is designed for FTTx and features four motors in the one splicing machine.

The portable product, which weighs around 1.31 kg (without battery) and is 122 x 124 x 131 mm in size, offers users reliability and efficiency in various environmental conditions (operating in a -15 to 60°C temperature range). It features a 4.3″ LCD monitor with a GUI interface and has a splice memory that can store up to 2000 records.

The device contains antishock capabilities and is both dustproof and waterproof. It provides quality fusion splicing at 0.02 dB loss, a splicing time of 7 s and a heating time of 18 s. It also has a long battery life of 260 cycles.

Two batteries are included in a standard package. The product also comes with a three-year warranty.

Warren & Brown Technologies

www.warrenandbrown.com.au

Smart managed 10G switch

Netgear has introduced the ProSAFE 28-port 10-Gigabit Smart Managed Switch (XS728T), designed for small to medium organisations with 10GBASE-T connectivity and Advanced L2+/Layer 3 Lite features.

The switch can provide 10G connections to 10G-capable servers and network attached storage (NAS) systems. It can also be used at the centre of a small business network, or as an aggregation or access switch in a larger organisation, including workgroup access or connecting to a 10G ProSAFE fully managed switch (M6100/M7100/M7300) on one end, and extending the 10G connections to the network edge.

The product provides L2+/Layer 3 Lite features for current and future needs on virtualisation, converged networks and mobility. Other features include: protocol-based VLAN, MAC-based VLAN and 802.1x Guest VLAN; advanced QoS (quality of service) with L2/L3/L4 awareness and eight priority queues including Q-in-Q; static routing (both IPv4 and IPv6); private VLAN; dynamic VLAN assignment; IGMP and MLD snooping; IPv6 support for management, QoS and ACL; and GUI or PC-based Smart Control Center application for multi-switch deployment.

The product also comes with the ProSAFE Lifetime Hardware Warranty.

Netgear

www.netgear.com.au

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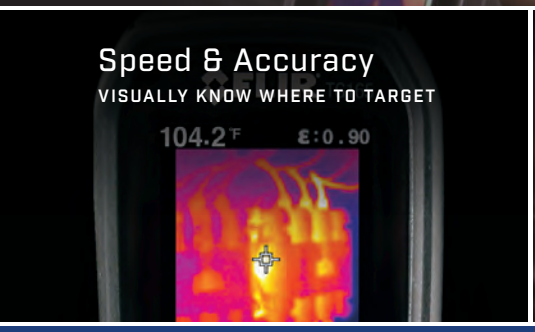

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AN INTRODUCTORY GUIDE TO LIGHTING CONTROLS

Lighting Council Australia has published an introductory guide outlining the benefits of lighting controls.

Lighting Controls Introduction explains the role that lighting controls systems play in achieving an energy-efficient lighting design — offering increased comfort, safety, convenience, health and wellbeing of building occupants; improving aesthetic appeal of building interiors and exteriors; providing installation cost reductions, building flexibility, maintenance improvements and compliance with building regulations.

Lighting Council Australia CEO Bryan Douglas said that lighting controls can cut energy bills, reduce greenhouse emissions and make a lighting system flexible and convenient to use. "For example, using a light level switch to control external building lighting will mean that external lights are not left on in the daytime," he said.

"Occupancy sensors and automatic light dimmers can switch or dim lighting automatically so that spaces are lit to predetermined illumination levels and only when occupied. Overriding such systems is possible," he added.

Lighting controls can provide conveniences and benefits for all types of buildings and applications. Designers, installers, specifiers and building owners should discuss their needs with their lighting equipment supplier or refer to the capability section of the Lighting Council Australia website — www.lightingcouncil.com.au.

RITTAL WELCOMES NEW MANAGING DIRECTOR

Rittal has appointed a new managing director for its Australia and New Zealand business.

Michael Mallia, the former general manager of Eaton's Power Quality and Telecoms business in ANZ, will be based in Sydney and responsible for leading the business through its next phase of growth.

"This is an exciting time to lead the Rittal business in Australia and New Zealand and to partner with the industry to meet the challenges of keeping critical equipment and processes secure, whilst maintaining operational efficiency and reliability," said Mallia.

"In an era where innovation and customer service are the keys to survival and growth, we have the added advantage of an industry-leading product portfolio.

"From our extensive range of industrial enclosures, climate control units and power distribution systems, through to our holistic data centre infrastructure offering, our products are particularly well suited to the Australian and New Zealand markets."

Mallia will also be responsible for propelling Rittal's sales and marketing presence and said he looks forward to working with key stakeholders in providing organisations with a range of tailored products and related services.

ENERGY-INDEPENDENT SUBURBS?

A new investigation by Brookfield Energy Australia could pave the way for a residential development in the NSW Hunter Valley to be built off the grid and powered by renewable energy.

The $1.1 million initial study is receiving $442,000 from the Australian Renewable Energy Agency (ARENA). Ivor Frischknecht, ARENA CEO, said substantial connection costs and the falling cost of renewable energy made it a good time to explore the option of forgoing grid connection.

"If this latest work shows renewables, battery storage and enabling technologies can reliably and cost-effectively power new suburbs, it could set a precedent for residential developments and potentially accelerate the uptake of renewables in Australia," Frischknecht said.

"There are a number of regulatory challenges and constraints and technical risks facing microgrids. Brookfield will share key insights about overcoming these barriers with the energy industry."

The study's findings could be used in the suburb of Huntlee, a residential development of 7500 homes by LWP Property Group, which will be the first new town in 50 years to be built in the Hunter Valley.

Brookfield Energy CEO Richie Sheather said the company is keen to explore sustainable alternative solutions for energy and water infrastructure, and see an emerging competitive market for large-scale local microgrids leveraging high penetration renewables.

Huntlee Project Director Stephen Thompson said Huntlee would be an entirely master-planned community designed for 21st-century living that embraces the very latest in renewables.

"For quite a number of years, we have been investigating ways to incorporate cutting-edge renewable technology into the very fabric of the town," Thompson said.

"If the proposed model for Huntlee is successful, it will positively influence the nature of housing, employment, business, transportation and education for our future residents."

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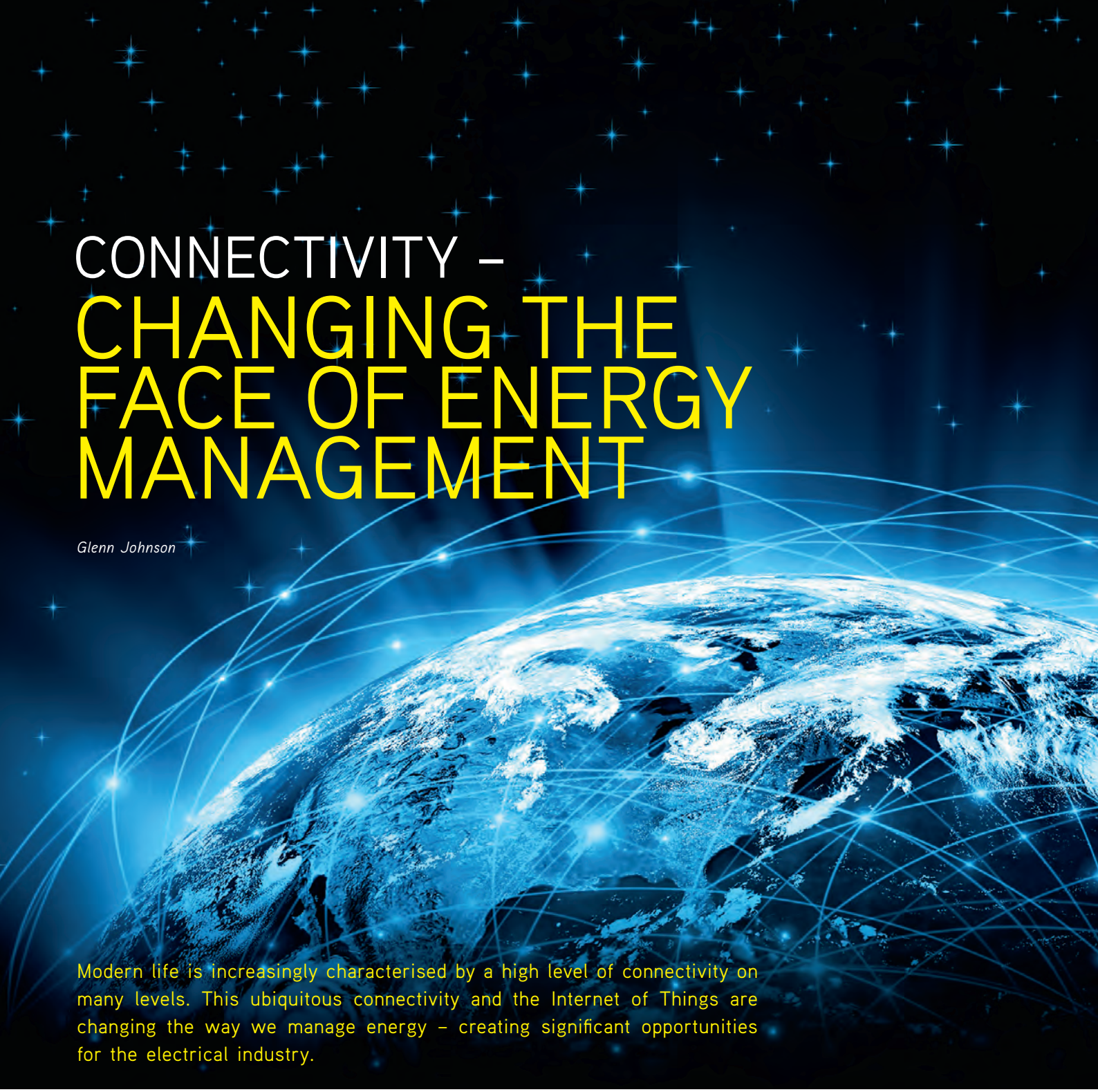


