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JUL/AUG 2014 | VOL.13 NO.3

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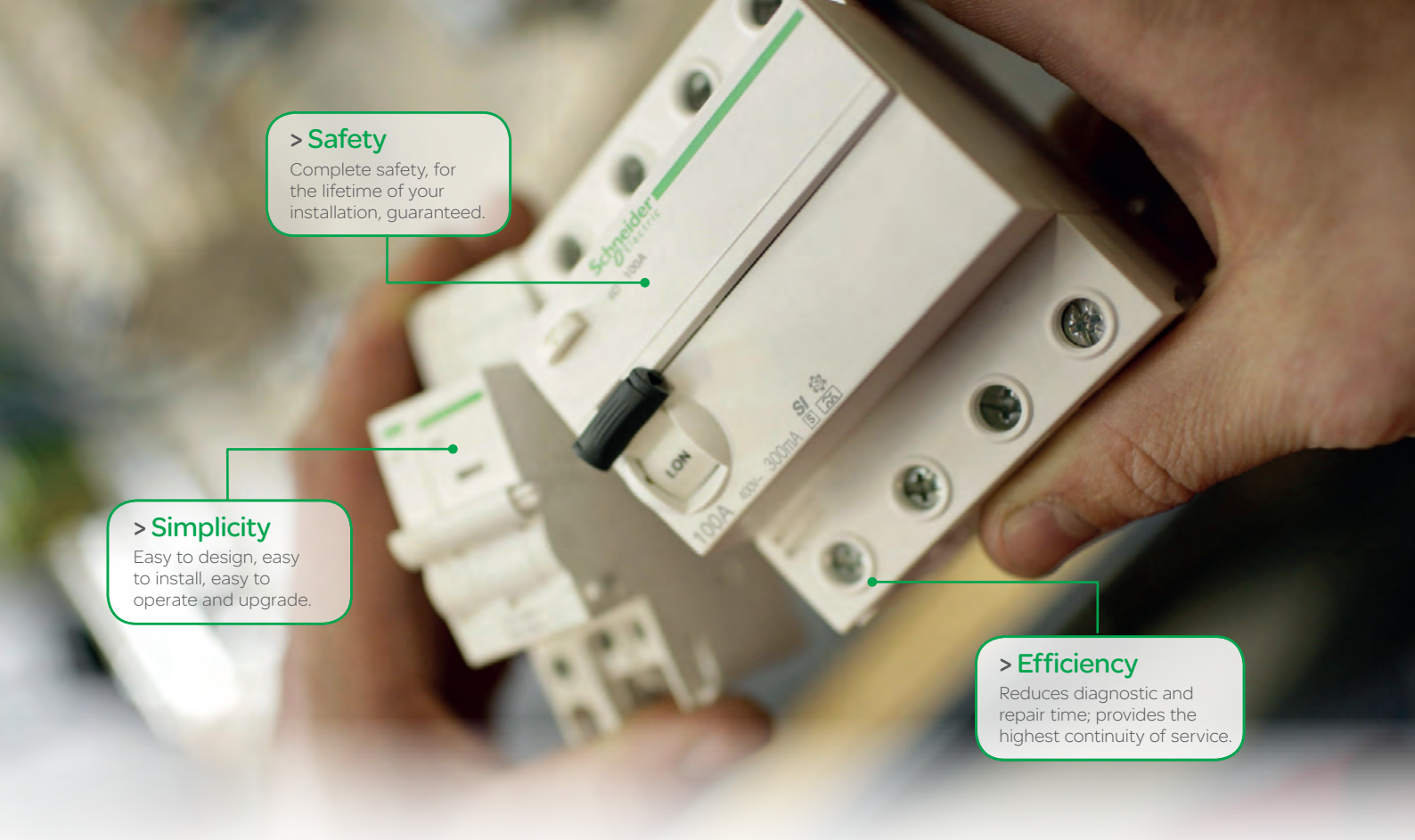

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CONTENTS

11 Efficiency + Renewables

21 Electrical Distribution

47 Comms + Data

FROM THE EDITOR

In the current envirenment, businesses are being compelled to look at ways to lower costs. Some are deceived into buying low-priced substandard products.

In recent months, we have seen a number of electrical products being recalled in Australia. These non-compliant electrical products not only endanger lives, but they also cause serious economic and social problems. Contractors could face huge fines and even imprisonment for supplying or installing non-compliant products.

Last year, the National Electrical and Communications Association and Voltimum launched the 'Does it comply?' initiative with an aim to raise awareness and educate users of the dangers of using products that are not compliant to Australian standards. NECA and Voltimum suggest the following to identify non-compliant products: avoid products with no brand; purchase goods only from authorised and respected distributors or manufacturers; watch for products with unusual trademarks; only buy products in their original packaging and be cautious of packaging with blurred markings; check to ensure only certified electrical products are acquired and installed; beware of prices that are 'too good to be true'; if purchasing from overseas make sure that your research whether the product you are bringing in is compliant to Australian standards even if it is from a reputable brand.

The pressure from price-conscious buyers is forcing businesses to consider overseas manufacturers or suppliers. These businesses face a greater risk. An electrical equipment importer has the added obligation of ensuring the equipment is designed, examined and tested to be electrically safe, according to the Electrical Regulatory Authorities Council. This testing includes materials flammability and strength, high voltage, product ageing, high current, overcurrent, product marking and dimensional requirement tests.

Mansi Gandhi - Editor
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LOSS AND CONTINUITY TESTING WITH MPO CONNECTORS

The deployment of multifibre push-on cabling systems is rising as businesses try to address the growing data requirements. This article provides an overview of issues related to testing the cabling for these systems.

Typically, the new-age data centre applications are for 40G/100G ethernet. Even if the immediate requirement is 40G, cabling may be installed for 100G ethernet in order to allow for incremental bandwidth upgrades. The 24 fibres used for 100G ethernet can alternatively be used to carry three 40G systems. This offers a choice of upgrade paths; for example, to incrementally add extra 40G channels or replace with a single 100G channel. Standards are also being developed for 400G ethernet.

The incremental cost of installing 24-fibre 100G cabling, instead of 12-fibre 40G cabling is actually quite modest, particularly given the cost of future rewiring and downtime. The major additional complexity may be a patch panel to give adequate flexibility for future deployment options.

Standards compliance

Internationally recognised standards define just about everything on data centre design. Just in the area of fibre-optic cabling, there are standards for fibre types (typically multimode OM3, OM4 etc), cable types (fire retardance, bend resistance, riser cables etc), cable installation (fire stops, ducting etc), connectors (LC, MPO etc), labelling conventions, ethernet, optical wavelengths (CWDM etc), optical safety (mandatory) and finally: cable acceptance testing.

There is one aspect of fibre test standards that everyone can agree on: they are currently a work in progress, and this is particularly true of MPO testing.