CONNECTIVITY – CHANGING THE FACE OF ENERGY MANAGEMENT

Glenn Johnson

Modern life is increasingly characterised by a high level of connectivity on many levels. This ubiquitous connectivity and the Internet of Things are changing the way we manage energy – creating significant opportunities for the electrical industry.

The technology that supports all this connectivity has been through a process of evolution for about 40 years, starting with the development of Ethernet technology in the 1970s and following with the development of the TCP/IP suite of protocols that make the internet possible. Today, Ethernet is the standard method of connecting computers together into networks — both wired and wireless — and the TCP/IP protocol suite is the standard method used for communication over Ethernet and many other technologies such as cellular phone networks. The widespread use of Ethernet has made networking hardware affordable enough to be embedded in a range of devices other than just computers — including industrial sensors and actuators, in our cars and appliances and even in our television sets.

The enormous growth in Ethernet-connected devices is leading to what is being called the Internet of Things (IoT), which is expected to grow to 50 billion connected devices by 2020 (Cisco 2011[1]). Within the IoT, devices across a variety of industries will be interconnected through the internet and peer-to-peer connections, as well as closed networks.

Ethernet-enabled devices are making our interaction with the electrical system in our homes and business premises smarter, therefore allowing better control and monitoring to make it more efficient. We are then able to keep a constant eye on our energy consumption, leading to savings in its daily costs.

Information that was not previously available can now be accessed — about the life cycle of the equipment, usage trend and alarms and signalling — should something go wrong in the electrical distribution system. A restaurant owner can now be notified immediately if a chiller unit has tripped to prevent any spoilage of food. This visibility allows significant cost efficiencies as the owner can quickly identify issues and respond accordingly.

Energy management and sustainability challenges

In parallel to the rapid evolution in smart technology and connectivity, the usage and cost of energy are also increasing exponentially as a result of industrialisation and urbanisation. This has led to growing concerns about the damage of increased electricity generation (such as non-renewables) to the environment. Ethernet-enabled smart devices are being seen as technology that we can leverage to monitor and control our buildings and facilities to optimise our energy consumption.

In response to these challenges, recent years have seen large growth in alternative electricity generation at end-user premises, particularly the use of solar panels. Electricity distributors are also working towards a technology known as the 'smart grid', part of which involves the use of 'smart meters' at end-user premises. Rather than just metering energy use for bulk billing purposes, these new meters will allow distributors and end users to have better information on how energy is consumed, and to better control that use, including the use of end-user generation systems. And of course, the enabling technology that makes all this possible is the technology of the internet.

According to the Energy Networks Association:

As technology and energy markets develop rapidly, smart meters and other devices will benefit individual customers. Customers should receive practical information and more rewarding tariff structures that match their needs; be able to control their energy use to get better deals and participate in new markets, such as exporting energy to the Grid through solar panels or supporting energy storage options, as these develop commercially.[2]

Making the most of it

In residential premises, the electricity distribution is relatively simple: the switchboard divides the home up into various circuits for lighting, cooking, water heating and general-purpose use, with circuit breakers protecting those circuits in case of overloads. Better monitoring of these circuits will enable the consumer to minimise their electricity consumption and costs.

In commercial premises, the layout of electricity distribution can be a lot more complex. Take for instance a hotel: each suite has its own electricity supply that must be protected without affecting other suites; there is a highly variable air-conditioning load from day to day and hour to hour; large common areas with lighting and air conditioning; commercial kitchens; fire protection and security systems; water heating; complex water distribution and wastewater systems — the list goes on. The ability to enhance the monitoring and control of electrical distribution in commercial premises has the potential to help businesses realise significant savings.

Industrial plants, as significant consumers of electrical energy, also stand to benefit greatly from smarter monitoring and control of electrical distribution systems.

Connected panels to the rescue

Modern switchboard panels can now be equipped with smart, Ethernet-enabled devices that greatly increase the control and monitoring of the electrical systems in a plant or building. Circuit breakers with embedded sensors can provide current monitoring down to the individual circuit level, passing this data to smart monitoring and data logging devices that are Ethernet and internet enabled.

Traditionally, commercial businesses that wanted fine-grained control of their electrical systems have used a building management system (BMS), and the advent of smart panel technology provides data collection and control via a BMS more cost-effective through the use of standard Ethernet-based technology. For those businesses that have not invested in a BMS, data from connected panels can be collected and managed via a cloud service.

Similarly, for industrial systems, connected panel technology permits simpler standards-based connectivity of electrical distribution technology with SCADA and DCS systems.

Since all modern buildings will have an Ethernet-based communication infrastructure in place, this data can be networked back to a central system or to the internet. The data can be collected to monitor and optimise energy consumption across the entire plant or building infrastructure, right down to individual circuits and devices.

Ethernet-equipped relays can also be used to provide control back to the individual smart panels — allowing individual circuits to be switched off or on as needed. For example, if you were a hotel operator, why would you want to air condition rooms that are empty for long periods of time? Connected panel technology could make this type of energy saving possible.

Managing the data

One of the challenges in making use of all this smart device technology is the sheer quantity of data that may need to be stored, analysed and presented in a meaningful way. Storing it and processing it would require computing and software infrastructure to be deployed, and the larger the number of smart devices, the larger the computing cost. For organisations with multiple sites, such as bank branches, restaurant or hotel chains, this would mean having to manage data at multiple sites.

The trend in dealing with such data issues is to make use of internet 'cloud' services. Rather than deploying software and computing infrastructure locally at a site — or perhaps in addition to local systems — the connected panel technology vendor can supply online services on the internet in the form of software-as-a-service (SaaS).

The SaaS service is configured to analyse and present the data back to the end user over the internet, without the end user needing to deploy any specialised services. Better still, for those users with multiple sites, the monitoring of energy consumption can be presented across all sites in one system, presenting considerable savings and providing access to the system from off-site and via mobile devices.

Multiple savings

While investing in electricity distribution switchboards with connected panels will obviously come at a cost, there will be a number of areas where savings will be realised.

First of all, for those businesses without a BMS or industrial control system, the use of cloud SaaS services removes the need for local site-based computing infrastructure and all the associated costs of owning and housing hardware and software. In addition, better management of building infrastructure, such as air conditioning, will in the long run reduce wear and tear by reducing the over-use of infrastructure, reducing future capital expense.

In terms of operating expenditure, the energy savings described above is a major saving, because the aim of the technology is to make better use of electrical energy, reducing waste.