The cable acceptance test requirements should be reviewed and refined at the project definition stage based on the latest and relevant standards and transmission equipment requirements.

So at the project definition stage, it is advisable to review and refine the fibre cable acceptance test requirements that end up as a combination of standards-based requirements and the mandatory requirements of the particular transmission equipment in use.

Optical loss

The majority of LAN transmission systems using MPO connectors have extremely tight end-to-end optical loss requirements, typically around 1.2 dB. This tiny loss figure creates unique challenges for precision loss measurement for cable certification. Most of the currently available test equipment and testing procedures are incapable of achieving the required repeatability (accuracy) to give confidence that the specification has been achieved.

The two reasons for this tight specification are to minimise per port electronics cost and because these systems are dispersion limited, not power limited. These systems use 850 nm and 50 µm core fibre, and end-to-end length is usually limited (by dispersion) to around 300 metres.

Inspection and cleaning

Connector condition and cleanliness is a major consideration, and it is the most common cause of problems. It's essential to have a good quality microscope with an MPO specific adaptor, a supply of suitable specific cleaning materials (more than one type is good), and adequate time and know-how to use them. The default MPO cleaners tend to do a reasonable job of cleaning the fibre ends only, but extra cleaning materials are available to clean alignment pins, and sometimes the whole connector end face. Inspection and cleaning should be performed every time before a connector is mated.

Cabling disturbance

Because of the combination of low loss requirements and fibre complexity, it is essential that testing and commissioning is accomplished with the lowest possible level of disturbance to connections. Also, once loss testing is done, any disturbance may require the loss testing to be repeated. This means that an unusually strict test regime is appropriate, so that each acceptance level is completed with confidence.

> THE PERFORMANCE VERIFICATION TEST IS QUITE SPECIFIC AND FAILURE TO DO THIS PRELIMINARY TEST MAY RESULT IN INVALIDATING THE RESULTS.

	MM MT Elite multimode MT ferrule	Standard multimode MT ferrule	SM MT Elite singlemode MT ferrule	Standardsin-glemode MT ferrule
Insertion loss	0.1 dB typical (all fibres) 0.35 dB maximum (single fibre)	0.20 dB typical (all fibres) 0.60 dB maximum (single fibre)	0.10 dB typical (all fibres) 0.35 dB maximum (single fibre)	0.25 dB typical (all fibres) 0.75 dB maximum (single fibre)
Optical return loss	>20 dB	>20 dB	>60 dB (8° angle polish)	>60 dB (8° angle polish)

Table 1

Continuity testing

This is the most basic test: does light get from end to end? As a minimum, this test is easily accomplished with a VFL source and a one low-quality breakout cable. If a numbered breakout cable is used each end, this could also double as a polarity test phase. Continuity testing usually doesn't need documenting.

The continuity test phase is usefully accompanied by thorough cleaning and inspection of the connectors with a microscope. This achieves a few objectives. Bad connectors are the main cause of installation failures. The inspection and cleaning enables the installer to identify and rework bad connectors at the earliest point. It also ensures that bad connectors do not contaminate the test leads and degrade other connectors.

If the connector quality is inadequate, there is little point proceeding to the next stages until this issue is fixed. Simple continuity testing doesn't identify if fibres are swapped back to front.

Polarity testing

Typically, the cable installation requires polarity testing to determine that the correct 1, n arrays of fibre at one end of a system, are mapped to the correct 1, n arrays of fibre on the other end. If the installation has a patching cable section so that connections can be split off to particular transmission equipment, niggling polarity mistakes can occur here. If the polarity test isn't 100% accurate, a great deal of time will be spent in finding swapped fibres. This will require a basic level of documentation, sufficient to record which fibres were tested and the general array direction.

Labelling

The system is now physically in place with the light going to and fro in the right combinations. This is the perfect time to check and rectify so that all associated labelling is fully correct, otherwise the next phase of loss testing could result in incorrect reassembly and non-working systems. A methodical approach is essential.

Accuracy issues

As mentioned, the acceptable maximum loss figure may only be 1.2 dB. For example, if the test uncertainty is 0.3 dB, then all measured losses above 0.9 dB would have to be considered marginal. Every small improvement in the uncertainty figure yields a suitably larger maximum loss level, which will reduce installation cost. This explains the importance of proper planning of test leads, cleaning etc. In practice, accuracy is optimised by:

- use of low-loss MTP Elite test leads, and ensuring they are in top condition;
- use of an encircled flux compliant test source, followed by a mandrel wrap;
- use of accurate loss test equipment, remembering that you are working on the limits of achievable loss test accuracy;
- rigorous inspection and cleaning every time a connector is mated;
- performing test lead verification at the start of the job;
- use of appropriate data recording systems, since there will be plenty of test data.

Test leads

A major loss test consideration is the test leads. Elite MPO/MTP leads are available with per connector/fibre loss of below 0.35 dB. Here are the USConnec specifications for these connectors.

Testing will require a combination of straight patch leads and breakout leads. It is also importance to ensure that connector pin polarities are correct, since swapping in the field is not viable. Spare leads will be required, in case one gets degraded or damaged.

The typical application environment uses a mix of LC and multifibre connectors. LC-MPO breakout test leads are an obvious choice. However, SC-MPO breakout leads are typically more robust, easier to handle and offer slightly improved optical performance. Refer to Table 1 for USConnect's specifications for these connectors.

Number the leads and ends

Test leads require performance verification before each use. The performance verification test is quite specific, and failure to do this preliminary test may result in invalidating all the test results. If the actual loss of each connection is recorded for each fibre during this test, then this loss can be used to compensate the following test results and improve accuracy.

General loss test equipment choices

There are three choices to be made - they will depend on the scale of expected work:

- Use a basic source and metre. This has minimal equipment cost but is tricky to perform (and prone to error), since both instruments need to be moved for each fibre to be tested. It's suitable for small projects.
- Use a basic source and special MPO compatible metre so that only the source needs to be moved for each fibre. For a modest equipment cost, this greatly speeds up and simplifies testing. This works for any fibre type, or wavelength, or number of fibres per connector, so it has excellent flexibility, and the same equipment can be used for other work. This is a suitable choice for mid-size projects or for cabling contractors.
- A special MPO test set. However, these sets only work at 850 nm and 12 fibres. They are expensive and inflexible, making them suitable for large projects.

Whatever the test equipment, a good reporting software will be required to prevent tampering.

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ANTI-DUMPING INQUIRY INTO CHINESE SOLAR

Australia's Anti-Dumping Commission has initiated an anti-dumping investigation on Chinese-produced solar modules being sold in the Australian market for the period 1 July 2012 to 31 December 2013. In the article below, the Australian Solar Council explains what this means and how it affects you.

The anti-dumping commission will investigate exporters and importers. If the Australian Government finds that solar modules have been sold in the Australian market for less than they are sold in China, they will conclude that dumping has occurred.