Asset management and maintenance

One of the great benefits of connected panel technology is also the ability to know when the electrical distribution technology itself needs maintenance, or to make troubleshooting easier when electrical failures occur. When electricity supply fails it can take considerable time and effort to isolate and determine the cause of the failure. Whether a cloud service, a BMS or an industrial control system is used, connected panel technology can significantly speed up the correction of the problem by pinpointing exactly where the failure has occurred, minimising downtime and cost.

Similarly, as the electrical distribution system ages, smart panel technology can assist with preventive maintenance, by alerting when components are likely to need replacement before they fail.

Conclusion

It is now possible to make the 'smart buildings' and 'smart plants' of the future using components such as circuit breakers, sensors and actuators that can be networked together using Ethernet in 'smart panels' in order to form an intelligent system — or to integrate with a BMS or industrial control system — more cost-effectively and efficiently than ever before. Cloud infrastructures are also now available that allow businesses to locally or remotely manage and monitor their electrical systems via the internet.

References:

1. Evans D, 2011, *The Internet of Things: How the Next Evolution of the Internet is Changing Everything*, Cisco Systems, Inc., 2011, viewed 17 July 2015, <http://www.cisco.com/web/about/ac79/docs/innov/IoT_IBSG_0411FINAL.pdf>.
2. Energy Networks Association, *Smart Metering*, viewed 17 July 2015, <http://www.esn.asn.au/smart-metering>.

Residual current device tester

Available to rent from TechRentals, the Megger RCDT330 Residual Current Device Tester (RCDT) tests standard, DC, selective and programmable RCDs to IEC61010-1.

The device's download manager software allows the user to download up to 1000 test results for analysis and data storage via a USB interface. Data is stored in non-volatile memory and is retained when the instrument is switched off or batteries are exhausted.

The product has been designed for ease of use for the electrical industry with straightforward operation and functionality. Even if inadvertently connected to a live three-phase supply, the tester will remain undamaged and present no safety hazard to the user.

The device enables testing on 110 V centre tapped supplies, features ramp testing and auto (remote) testing, and is weatherproof to IP54.

TechRentals

www.techrentals.com.au

LED light bulbs

Philips has released three LED bulb ranges for the residential market, providing flexibility of home lighting and interior design needs. The range consists of the LED Deco Classic, Scene Switch LED bulb, and the new-generation LED bulbs, including the mini, regular and mega bright LED bulbs.

The LED Deco Classic filament bulbs have the appearance of traditional filament incandescent bulbs, but with energy-efficient LED technology. They come in eight different designs, suitable for general and decorative indoor lighting, such as chandeliers, wall sconces or modern luminaires. They offer 250–806 lm in a warm white light (2700 K), saving up to 90% energy with an estimated life expectancy of 15,000 h.

The Scene Switch LED bulb is a 2-in-1 LED bulb offering warm white light and cool daylight in a single light bulb. Users can toggle between the two light colours by switching the light on and off. The compact light bulbs fit into either Edison screw or bayonet cap fittings and fixtures. Featuring a light output of up to 806 lm, the bulbs offer an estimated life expectancy of 15,000 h.

The new-generation LED bulbs provide diffused and non-glaring light. The mini bulb comes in 250 and 35 lm, suitable for small spaces like hallways or storage areas, while the regular bulb comes in five different brightness options (470, 600, 806, 1055 and 1400 lm), suitable for most areas of the home. The mega bright LED bulbs offer 2000 lm, suitable for larger living spaces.

Philips Lighting Pty Ltd
www.philips.com

CASE STUDY

LED video displays dominate Qld mall

Image courtesy of NanoLumens

Enormous curved LED video displays suspended from the ceiling in Queensland's biggest mall — Pacific Fair on the Gold Coast — are part of a $670 million renovation that began in 2014.

The newly refurbished mall features around 420 stores covering more than 1.6 million square feet, a place where visitors will now also experience the largest curved LED displays purported to have ever been installed in Australia.

The NanoCurve LED video displays by NanoLumens appear to float above shoppers, and they offer a bright and dynamic consumer engagement solution. Three single-sided 5MM NanoCurve displays, measuring 3 m wide and 5.2 m tall, as well as a 6MM double-sided NanoCurve, measuring 3.2 m wide and 5.4 m high, which was built with a wave shape running through the display, were installed by AV systems integrator Digi Corporate.

Design challenges

The NanoLumens displays were recommended by Digital Place Solutions (DPS), and co-founder Stephen Rubie said the format and shape of the displays were considered the biggest challenges when designing for the refurbishment.

"The atrium is large, with a combination of circular and triangular openings and a skylight above," said Rubie. "To provide a relevant display in the space required a circular array of curved displays to meet the aesthetic objectives of the mall, while aligning the advertising faces with the main pedestrian traffic corridors. This had to be achieved while maintaining standard portrait media format dimensions."

The design criteria also required the displays to be thin and light. The atrium space is open with a lightly supported glass roof structure so the displays had to continue this design theme, while delivering high-impact visuals.

Curved solution

The NanoLumens displays were considered the best solution at a resolution fine enough for close viewing from the upper levels of the atrium.

"The NanoLumens 5MM NanoCurve was ideal for the application — fine pitch, perfect curve and super-wide viewing angles across multiple levels of the mall," said Rubie.

"With a depth of just over four inches, the NanoLumens displays allowed the designers to complement the display with a lighting feature on the inside of the array, creating a chandelier effect."

He said the NanoLumens displays at Pacific Fair mark the first time that LED displays of this size have ever been deployed together in Australia, enhancing the space "in a way that no other piece of architecture or technology could".

NanoLumens
www.nanolumens.com

Towel rail timer kit

The CABAC Real Time Switch 2-WIRE 230 V 35 W towel rail timer kit comes with an energy-efficient timer designed to provide dry and warm towels for residential applications. The timer automatically turns the power on each day at predetermined times before switching off. Users can select up to eight predetermined routine times per day, which can be preset from 1 to 6 h (factory default is 1 h). A holiday mode option will suspend routine timer operation to save power, which can be switched back to routine times with a tap of the button press. The timer can also be manually operated to turn power on or off, while the interval battery retains routine times even after power loss for up to 24 h.

The kit includes: the CABAC HNS710RT 2-Wire Real Time; wall plate; cable clamp; CABAC/HPM style push-button; Clipsal style push-button; insulation breakdown sticker and instruction sticker; and towel rail timer instruction manual.

CABAC

www.cabac.com.au

LED floodlights

The NOX floodlight range from M-Elec contains seven LED floodlights designed for a variety of applications.

The slim floodlights are lightweight and feature an offset bracket design, which means they can be installed in one simple procedure without needing to remove the bracket.

The range includes the NOX1, the lightest in the range weighing only 0.55 kg but delivering up to 1500 lm at 15 W; the NOX3, which offers up to 2980 lm at 30 W; the NOX5, which weighs 1.7 kg and gives up to 5000 lm at 50 W; the NOX10, weighing 5 kg and providing up to 11,000 lm at 100 W; the NOX15, weighing only slightly more at 5.1 kg but offering up to 16,400 lm at 150 W; the NOX20, which delivers up to 25,600 at 220 W; and the largest floodlight NOX30, which weighs 11.1 kg and gives out 34,000 lm at 300 W.

The products have a lifespan of up to 50,000 h and come with an IP65 rating and 3-year warranty (5 years for Platinum Licensed Installers).

M-Elec Pty Ltd
www.melec.com.au

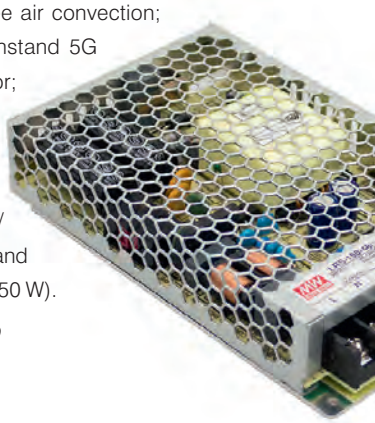
Enclosed power supply

ADM has released the LRS series of enclosed power supply from Mean Well, which includes models ranging from 35 to 150 W.

The series is the next generation of the RS series, delivering a higher efficiency rating and a cost-effective alternative due to a streamlined circuitry design that lowers the electrical component count. The LRS also has a compact design and a useful 1U low profile, fulfilling the increasing demand for smaller power supplies.