Exporters

These are the companies that manufacture and export solar modules from China to the Australian market. Four sample Chinese manufacturers have been selected to be the focus of this investigation. They will provide detailed information to the anti-dumping commission.

From these sample manufacturers the commission will determine for each:

- Did dumping occur?
- If it did occur, what tariff rate will be applied to this company?
- What is the average level of dumping that occurred across the four companies?

These companies have been notified directly by the commission. If you have not been notified, you are not one of these four companies.

What do exporters need to do?

If you are a Chinese manufacturer who exported solar modules to the Australian market during this period, it is essential that you contact the anti-dumping commission and provide them with information on your circumstances.

If you cooperate with the investigation your company will be assessed in its own right.

The potential outcome for you is:

- You are found not to have dumped - no duty will be applied.
- You are found to have dumped - the average level of dumping across the four test companies will be applied to you.

If you do not contact the anti-dumping commission and do not cooperate with them then the highest rate applied to any one of the four test companies will apply to you. This is called the default rate.

Exporters need to provide detailed information to the commission for it to make a ruling. Typically, this takes between 15 and 20 days to complete. In limited circumstances an extension may be granted. The anti-dumping commission will travel to China to meet with exporters to assess their individual cases.

Importers

These are companies who have imported solar modules into Australia from China during the period under investigation. Nine sample importers have been contacted by the commission and will be investigated as a sample set.

The purpose of this investigation is to determine the level of injury that may have been suffered by the complainant.

What do importers need to do?

It would be useful for importers to contact the commission. They will send you a questionnaire. This is generally regarded as a more straightforward process and questionnaires are due on the first of this month.

The timeline

The investigation had 60 days (until 13 July) to conduct the review. A report released around 1 September will provide the industry with a good indication of the commission's findings. The findings will go to the Parliamentary Secretary for the Department of industry on 16 October. The minister has 30 days in which to respond, or to make a public statement explaining why the response may be delayed. Any penalty duty can be retrospectively applied from 13 July 2014.

Public interest test

Trade issues are by their nature very political. This case is already proving to be high profile, and the Government of China has an interest in its outcome. The decision whether to apply penalty duties is ultimately a political one. The Australian Solar Council will be providing a submission to the commission. We will provide, as an interested party, information about the market, market conditions, size of market and other factors that set the scene for the commission's investigation. The council will also lobby the government directly on this issue. Similar penalty duties in Europe have had a devastating impact on the solar industry there.

Summary

If you are a Chinese manufacturer exporting to the Australian market, it is essential that you participate in this process. If you do not, you could be at a serious disadvantage. The commission is happy to speak with you at any time and to meet with you in person. If you are an importer, it would be useful to have your voice heard and to provide supporting information.

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CONTRACTORS URGED TO EXERCISE CAUTION

Mansi Gandhi

The recent recall of faulty Avanco and PV Power branded DC solar isolators provides a harsh reminder to contractors about the importance of buying from reputed suppliers.

There is a risk that these isolators may overheat and catch fire. Although NSW Fire & Rescue has responded to only one incident linked to the faulty switches, 57 similar incidents have been reported in Queensland.

These are the same devices sold by two different companies that relied on the same manufacturing plant or equipment to develop "that one product", says Malcolm Richards, CEO, Master Electricians Australia. The difference, he says, was DKSH (the company behind PV Power isolators) held an insurance policy for protection against recalls and Advancetech (Avanco) did not. DKSH voluntarily recalled the product and agreed to organise and pay for a replacement isolator and its installation. Advancetech slipped into liquidation following the recall. Due to liquidation, the company did not have to comply with the terms of product recall order by the Queensland Attorney-General. This meant that the electrical contractors who bought the product directly from the company have to wear the cost of replacing the product.

Buy from reputed suppliers

The pressure of reducing costs and staying ahead of the competition is forcing contractors to buy products online or from other cheaper sources, says Malcolm Richards, CEO, Master Electricians Australia. He suggests contractors should use normal wholesaler networks to purchase electrical products as it provides an extra layer of support if anything goes wrong with the product after it's purchased.

According to the Australian Competition and Consumer Commission, the number of electrical products (used/installed by contractors) recalled so far this year is already higher than the total number of contracting products recalled in 2013.

More scrutiny

The 'nearly national' implementation of the Electrical Equipment Safety System (EESS) - that involves post-market testing and intervention - could lead to a short-term increase in the number of recalls, says Richards. A number of recalls are coming from proactive work from regulators and the rest are coming from cheap online purchases, he adds. This will educate the supplier industry that there is a lot more scrutiny on keeping a product up to standard during its product life cycle.

"MEA would warn extreme caution in using that (online) as an avenue, particularly because the non-traditional channels to market have been leaving a lot of our members high and dry in terms of the support following a recall."

Recall insurance

Significant work is being done at the pre-market and post-market stages, says Richards. The focus for the industry now is on what to do after a problem has been identified with a product, he notes. Richards' association aims to look at companies that hold recall insurance and ask regulators around the country to add a formal declaration to the EESS to define whether a company has recall insurance or has got an equivalent system where they can demonstrate a capacity to manage a full recall of their product. Then the association will recommend its members to only use these companies as legitimate suppliers. The association also recommends that contractors purchase products from wholesalers because then the due diligence falls on the wholesalers to identify which companies have got that recall capacity.

In order to provide some certainty to its members and help them protect their business, MEA has added limited recall protection insurance to its existing insurance package.