Other features include: universal AC input; withstand 300 VAC surge input for 5 s; short circuit, overload and overvoltage protection; cooling by free air convection; operating altitude up to 5000 m; withstand 5G vibration test; LED power on indicator; no load power consumption <0.3 W; 100% full load burn-in test; and a high operating temperature up to 70°C.

The series is also compliant to IEC/EN60335-1(PD3) and IEC/EN61558-1, and -2-16 for household appliances (35~150 W).



ADM Instrument Engineering Group
www.admtech.com.au

Individually switched power strips

The RackLink individually switched power strips are designed to instantly power-cycle equipment directly from the rack.

Each rear-facing power outlet can be controlled via a panel-mount switch on the front face of the power strip, while space is available beneath each switch for mounting labels at the point of installation. Users can identify each outlet's on/off state with a range of illuminated or non-illuminated switches that feature coloured tabs, as well as control the whole power strip with an illuminated master switch or use a master neon indicator.

Built to last using mild steel and powder coated with a black ripple finish, users can opt from either GPO (AS3112 - Australian 3 pin) or the IEC-Lock C13 outlets. IEC-Lock outlets are designed to give existing equipment a safe and secure power supply by locking into any existing IEC C14 plugs, thereby eliminating the need for special locking plugs.

The entire power strip is protected with a high-quality thermal overload breaker and comes standard with a rear-entry input cable that can be terminated with a connector of choice.

RackLink
www.racklink.com.au

Energy-efficient air conditioners

Mitsubishi Electric Australia has introduced the MSZ-GL series of air conditioners with R32 refrigerant technology, providing fast, quiet and energy-efficient air conditioning. The models in the range include the MSZ-GL25VGD, -35, -42, -50, -60, -71 and 80.

The R32 refrigerant technology improves upon its closest equivalent (R410A) with a third of its global warming potential, according to the company. The series is designed with 'set and forget' functions, including a weekly timer and an i-save mode that recalls preset temperatures by pressing a button on the remote controller. The series also offers an optional Wi-Fi control that connects units to smartphones or other smart devices, allowing users to control their air conditioners via an internet connection.

A Blue Fin Condenser provides an anticorrosion treatment for the heat exchanger of the outdoor units, suitable for coastal areas, while a demand response-enabled interface allows a Demand Response Mode to be activated in response to signals sent from the electric power company at times when it is necessary to reduce peak demand.

The series offers wide and long airflow over a horizontal range of up to 150° in heating and 100° in cooling, with a reach of up to 12 m. A quiet-mode fan speed setting provides quiet operation below 19 dB(A) for 2.5 and 3.5 kW models.

Mitsubishi Electric Australia

www.mitsubishi-electric.com.au

Energy meter

The Carlo Gavazzi EM270 from NHP is a dual 3-phase energy meter developed to reduce metering space and save installation time.

The increasing need to monitor energy usage as well as the requirements of NABERS, Green Star and Section J 8 of the BCA has seen a rise in meter installation time and a decline in valuable panelboard/loadcentre real estate. The product, which squeezes three meters into one, addresses this by using fewer wires and terminals compared to other traditional solutions. It also features a daisy-chain voltage and serial bus.

The company claims the energy meter saves up to 90% of the installation time. Users can install the meter in the panel or in a DIN rail by placing the patented removable display in the relevant side and connect three-phase current transformers quickly with no wiring error.

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

Sensor switch

The Ecopoint Sensor Switch — a wall-mounted, three-way sensor switch — provides a suitable energy-saving solution for spaces often unoccupied, such as offices, schools, hallways or bathrooms.

Designed to replace a standard light switch, the product detects motion/body heat (PIR sensor) as well as sound and ambient light levels, ensuring lighting and connected equipment only operate when the room is occupied. Once the primary PIR sensor is activated by movement or body heat, the lights and connected equipment will operate for the predetermined time before automatically switching off, thereby offering up to 40% in power savings.

A secondary sound sensor can also detect noise to reset the timer, while the ambient light level sensor, once enabled, will not switch on the light if adequate light levels are detected. Operating time and ambient light level settings can also be easily configured by users. The sound detection and/or ambient light sensors can be disabled and the switch can be manually overridden, allowing it to be used as a standard switch. Voltless dry contacts also enable the switching of heat pumps or security equipment.

The product is compatible with LED lighting, fans and electronic ballasts.

Ecopoint Ltd
www.ecopoint.co.nz

LED floodlight

The ECO Light LED floodlight range is a high-power LED array designed as a suitable energy-saving replacement solution for traditional floodlights.

Manufactured from die-cast aluminium, the IP65-rated floodlight is available in 3000 and 6000 k colour temperatures and has a high output light level with options from 10 to 300 W producing up to 24,000 lm. The product range can be connected directly to the mains supply and comes pre-wired with rubber flex meaning it is not necessary to wire into the fitting. It does not have infrared or a filament, which is liable to break through vibration.

The range offers savings in both energy and lamp replacement costs and can be custom manufactured to suit various needs. It has a high life expectancy of 50,000 h and comes with a 5-year guarantee.

ECO Light LED
www.ecolightled.com.au

RETHINKING POWER FACTOR CORRECTION

David Gale

Low switching loss, high temperature semiconductors combined with pulse width modulation (PWM) and control algorithms based on Park-Clark transformations, providing a simple orthogonal vector presentation of three-phase vectors as the basis for control, are the backbone of active filters.

The same technology is now being applied to displacement power factor correction giving rise to a smaller physical package, extended longevity, minimal maintenance requirements and superior power factor control.

It is surprising, given the limitations of capacitor-based power factor correction, that there has not, to date, been a wider adoption of solid-state technology given that its use in HV and MV VAR compensation is well established. Self-commutated VAR compensators, in particular three-level compensated systems, are increasingly used in MV networks. For HV networks, the switching levels are increased to four and beyond. In flexible AC transmission system (FACTS) controllers, the technology has been well established.

The Sinexel SVG three-level compensator, using PWM inverter control technology, is designed for LV power factor correction and offers some advantages over capacitor-based systems, chiefly: infinitely fine control of compensating reactive current; per phase compensation; leading as well as lagging compensation; rapid dynamic response, eg, regenerative drives (eg, overhauling elevators, winders, etc); line voltage independent compensating reactive current.

Capacitive power factor correction for LV reticulation grew out of its use in MV and HV transmission and distribution where it was often a more economic and simpler alternative to synchronous condensers for the control of voltage. The application to LV is obvious, but what is less obvious are the engineering considerations to provide reliability and safety, speed of response and overcoming the limitations on correction dynamic range as well as fineness of control. As will be seen, providing for all these factors is, practically speaking, an impossibility.

The use of PWM inverter control technology (see Figure 1) to provide lagging or leading correction of load current from -90˚ to +90˚ provides a unified method which can only be approximately simulated by a switched capacitor–inductor paralleled system. Although this combination is seen in transmission line compensation, it is not applied in LV reticulation where therefore only lagging power factor can be controlled. It might be argued that

IN MANY INSTALLATIONS, IF NOT MOST, CAPACITIVE POWER FACTOR CORRECTION EQUIPMENT IS PLACED INTO THE MAIN SWITCHBOARD. IT IS A READY SOLUTION BUT A BAD ONE IN THAT A SHORT CIRCUIT IN CAPACITOR BANKS CAN BRING ABOUT A MASSIVE SWITCHBOARD FIRE.

unlike the case in transmission lines, leading power factors are not encountered in LV reticulation. However, that is not the case: consider, for example, the use of passive filters in server room UPS systems exhibiting leading power factor during 'walk-in'.

Speed of response is important and in practice a limitation for capacitive systems. Loads such as motors in load-no load or light load cycle operation oscillate between relatively high power factor and low power factor when essentially only magnetising current is drawn. Generally the contactor switching technology employed in capacitive correction is lagging a significant number of cycles therefore, in effect, controlling on the basis of a 'quasi-average power factor'.

Under or overcompensation because of slow response is avoided using the inverter-based topology described here. The superior dynamic capability in comparison to capacitor systems is critically important in reticulation systems with large regenerative loads. Four-quadrant operation, for example, overhauling lifts, braking of high inertial loads, etc requires the use of highly responsive correction. In practice, the use of PWM inverter control technology is the only practicable solution.