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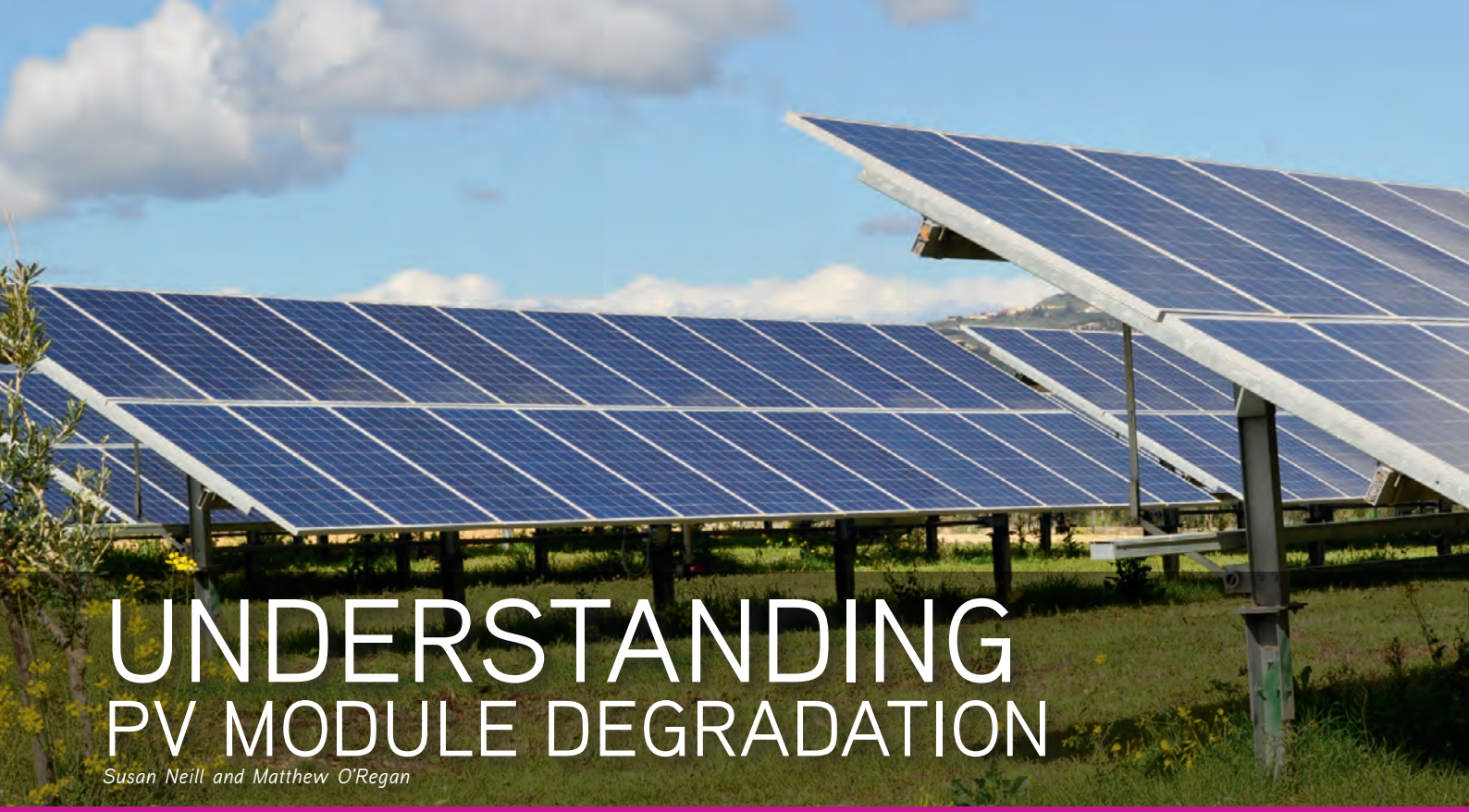

UNDERSTANDING PV MODULE DEGRADATION

Susan Neill and Matthew O'Regan

Potential induced degradation (PID) can reduce the efficiency of a PV module. This article provides insights on PID, including how this degradation process develops, the conditions that make PV systems prone to it, its effects and the methods to correct or prevent it.

PID is a process that occurs in PV cells when the system has a negative potential relative to the ground. Although it is a relatively new concept and is not widely understood, techniques already exist to minimise its undesirable effects. The prevention of these adverse effects mainly involves changes in the material used and the system design. However, for systems already affected by PID or for those susceptible to it, a device has been developed that reverses the polarity of the array, forcing the negative charge out of the module.

In the past five years, the global solar PV capacity has grown at the average rate of over 50% a year. In addition, as module and associated costs have decreased, PV systems and solar farms have become larger. Over this period, a considerable number of reports amongst the solar community have emerged about unexplained power losses. Eventually, the cause of these was identified as PID. The explanation is simple: for these large installations, a large number of solar modules are required. Once the modules are connected in series, the systems operate at a high voltage. These are the conditions in which PID can occur.

It is now realised that the environment, module material and system design are also related to the degradation process. To understand how each of these factors affects the cells, it is important to understand how the phenomenon develops.

The PID phenomenon

When a PV system operates at high voltage, ie, >1000 V, a considerable potential difference is established between the solar cell and the frame. This means that an electrical difference builds up between the system and ground, as the frame is earthed for safety reasons. If the potential is negative (that is, the cell has more electrons relative to the ground), it creates a current that flows from the module frame to the PV cells, known as a leakage current.

In 2005, Swanson et al summarised data on the inexplicable power losses observed in large systems in an article for the European Photovoltaic Solar Energy conference. In this article, the cause of these losses was identified as PID, thus highlighting the issue and raising concerns of those in the solar industry. To increase the lifetime and reliability of the solar cells, manufacturers started to invest in solutions to PID. Although many manufacturers claim to have overcome the problem, few PV modules are actually free of PID.

There are three main paths that the leakage currents can take: from the front side of the frame to the cell, through the solar glass; from the side of the frame to the cell, through the encapsulating material; from the back side of the frame to the cell, through the back sheet and the encapsulating material. As regards to the PID effect, the critical current moves from the frame to the cell through the solar glass. This current allows positive sodium ions from the glass to drift towards the top layer of the PV cells, while negatively charged electrons move away from it via several paths.

The mechanisms that follow after the positive sodium ions reach the PV cell are not yet well known. For now, we know that these positive charges accumulate on the top of the PV cell and interact with the p-n junction, causing a local short circuit.

One well-accepted theory about the local short circuit proposes that the sodium ions diffuse into the bulk of the PV cell and act like donor atoms, increasing the concentration of sodium ions in the n-doped layer. Eventually, the ions neutralise the negative doping, reducing the photovoltaic effect of the cell. The sodium ions act as impurities in the cell and become sites of recombination, reducing the amount of current that can be extracted and the potential across the cell, thus lowering performance. More studies are required to confirm whether this is the true degradation mechanism.

If the local short circuit occurred within only a single p-n junction, it would not be a problem. However, it happens in multiple p-n junctions. This reduces the maximum power point and the open circuit voltage, which in turn reduces the total string voltage. As a consequence, the inverter switches on later in the morning than it should because the solar array needs more radiation to reach the inverter's minimum voltage. The inverter also switches off earlier


Alfi/Dollar Photo Club

in the evening, as the system voltage drops rapidly with the day's decreasing irradiance.

PID also affects the output current because, as the leakage currents between the cells and the frame become greater, the output current reduces, which results in a bigger output loss.

Once PID has affected the array, the modules become increasingly less effective and a loss of up to 70% can be measured.

Contributing conditions and methods to prevent PID

PID is caused by leakage currents created by the potential difference between the ground and the PV cells. Any factor that increases these leakage currents or the electrical potential (even indirectly) contributes to PID. This, therefore, also deserves attention.

Contributing factors can be broken down into the three following areas: environmental, material and system design. It is important to note that these factors affect every installation and are considered to have the greatest impact on PID.

Environmental factors

The two principal environmental characteristics that affect how much leakage current will flow through the module are humidity and temperature. As the PV system is exposed to higher levels of relative humidity, water vapour penetrates the system and makes it more conductive. The sodium ions can move more easily inside the material, and more positive charge is accumulated on the top of the solar cell. As a consequence, leakage current intensifies and PID increases.

Increased temperature has the same effect. Higher temperatures can cause the leaking of sodium ions in the system and also accelerate their mobility; this results in increased current intensity. When the leakage currents become more intense, the current that generates power is weakened.

Although temperature and humidity have a strong influence on PID, they are hard to control. Therefore, the techniques and methods to prevent PID focus on other areas.

Material factors

A PV system is composed of many different elements. The qualities and properties of each one can determine how prone the cell is to PID. The main components of a module that influence degradation are the anti-reflective coating, the glass and the encapsulating material.

Anti-reflective coating: The anti-reflective coating helps to increase the amount of light captured by the solar cell, which results in higher currents. However, depending on its thickness, refractive index and coating homogeneity, the anti-reflective coating affects PID in different ways. For example, the widely used anti-reflective coating silicon nitride (SiN) can accelerate the PID process when its layers accumulate highly mobile sodium ions.

Solar glass: Researchers have shown that some types of glass are more susceptible to increased leakage currents than others. This is because certain glasses have high concentrations of sodium that can be released when the glass is exposed to moisture or high temperatures. Using a type of glass with less sodium (for example, quartz instead of soda-lime) can potentially reduce the PID susceptibility.

Encapsulating material: Because humidity increases the conductivity of the PV system, how permeable the encapsulating material is also plays a crucial part in PID susceptibility.

System design factors

PID occurs when the system has a negative potential relative to the ground. A simple solution is to ground the negative pole of the array and make the system operate only in a positive potential, a process known as functional earthing. Excluding the case where the cell suffers electro-corrosion, this method works well. However, in the past few years, transformerless or non-isolated inverter technologies have been widely adopted, and these do not allow for functional earthing of the array.

Another possible solution is to install a PV-offset box. During the night, this device applies a positive potential to the system, discharging any particles and reversing the polarisation effect.

Summary

PID is a degradation process observed when a PV system is exposed to a high negative voltage relative to ground. The temperature and humidity to which the solar system is exposed enhance this effect.

There are several proposed methods to prevent the occurrence of PID. As the weather cannot be changed, and having a system operating at a low voltage is impractical, the solutions focus on impeding the leakage current by changing the material or the system design.

Three factors related to material selection can greatly affect PID: the anti-reflective coating, the encapsulating material and the solar glass. As regards the system design, the most significant factor is how the system is grounded (if at all). Grounding the negative leg of the PV system can prevent the occurrence of PID, as the array will always be at a positive potential compared with the ground. However, not every system can be grounded in this way, depending on the inverter technology used. For systems that cannot be functionally grounded, it is possible to use a device that changes the bias of the array during the night, releasing any negative charges.

It is important to note that PID occurs mainly on crystalline silicon modules. This type of module is widely used, and many systems and solar farms were installed in the past without any PID testing or preventative measures. Degradation of these systems could represent a significant problem in the near future.

Global Sustainable Energy Solutions (GSES)
www.gses.com.au

Downlights

Designed to work with the Clipsal 32E450 universal dimmer series, Clipsal LD series LED downlights overcome the frustration of flickering and lag caused by incompatible products.

The LD series has a high lumen output and long life span of 30,000 h. A wide lip allows for easier retrofitting, and low-profile heat sink (11 W) allows for installation in restricted ceiling cavities.

Features include: dimmable with the Clipsal 32E450 universal dimmer mech; products available in two lamp temperatures: warm white (3000 K) or cool white (4000 K); high lumen output: 11 W (600 lm) and 15 W (900 lm); 30,000 h rated lamp life to L70; wide beam angle of greater than 150° for large light spread; IP44 rated.

Clipsal Australia Pty Ltd
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Outdoor luminaire

The Eco R250, built on the R250 outdoor luminaire technology, is designed for optimal application on major highways, roads, pedestrian sidewalks, as well as parking and retail areas.

Similar to the R250, this light enjoys a premium module design, allowing it to become a strong foundation for a complete outdoor LED solution. Utilising high-powered LED COB particles, it generates a uniform light while using energy efficiently. Key features of the Eco R250 luminaire include its long life span and a self-cleaning thermal design, which serves to significantly reduce maintenance requirements.

The outdoor LED system provides users with a complete lumen package from 3600 to 28,800 lm. It is easily scalable from 40 to 320 W using a one to four module construction. With 120 to 277 V voltage options, the Eco R250 luminaire may be conveniently applied for use in most countries in the region. In addition, there is a special paint option to support installation at beach areas.

GE Lighting
www.geindustrial.com/asia

Outdoor motion sensors

The PIRAMID XL2 outdoor motion sensor provides false-alarm-free performance and 'volumetric' protection even under severe environmental conditions. Rain, sleet, snow, fog, ice and wind is said to have no impact on the XL2's performance or reliability. Additionally, moving vegetation, blowing debris, swinging signs, vibration and randomly moving objects are filtered out by the sensor.

The sensor is also not affected by extreme temperatures as it has an operating temperature range of -34 to 66°C. It is encased in a rugged, weatherproof, IP65 metal housing that shields the unit from RFI/EMI interference, rain, snow, wind and sun loading. Additionally, the sensor features enhanced bird and animal immunity control.

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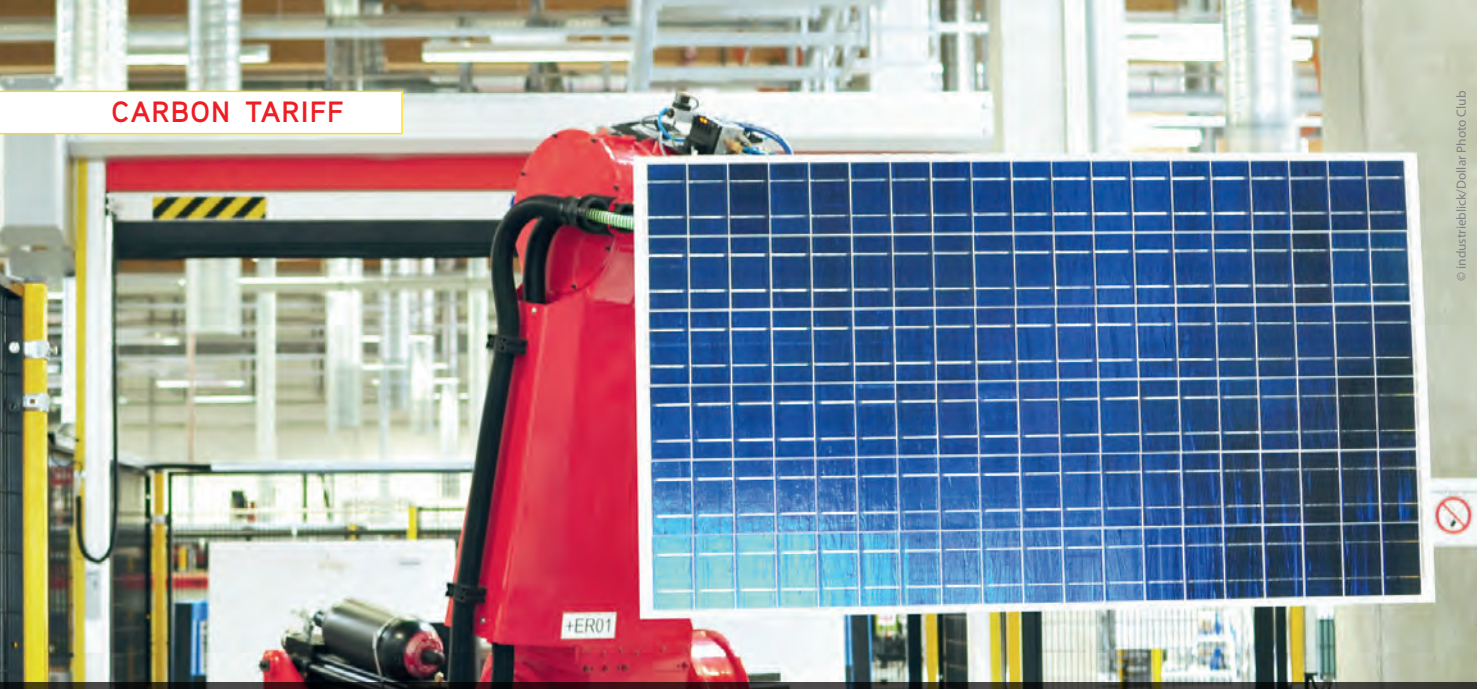