Historically, the prevalence of stable linear loads made capacitive correction viable. It could be applied directly on fixed loads such as squirrel cage and wound rotor motors, or provided with control steps where necessary. In any event, the leading compensation current supplied by a capacitive system is line voltage dependent. Because of the undesirability of leading power factor, compensation is kept below 1.00. No such limit is required with the solid-state equipment described here.

The prevalence of nonlinear loads in modern electrical installations provides operational hazards for capacitor banks. The rule of thumb is to assume the 5th harmonic as leading culprit for parallel resonance and therefore an inductor in series with the capacitor bank is used to bring the resonant frequency to 4.7 equivalent. Although this measure is largely effective for harmonic patterns such as those from 6-pulse converters, other loads such as burst-fired and phase-fired ones can cause problems including overheating of the capacitor banks.

Traditionally, power factor correction capacitors were over-engineered and physically large, which for transmission and distribution was not critical. In LV reticulation on the other hand, capacitors are required to have a much larger kVAr/volume ratio so that power factor correction equipment can be conveniently housed, usually at the incomer switchboard. Oil-filled capacitors have been replaced by metallised polypropylene (MPP) types. Basically formed by a spirally wound sheet of metallised polypropylene film, these capacitors are compact and have as a benefit a self-healing feature which permits them to function after a momentary short has occurred (the metal film in that area is vaporised).

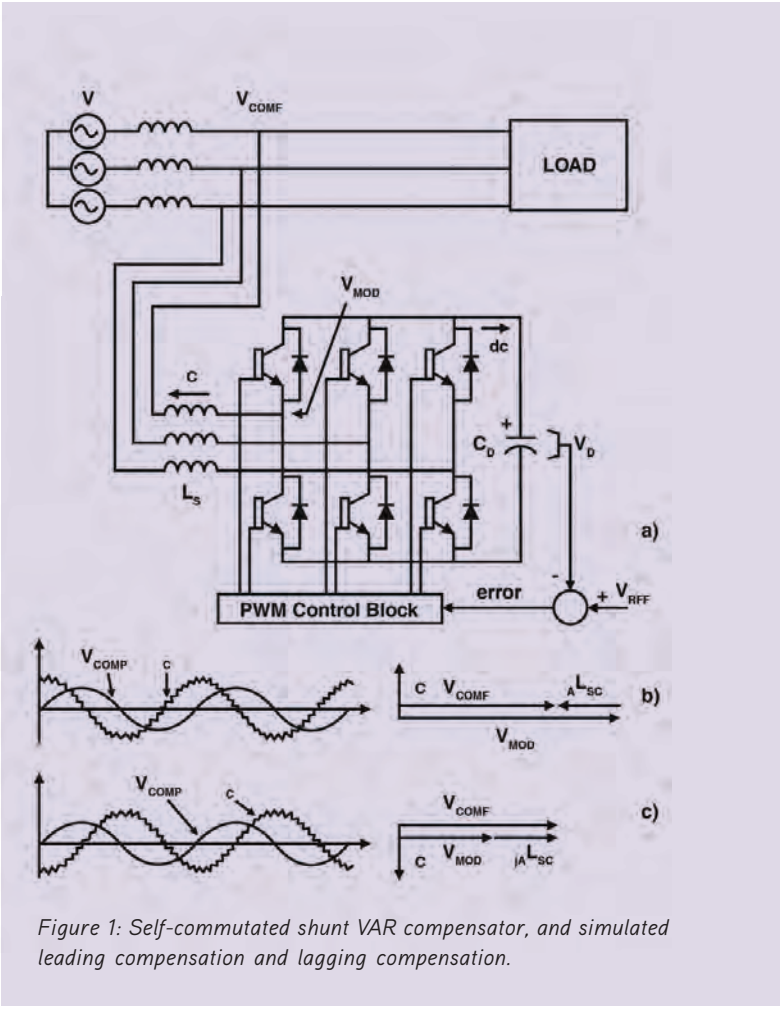


Figure 1: Self-commutated shunt VAR compensator, and simulated leading compensation and lagging compensation.

Further developments of pin holes through the occurrence of shorts alter the value of capacitance and can change resonance conditions. Temperature degradation both in terms of component value and reduced lifetime are serious problems if not taken account of by regular preventive maintenance testing including capacitance measurement. In Figure 2, the lifetime of MPP capacitors is shown as a function of the rating at 70°C. For this reason alone, twice-yearly check-ups are recommended, but this is rarely done in practice even though desirable for the continued effective operation of the equipment.

Mostly contactor switched capacitor banks are employed. Problems occur with frequently exercised capacitor banks, particularly in regard to inrush current which can be several orders of magnitude larger than under steady state conditions causing welding of contacts. Specialised contactors are sometimes employed with early make contacts in series with a current limiting resistor to help 'form' the capacitor, followed by the later main contact closure. Some contactors employ the use of small, air core inductors to limit inrush current. This form of technology, however, has the effect of increasing the response time of the power factor correction equipment. The use of zero voltage cross-over thyristor (triac) control diminishes inrush current and improves response time.

In many installations, if not most, capacitive power factor correction equipment is placed into the main switchboard. It is a ready solution but a bad one in that a short circuit in capacitor banks can bring about a massive switchboard fire. High temperature in the switchboard tends to compromise capacitor life. There have been many instances of fire caused by capacitor

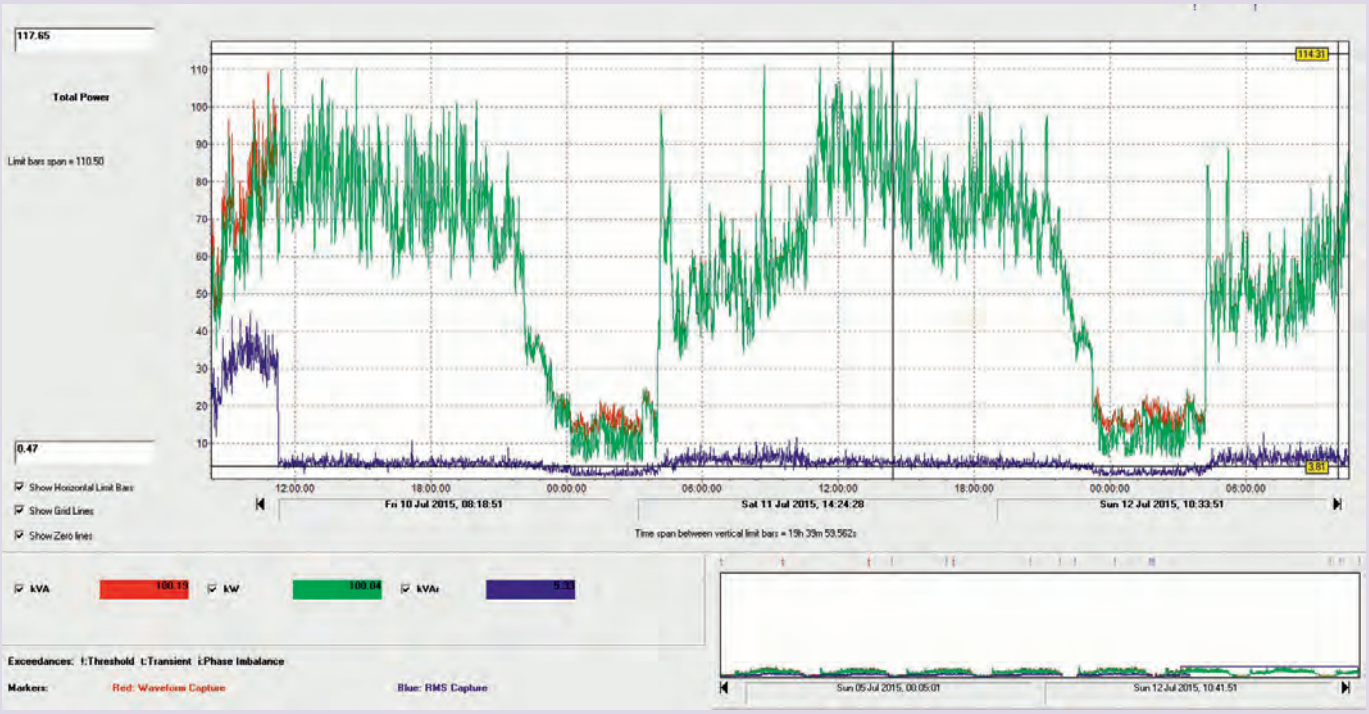


Figure 2: Practical example of power factor correction in a fast food outlet. The screenshot shows the trend of kVA, kW and kVAr for a fast food outlet over three days following installation of the Sinexel SVG VAR compensator. The red trace indicates kVA, green for kW and blue for kVAr. The compensator was switched in at 11 am on Friday, and red trace from then on is identical to the green one, kVAr having been brought down to an average value of 3.5 kVAr. As can be seen from midnight to 4 am, consumption is at its lowest.

banks and forensic specialists strongly advise that the power factor correction equipment should be housed separately and at some distance from the main switchboard.