CARBON FOOTPRINT OF CHINESE SOLAR PANELS HIGHER THAN EUROPEAN

Louise Lerner

The overall carbon footprint of solar panels is about twice as high when made in China and used in Europe, compared to those locally made and used in Europe, reveals a recent study from Northwestern University and the US Department of Energy's Argonne National Laboratory.

The report compared energy and greenhouse gas emissions that go into the manufacturing process of solar panels in Europe and China. "While it might be an economically attractive option to move solar panel manufacturing from Europe to China, it is actually less sustainable from the life cycle energy and environmental perspective - especially under the motivation of using solar panels for a more sustainable future," said Fengqi You, assistant professor of chemical and biological engineering at Northwestern and corresponding author on the paper.

To encourage more sustainable production of solar cells, the authors suggest a break-even carbon tariff. "This would be based on the carbon footprint and energy efficiency difference between manufacturing regions, and would be a better market- and science-based solution than a solar panel tariff," said Dajun Yue, a Northwestern graduate student in You's research group and lead author on the paper.

"The break-even carbon tariff we calculated, which is at the range of €105-129 (AU$154-190) per ton of carbon dioxide, depending on the possible carbon tax to be imposed by these two regions in the near term, is close to the reported CO_2 capture and sequestration cost," You said.

The team performed a life cycle analysis to come up with hard data. The analysis tallies up all the energy used to make a product - energy to mine raw materials, fuel to transport the materials and products, electricity to power the processing factory, and so forth. This provides a more accurate picture of the overall energy consumed and produced, and the environmental impact of making and using a solar panel.

Assuming that a solar panel is made of silicon - by far the most common solar panel material - and is installed in sunny southern Europe, a solar panel made in China would take about 20 to 30% longer to produce enough energy to cancel out the energy used to make it. The carbon footprint is about twice as high.

The biggest reason is that China has fewer environmental and efficiency standards for its factories and plants and generates more electricity from coal and other non-renewable sources, the authors said.

"It takes a lot of energy to extract and process solar-grade silicon, and in China, that energy tends to come from dirtier and less efficient energy sources than it does in Europe," said Argonne scientist and co-author Seth Darling. "This gap will likely close over time as China strengthens environmental regulations."

The study did not include the energy cost of transporting a solar panel to its final destination. Transportation would magnify the difference even further if it - like 60% of all solar installations in 2012 - went up in Germany or Italy, Darling said.

The team also compared the numbers for different types of silicon solar panels. Single-crystal solar panels are better at harvesting energy than other types but take the longest to pay back the energy used to manufacture them because the process is more energy-intensive. Multicrystalline panels came next, followed by ribbon silicon panels, which are easiest to manufacture but least efficient - however, their payback time was fastest.

The paper, Domestic and overseas manufacturing scenarios of silicon-based photovoltaics: Life cycle energy and environmental comparative analysis, is available online and will be printed in the July issue of the journal *Solar Energy*. Funding for this research was provided by the Institute for Sustainability and Energy at Northwestern University. The research was performed in part at the Center for Nanoscale Materials, a US Department of Energy user facility.

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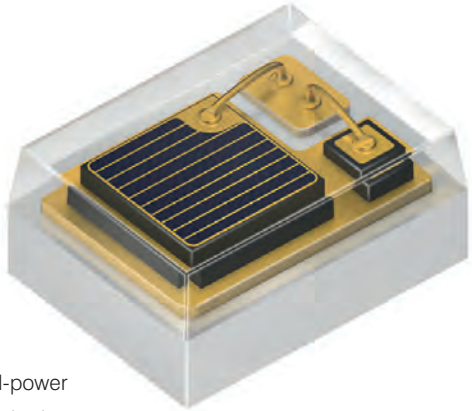

Compact infrared LED

The Oslon Compact infrared light-emitting diode (IRED) has been added to the Osram Opto Semiconductors range. Despite its small package it offers good output and can therefore be used for such tasks as surveillance, digital image processing, 3D measurement, pattern recognition and gesture detection.

The infrared Oslon Compact SFH 4710 has been designed for industrial applications. As a mid-power LED with a typical output of 270 mW from an operating current of 500 mA, it occupies the output range between the company's Power TopLED and Oslon Black.

The IRED accommodates a small powerful chip with an edge length of 750 μm and half the footprint of standard chips in the Oslon Black. With package dimensions of 1.6 x 1.2 x 0.8 mm, the IRED is not much larger than the chip itself and is therefore one of the smallest in its output class.

The infrared light emitting diode has an emission angle of ±65° and does not need internal optics or reflectors. Its light can, however, be successfully injected into narrow-angle external optics.

With external optics, it is suitable for illumination in surveillance applications and for machine vision tasks such as pattern recognition and 3D measurement because the wavelength of 850 nm is barely perceptible to the human eye but can be very easily detected by camera systems. Without external optics, the IRED covers the near-field range of a few metres and is therefore suitable, for example, for eye tracking and gesture detection.

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LED floodlights

The Cortem EWL series lighting fixtures from NHP utilise LED technology that has been developed to replace, in the coming years, conventional light sources which will become obsolete.

The distinctiveness of these floodlights, available with optics of different angles (10°, 20°, 40°), is in their rigid body that is able to withstand vibrations designed for the harshest environments.

These compact, efficient floodlights are Ex de certified, produce no UV emissions and are able to perform well in extreme climates. The EWL series floodlights also have a long life duration (about 100,000 h, which equates to around 12 h a day for 20 years), with an energy savings of about 50% in management cost reduction.

NHP Electrical Engineering Products Pty Ltd

www.nhp.com.au

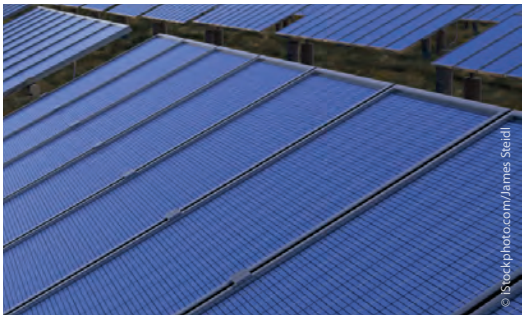
CASE STUDY

Off-grid solar for Rio Tinto's Weipa site

First Solar, Rio Tinto and Ingenero have reached an agreement for the development of the Weipa solar PV project in Queensland.

Weipa Solar Farm, a joint venture between First Solar and Ingenero, will have an initial capacity of 1.7 MW with the potential to expand by an additional 5 MW after the commissioning of the initial phase. The project will generate electricity for Rio Tinto Alcan's (RTA) Weipa bauxite mine, processing facilities and township on the Western Cape York Peninsula.

The first phase of the project is expected to generate sufficient electricity to offset up to 20% of the daytime electricity demand, while reducing the diesel consumption for every MWh of electricity produced.



The Australian Renewable Energy Agency (ARENA) has announced that it is providing $3.5m towards the first stage of the project, to be followed by an allocation of up to $7.8m for the project's second phase. ARENA CEO Ivor Frischknecht said off-grid communities and businesses have had little choice but to rely on diesel generators that are expensive to run and subject to volatile fuel prices. "Transporting fuel long distances for generators is dangerous and subject to variable weather conditions - it is a costly, unpredictable arrangement that doesn't make good economic sense," Frischknecht said.

"We expect the use of solar power will reduce Weipa's annual diesel consumption and its carbon dioxide emissions by around 1600 tons," said Rio Tinto Alcan General Manager Weipa Operations Gareth Manderson.

First Solar will offer a FuelSmart solution that is said to provide maximum fuel savings while maintaining system reliability. With completion scheduled for late 2014, First Solar will supply its advanced thin-film PV modules and other balance of system components, in addition to providing operation and maintenance services for the duration of the project.

RTA will purchase the electricity under a 15-year power purchase agreement. The project is one which all partners see as a step towards energy alternatives for remote mining operations.

Manderson noted that the hybrid diesel/PV solution will introduce to the site a reliable source of electricity, with low maintenance requirements. "For the Weipa bauxite mine, solar PV complements the existing base-load generation by providing electricity in times of peak demand and reducing the amount of diesel fuel used," said Jack Curtis, First Solar's VP of business development for Asia Pacific.

ENERGY USE SLASHED WITH EFFICIENCY CONTROLS

Commercial buildings could cut their heating and cooling electricity use by an average of 57% with advanced energy-efficiency controls, according to a year-long trial of the controls at malls, grocery stores and other buildings.

The study conducted by the Department of Energy's Pacific Northwest National Laboratory demonstrated higher energy savings than what was predicted in earlier computer simulations by the same researchers.

Sitting on the roofs of many commercial buildings are shiny metal boxes containing HVAC units. These are pre-made in a factory and have all their components inside a box, leading the industry to call them 'packaged' HVAC units. Another kind of commercial HVAC, called air handling units, have long used sophisticated controls to ensure they work as efficiently as possible. But packaged units are often allowed to run for hours on end, even if they aren't needed, and receive little maintenance.

Packaged HVAC units consume the same amount of electricity each year as 8 million US residents. All those ignored and often-inefficient HVAC systems add up, creating higher power bills and contributing to the nation's greenhouse gas emissions.

In 2011, PNNL's Srinivas Katipamula and his colleagues set out to adapt the controls already found in air handling HVAC units for use in packaged rooftop HVAC units. The goal was to enable packaged units to automatically adjust their operations based on conditions inside and outside a building. Using sensors and variable-speed motors, the controls decide when and how fast ventilation fans should run, and if the units can use naturally cold air from the outside instead of mechanically cooling indoor air.

While the PNNL team was evaluating how these controls could work, they learned a few companies were simultaneously and independently in the process of developing such advanced controls. During the summer of 2012, the team installed one of the commercially available control kits on 66 rooftop HVAC units at eight volunteer commercial buildings in Washington state, Ohio, California and Pennsylvania. The buildings included shopping malls, grocery stores, big-box stores and a medical clinic. The installed devices, manufactured by Transformative Wave of Kent, Wash., were chosen because they most closely resembled the advanced controls PNNL had envisioned.

Katipamula and his colleagues found that, compared to standard operations, the HVAC units using advanced controls cut their energy use by an average of 57%. The actual energy savings ranged from 20 to 90%. Larger buildings such as malls, which need bigger HVAC units, saved more energy than smaller buildings. And buildings that ran ventilation fans more, such as stores open long hours, tended to save more energy.

Translating the energy savings into dollars saved depended on local power costs. Nationwide, energy costs an average of 10 cents per kWh, though areas with abundant and inexpensive power supplies often pay less and large cities with greater energy needs generally pay more. When using the national average, researchers found all the field-tested HVAC units would have saved an average of $1489 annually per unit. The team calculated it would take a building owner three years to recoup the cost of buying and installing advanced controls with that average cost savings. Commercial buildings often have multiple rooftop HVAC units, so actual savings per building would depend on the number of units used.

But the exact payback period depends on several factors. To help building owners weigh the costs, the research team developed a table that lays out which specific combinations of an HVAC unit's size, the number of hours its fan runs daily and the local energy rate would result in a three-year or less payback period. The team concluded installing advanced controls in smaller units with a capacity of 15 tons or less could achieve a three-year payback in areas where energy costs 12 cents per kWh or more, or where sufficient utility incentives were available.

"We hope commercial building owners will be inspired by these tangible savings and install advanced controls in their rooftop HVAC units," Katipamula said.

This research was supported by DOE's Office of Energy Efficiency & Renewable Energy and the Bonneville Power Administration.

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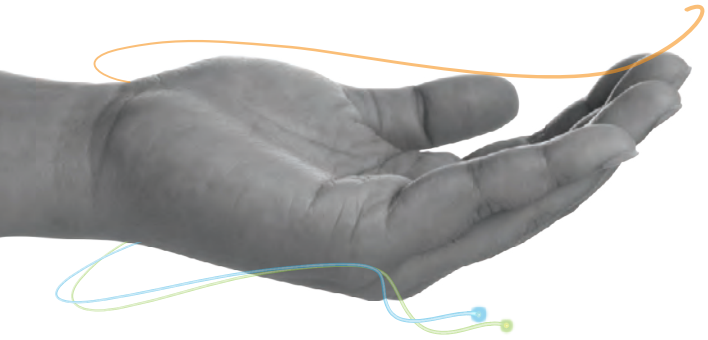

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ELECTRICAL NEEDS OF THE MODERN HOME

Brett Birthisel, General Manager, EcoBusiness

There is no doubt that in recent decades technology has changed the way Australians live and work. With the complex mix of technologies, home owners are now being urged to think about how their homes are currently wired and their future requirements.