The above problem area which can add significantly to the expense of the installation if remedied by separately housing the power factor correction equipment can be obviated by the Sinexel SVG three-level compensator. The advantages of using opposite (anti) phase PWM created current to sink reactive lagging or reactive leading load current are too significant to relegate the technique as simply an alternative to capacitor-based methods.

Its modest footprint per kVAr and its temperature environmental ruggedness make it suitable for incorporation within switchboards, or in close proximity.

In conclusion, the use of three-level PWM inverter technology power factor compensation provides a more responsive, wide range of control (-1 to +1 power factor range), with immunity from harmonics, far safer operation and a more cost-effective solution on whole-of-life basis.

Fuseco Power Solutions Pty Ltd
www.fuseco.com.au

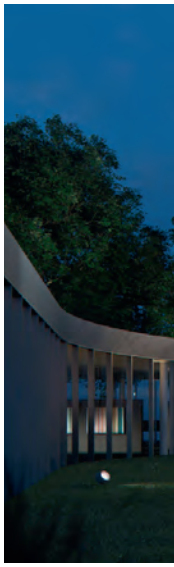
Metered communications gateway

The Enphase Envoy-S Metered communications gateway delivers solar production and energy consumption data to Enphase Enlighten monitoring and analysis software for comprehensive, remote maintenance and management of the Enphase System. The product can be installed in homes with no solar, with solar, or with solar and storage.

With production metering and consumption monitoring options, the product is the platform for total energy management and integrates with the Enphase AC Battery. It monitors solar generation (if present), grid power usage and energy stored in the battery (if present). It then displays the information on the Enlighten App, and allows users to see how much storage is needed.

Designed for installation indoors or in an outdoor enclosure, the product enables web-based monitoring and control, as well as bidirectional communications for remote upgrade. The system is easily configured using the Installer Toolkit mobile app and offers flexible networking with Wi-Fi, Ethernet or mobile devices.

Operating in an ambient temperature range from -40 up to 65°C and featuring an IP30 rating, the product is compliant to IEC/EN 61010-1:2010, EN50065-1, EN61000-4-5, EN61000-6-1 and EN61000-6-2 standards, and also comes with a five-year warranty.



Enphase Energy
www.enphase.com/au

Zone 2 LED floodlight

The Chalmit Arran Ex LED floodlight range, available from JT Day, is a compact Zone 2 floodlight suitable for applications where moisture, dust or dirt is present. The product is resistant to vibrations and can be used in locations where flammable vapours, gases or combustible dust exist.

With an instant on crisp white output, the range comes in a variety of outputs from 5000 to 15,000 lm and can offer 80,000 maintenance free hours to L70 (70% initial lumens). The floodlights also have uniform photometric capabilities and offer high output lighting from a broad temperature range of -50 to 55°C. With an easily maintainable driver and LED strip, the company claims the floodlights are highly energy efficient and have lower power consumption than HID lamps.

JT Day Pty Ltd
www.jtday.com.au

LED panels

The LED panels from Lumitex offer clean, uncluttered and low-glare illumination for commercial environments.

The square or rectangular panels are available in 4000 and 5000 K colour temperatures, which emit a good amount of uniform light with a wide-beam angle for large open spaces. The panels are also available in 1200 x 300 mm, 600 x 600 mm or 600 x 300 mm sizes, and can be ordered with a dimmable driver option of 1–10 V. They offer significant energy savings and low heat emissions.

The panels can be retrofitted to replace existing fluorescent tube technology, while meeting Australian lighting standards, and come with a 5-year warranty/35,000 h.

Lumitex Limited
www.lumitex.com.au

Outdoor luminaires

The Kona range from ERCO offers versatile luminaires for a variety of outdoor urban applications, as well as indoor applications that call for a high degree of protection.

The range, consisting of projectors, floodlights and wallwashers, are energy efficient with lumen packages up to 12,720 lm at just 109 W, meaning they can also project light across large distances. Designed with a round, tapered housing and an optical system set back deep inside the luminaire, the range gives good glare control even with maximised lumen packages. Maintenance-free optoelectronics and the corrosion-resistant housing are also designed for a long life.

The specially developed Spherolit lens system, based on a combination of LED module, collimators and Spherolit lens, focuses the digital light, offering powerful lighting tools with energy usage as low as 19 to 96 W. The robust housing is also made of corrosion-resistant cast aluminium and is double powder-coated ensuring it has a rating of IP65.

The range is available in three sizes for compatibility with a large variety of outdoor project challenges.

ERCO Lighting Pte Ltd

www.erco.com

CASE STUDY

Wireless LED streetlights for Los Angeles

Los Angeles will be the first city in the world to deploy 100 Philips SmartPoles — LED streetlights that come with 4G LTE wireless telecommunications technology.

In addition to providing energy-efficient lighting for safer, brighter streets, Philips said the SmartPole will improve the wireless network in dense urban areas by providing broadband coverage to businesses and residents.

With cellular data traffic expected to grow nine times by 2020, according to the Ericsson Mobility Report, and current telecoms infrastructure struggling to respond to this demand, the SmartPoles will enable seamless mobile wireless 4G LTE connectivity, with Ericsson's small cell technology housed in the poles to increase data capacity in the network.

Philips SmartPoles were designed and tested to accept FCC licensed wireless mobile network operator equipment, granting an alternative deployment method for 4G LTE broadband services, which will connect each pole through a fibre link to its core network.

"We are now taking advantage of previously untapped real estate to give our streets better broadband connectivity and future-ready infrastructure," said LA's Mayor, Eric Garcetti.


Image credit: Philips

Earlier this year, LA was also the first city in North America to monitor and control its street lighting through Philips CityTouch, a streetlight asset management system that uses mobile and cloud-based technologies.

Ericsson Senior Vice President and Head of Business Unit Radio Arun Bansal said LA will be a role model for other smart cities that place sustainability and connectivity high on their agenda.

"As citizens, businesses and industries transform through mobility, cities have an increasingly important role to play as eco-system partners enabling the next wave of innovations that will bring us to 5G in 2020," said Bansal.

"Innovative solutions like Philips SmartPoles and Ericsson Zero Site that efficiently improve the performance of mobile networks will be necessary to address the growing demand from both smartphone users and the Internet of Things."

For mobile network operators this will offer new possibilities to improve data coverage and capacity for citizens so there are no more signal dropouts.

Philips Lighting Pty Ltd
www.philips.com

Protection relay test set

The OMICRON CMC 356 Advanced Protection Relay Test Set is a versatile relay test set with six current sources (6x32 A/430 VA; 3x64 A/860 VA; or 1 x 128 A/1000 VA), four voltage outputs (4x300 V or 1x600 V), four binary outputs, 10 multifunctional binary inputs (dry/wet) and Generator Combination Cable for wiring convenience. It is available to rent from TechRentals.

The six current and four voltage output channels are continuously and independently adjustable in amplitude, phase and frequency, and all outputs are overload and short-circuit proof.

The product comes preloaded with the Test Universe software package with automatic testing functionality on a laptop computer. IEC61850 software is also an option (includes GOOSE, Samples Values, IEDScout and SVScout). CMGPS units are optionally available for synchronised testing between units.

Other features include: powerful current sources for testing high-burden electrochemical relays; high accuracy and versatility for testing static and numerical relays of all types; and primary injection capabilities for commissioning tasks.

TechRentals
www.techrentals.com.au

High-bay LED

The ECO Light Multi Chip LED High Bay is a pendant LED light designed as an alternative to traditional 400 W metal halide lamps, using only 38% of the energy by comparison. Weighing 3.9 kg, the product is suitable for hanging at a height of 5–8 m and has a beam angle of 60°/120°.

Made from aluminium alloy, the LED offers a colour temperature of 5700 K — the equivalent to natural daylight — and features up to 13,500 lm. It also has a built-in Mean Well power supply, providing a reliable and stable power supply. Heat is also transmitted from the light source to a heat sink through a copper cylinder, quickly dissipated via an air circulation duct, while an antioxidant coating enables it to withstand moisture and chemical corrosion.

The product also comes with a 50,000 h life expectancy and IP54 rating, the ability to operate at temperatures from -20 to +55°C and a 3-year commercial use warranty.

ECO Light LED

www.ecolightled.com.au

LED driver

ADM has introduced the Mean Well PWM series LED Driver, suitable for dimming LED strips as it ensures even dimming, regardless of the load on the LED driver.

The series eliminates 'dead travel', an issue where a dimmable LED driver is not being used to its maximum capacity (90–95%), resulting in an unsatisfactory dimming performance. Dead travel also causes different lengths of LED strip to dim at different rates.

Other features include: a PWM type output; the ability to dim down to zero; and an IP67 rating to protect against both dust and moisture ingress.

ADM Instrument Engineering Group

www.admtech.com.au

Circuit breakers

The TE Connectivity W28 series of thermal circuit breakers is suitable for industrial applications including heating, ventilation and air conditioning. The 1-pole range comes with a push-to-reset actuator, fuse holder and series trip function.

The circuit breakers have a voltage rating of 250 VAC and 32 VDC, and come in a range of current ratings including 0.25, 1–8, 10, 12, 15 or 20 A. The range can replace a slow blow glass cartridge fuse and includes labour-saving snap-in mounting, as well as a button that extends for visual trip indication.

The series is compliant to UL 1077, File E69543 and File LR15734, and is CSA Accepted as Supplementary Protectors (Appliance Component Protectors). It is also VDE approved for use in office equipment (AC loads only) and provides 8 mm isolation.

element14

au.element14.com

String inverter power solution

The Fronius Power Package offers a power solution for Fronius string inverters, suitable for both small- and large-scale PV systems. Each power package includes: the inverters (3 to 6 Fronius Symo 15-20 kW or 2 to 4 Fronius Eco 25-27 kW); the connection between the inverters and the public grid/transformer station (Fronius AC Combiner); and prefabricated cables.

The power package offers flexibility in the design of the PV system with a variety of options for configuration. The pre-installed inverter cabling and the supplied Fronius AC Combiner also reduce the planning work during installation as well as failure rates. Along with the SnapINverter mounting system, the likelihood of mounting errors and the labour costs associated with assembly time are significantly reduced.

In addition to its own monitoring portal, Fronius Solar.web, the product offers various open interfaces, such as Modbus (TCP or RTU), to enable easy connection to external data loggers, park regulators or energy management systems. The open Modbus and JSON interfaces can be used in parallel to Fronius Solar.web with system data able to be sent to any server.

Fronius Australia Pty Ltd

www.fronius.com.au

Cordless power tools

Panasonic has added three cordless power tools to its Tough Tool IP range of IP56-rated dust- and water-resistant power tools with enhanced internal engineering and technology. The updated range includes the EY74A2 13 mm drill and driver; the EY79A2 hammer drill and driver; and the EY75A7 impact driver.

The cordless tools feature a comfort grip for improved performance, suitable for tradespeople such as plumbers, electricians and carpenters. The brushless motor in the EY74A2 and EY79A2 has control circuits designed to increase stable current flow by more than 70%. Both models feature high power up to 50 Nm; variable speed control (H/M/S) which can operate at maximum speeds with metal hole saws, thereby reducing burnout; an 18-stage clutch plus drill position; an LED light to support work; and an electric brake.

The shorter brushless motor included in the EY75A7 cordless impact driver ensures comfortable handling and heavy-duty use in restricted spaces such as ceiling voids, lofts or under floorboards. The lighter-weight model has a 'self-drilling screw mode' which limits the risk of stripping the thread on fasteners or materials during screwing in (less than 4 x 15 mm) by automatically switching from high speed to low speed. Other features include high power up to 160 Nm and a four-stage rotation speed selection.

The models contain a hybrid switch that has been redesigned to deliver increased durability and provide up to double the life of conventional Panasonic switches. The tools are available in a range of kits including 14.4 V 4.2 AH, 18 V 5 AH and 18 V 3 AH batteries.

Panasonic Australia Pty Limited

www.panasonic.com.au

Polycarbonate enclosures

NHP has introduced the Fibox ARCA polycarbonate range of enclosures, designed for use in harsh and demanding outdoor environments.

Manufactured using glass-reinforced polycarbonate, the enclosures are as strong as steel, without any risk of corrosion and at 1/6 of the weight. This means an extended lifetime and increased possibility of one-man installation. The rugged range is also high-impact and UV-resistant, providing suitable protection against vandalism.

A DIN-rail frame set design and lockable inner door ensure customisation is easily achieved either on-site or in the factory. Due to the polycarbonate-based material, there is also no hazardous dust or swarf residue produced when drilling or cutting.

Variable depth options for internal plates, as well as multiple locking options, provide increased flexibility and ensure a secure solution for a variety of applications. The enclosures are available in seven common sizes with custom milling available, and also come with an IP66 rating.

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

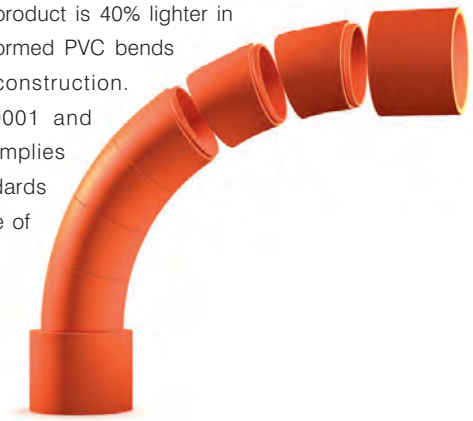
Rigid conduit bend solution

The Evcco Smart-Bend by Albatech has been designed to provide a flexible solution to rigid conduit bends.

The product, which is available in a range of colours (orange, white, black and grey), consists of segmented bends that 'snap-lock' together to provide an assembled bend of varying angles. Produced in a range of 40 to 150 mm, they can be assembled in segments from 7.5 to 90° or beyond and can also be adjusted to provide compounded angles, which are important when connecting misaligned wall or floor penetrations. The halogen-free product can also be assembled segment by segment over a preformed cable helping to minimise injuries associated with pulling cable through formed bends.

The company claims the product is 40% lighter in material weight than other formed PVC bends and offers a solid core construction. Manufactured under ISO9001 and ISO14001, the product complies with AS/NZS2053-200 standards and also comes with a range of HFT conduit and fittings.

Albatech Pty Ltd
www.evcco.com.au



CASE STUDY

‘Liquid blanket’ drops solar panel DC voltage to zero

Solar panels cannot be turned off when exposed to light and can potentially cause electrocution during an emergency situation. In the event of a short circuit or an emergency such as a fire or flood, they continue to produce a potentially lethal amount of DC voltage.

To address this issue, Australian company LJW Solar has developed PVStop — a spray-on solution to mitigate solar panel risks by reducing DC output to safe levels.

The technology is designed to safely deactivate photovoltaic panels in all weather conditions in seconds, mitigating the risk of DC electrocution to emergency services personnel, electrical contractors and all owners of solar panel systems. The ‘liquid blanket’ covers the solar panel and blocks the light from reaching the solar panel surface. The neutralisation process takes less than three seconds; to completely disable the solar panel can take as little as six seconds.

The PV module does not need to be entirely covered for the panel to be deactivated. Spraying a line down the middle of the panel, for example, and covering only as much as 25% is enough to interrupt solar power production.

Luke Williams is a CEC (Clean Energy Council) accredited renewable energy system designer at LJW Solar and also the inventor and patent holder of PVStop. He has worked in the solar industry since the early eighties, designing and installing solar photovoltaic and wind energy systems for a variety of domestic and commercial clients.

“Over the years, LJW Solar has become increasingly concerned about solar panel risks and associated solar PV hazards,” said Williams. “With over 1 billion solar panels installed globally and 1.5 million solar panel installations in Australia alone, the need for a solution to combat the risk of DC electrocution in the face of an emergency situation has become paramount; this is the driving reason behind why we developed PVStop.”

PVStop is a polymer film technology that literally acts as a ‘liquid blanket’, switching off the solar panels in seconds and reducing the risks faced by emergency services personnel, electrical contractors and all owners of solar panel systems. Once the threat has been eliminated, the film can be simply peeled off the solar panel within up to 12 months after application.

Solar Developments Pty Ltd
www.pvstop.com.au

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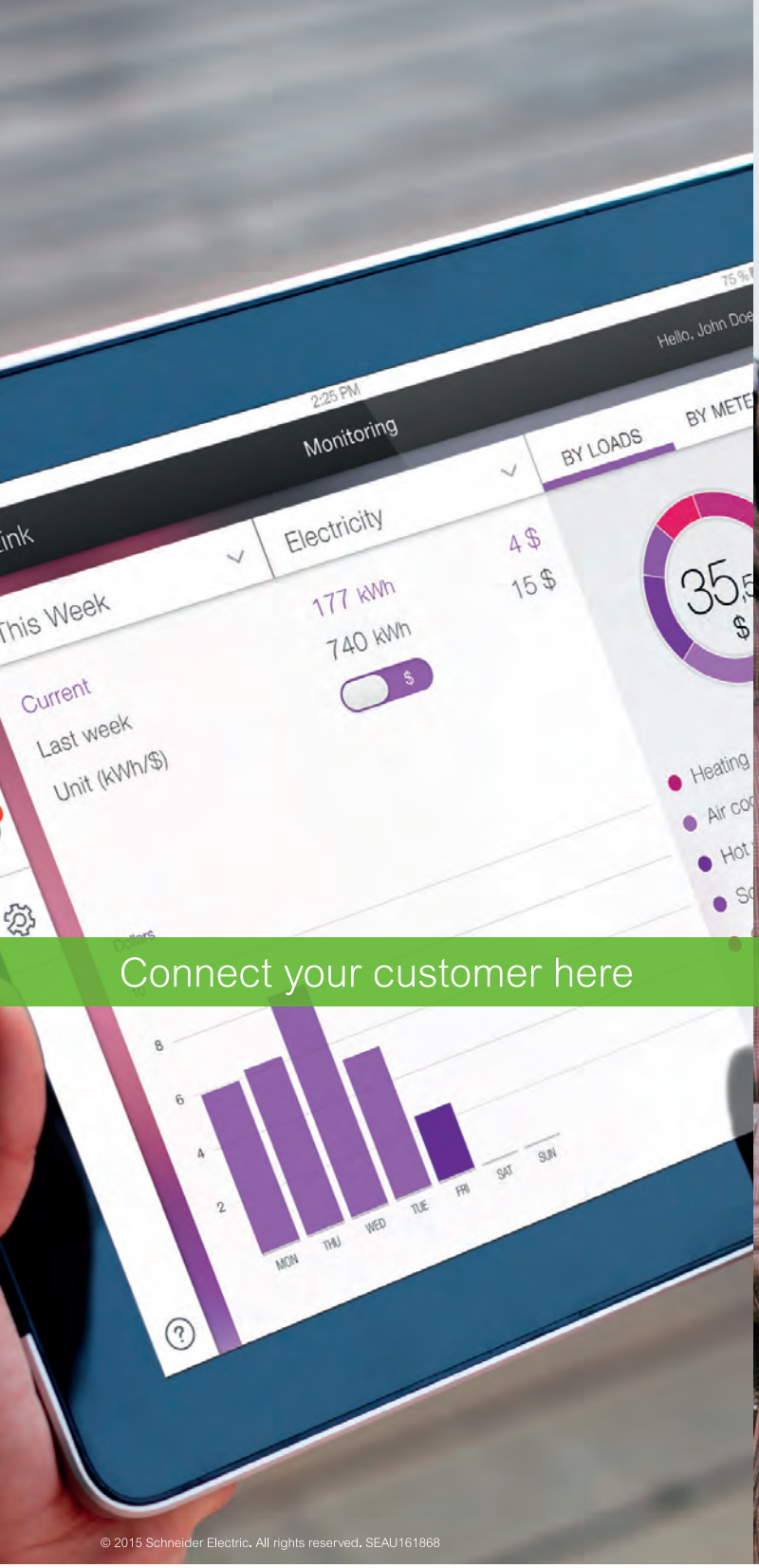

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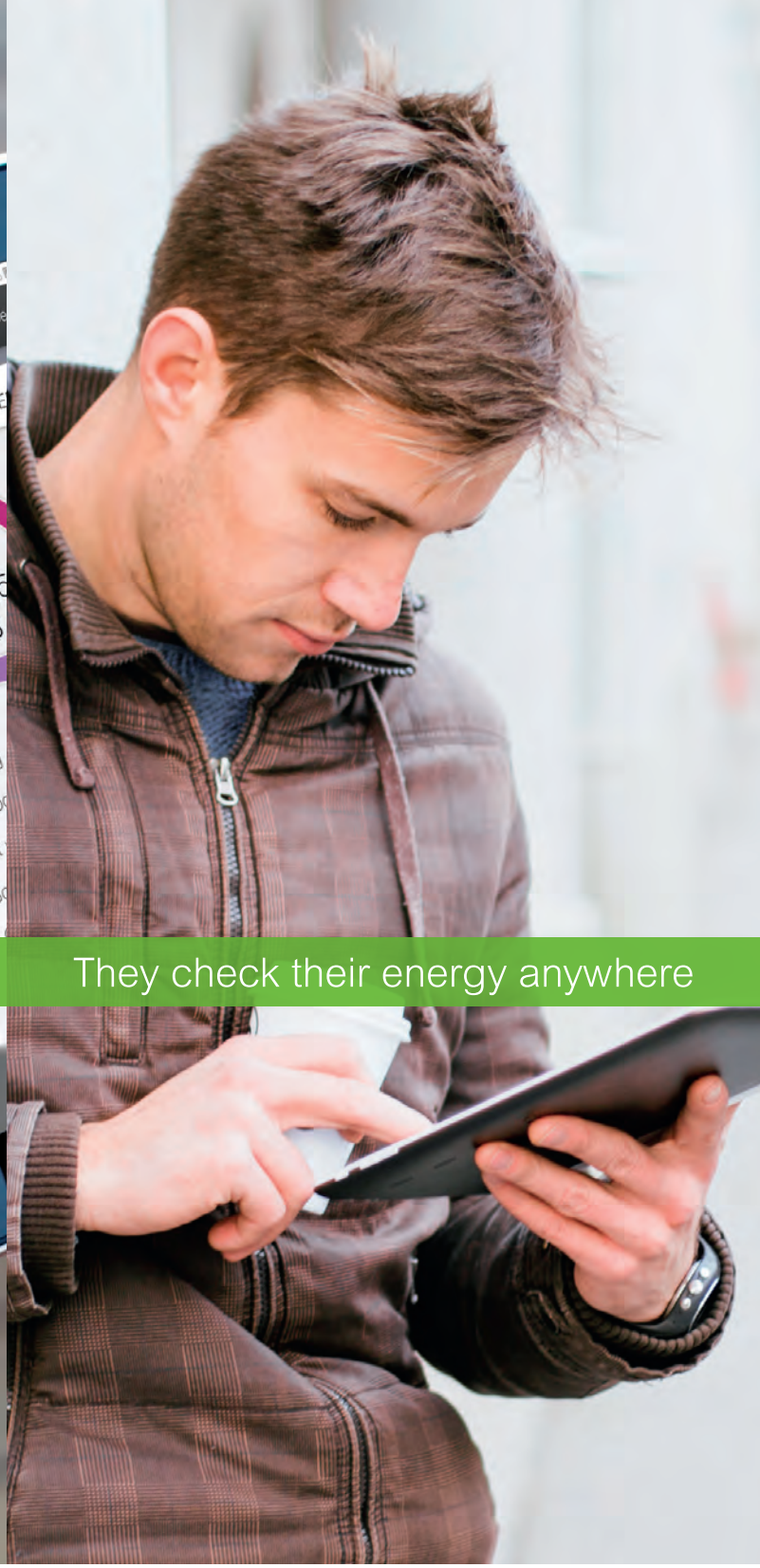

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