Modern homes are filled with multiple forms of technology - tablets, home computers, smart TVs, game consoles and smartphones to name a few.

New technologies, such as USB charger outlets, are being developed all the time, so home owners are continually faced with the questions of how best to connect them and how to know what equipment has real 'staying power'.

With the rollout of the National Broadband Network (NBN) into Australian homes underway across the country, home owners, renovators and new home builders are also considering the steps they need to take to prepare the new homes for the NBN; and how they can take full advantage of what the NBN will offer in entertainment, healthcare, education and convenience.

Due to the recent advancements in connectivity the NBN has allowed, home control and automation products are gaining traction with consumers. A smart home, equipped with lighting, heating and electronic devices that can be controlled remotely by a smartphone or computer enables home owners to improve energy efficiency and reduce bills.

Because systems within the smart home are activated only when needed, unnecessary consumption of energy used for heating, cooling, lighting and watering is minimised. For example, window furnishings can be controlled to maximise natural light, shade and temperature, and watering systems can be activated when they are most effective during the cooler hours of the day.

The ability to manage energy and water usage to this extent also means home owners are now looking, and expecting, significant cost savings on electricity and water bills by reducing lost energy and using off-peak power where possible.

With this, we're seeing a change in the electrical contractor industry led by the 'eco-sparkie', or an electrical contractor who considers the environment.

As a result of the focus on convenience, energy efficiency, environmentally friendly solutions and cost savings, the electrical contractor is now expected to provide much more than just on-site labour. The eco-sparkie is required to act as a trusted advisor in specification, design and integration for the modern home.

The electrical contractor must now consider the need for not only the hard-wired cabling and wireless technology that is required for technology in the home, but how energy-efficient products can be integrated in the electrical design to create the desired outcome for the home owner.

For example, a sustainable solution in a home or office can often be as simple as the addition of a motion sensor to an outside light. This solution will work to meet the home owner's need by providing energy savings, added security and convenience, while showcasing the knowledge and value the electrical contractor can provide.

The trend towards energy efficiency, ease and convenience extends not only to modern home owners but to commercial and industrial sectors, where energy-efficiency ratings are often even more important. Monitoring and control systems are used by many building owners in the industrial sectors to maintain their NABERS energy-efficiency rating and comply with BCA requirements. Commercial buildings are often more attractive when they meet energy-efficient credentials - from the point of view of landlords who find them easier to lease and sell and for tenants who see overwhelming benefits in ongoing energy savings.

As a result, energy management organisations are also adopting the concept of the eco-sparkie. For example, Schneider Electric and Clipsal have launched the EcoXpert program - an exclusive partnership for electrical contractors who focus on commercial and industrial buildings that provides access to coaching, training and specialist tools so contractors can keep up to date with solutions for the commercial sector.

The focus on convenience, energy efficiency and sustainability has meant home owners are now relying on the electrical contractor as a trusted advisor and specialist in the space of energy efficiency and sustainable energy use.

Schneider Electric Buildings Australia Pty Ltd
www.schneider-electric.com.au

CABLES THAT STORE ELECTRICITY

Researchers at the University of Central Florida have developed a way to both transmit and store electricity in a single lightweight copper wire.

Copper wire is the starting point but eventually as the technology improves, special fibres could also be developed with nanostructures to conduct and store energy, says nanotechnology scientist and professor Jayan Thomas, who worked on the project with his PhD student Zenan Yu.

More immediate applications could be seen in the design and development of electrical vehicles, space-launch vehicles and portable electronic devices. By being able to store and conduct energy on the same wire, heavy, space-consuming batteries could become a thing of the past. It is possible to further miniaturise the electronic devices or the space that has been previously used for batteries could be used for other purposes. In the case of launch vehicles, that could potentially lighten the load, making launches less costly, Thomas said.

Thomas and his team began with a single copper wire. Then he placed a sheath over the wire made up of nanowhiskers the team grew on the outer surface of the copper wire. These whiskers were then treated with a special alloy, which created an electrode. Two electrodes are needed for the powerful energy storage. So they had to figure out a way to create a second electrode.

They did it by adding a thin plastic sheet around the whiskers and wrapping it around using a metal sheath after generating nanowhiskers on it (the second electrode and outer covering). The layers were then glued together with a special gel. Because of the insulation, the inner copper wire retains its ability to channel energy, but the layers around the wire independently store powerful energy.

In other words, Thomas and his team created a supercapacitor on the outside of the copper wire. Supercapacitors store powerful energy, like that needed to start a vehicle or heavy-construction equipment.

Although more work needs to be done, Thomas said the technique should be transferable to other types of materials. That could lead to specially treated clothing fibres being able to hold enough power for big tasks. For example, if flexible solar cells and these fibres were used in tandem to make a jacket, it could be used independently to power electronic gadgets and other devices.

Thomas and Yu's study is the focus of the cover story of the 30 June issue of the material science journal *Advanced Materials* and *Nature* has published a discussion about this technology in the current issue.

Yu works in Thomas's Nano Energy-Photonics Group. It conducts research focused primarily on nanostructured supercapacitors and lithium-ion batteries, nanoarchitectured light-trapping solar cells, photorefractive polymers for 3D display applications and nonlinear optical materials.

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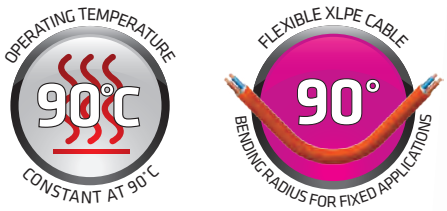

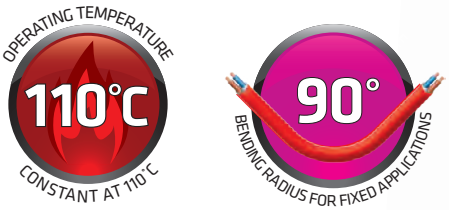

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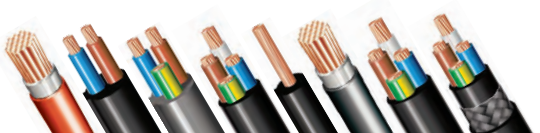


CASE STUDY

Steel manufacturer switches over to LED

Earlier this year, steel manufacturer Gerdau began searching for a lighting solution for its facility located in Knoxville, Tennessee. The company was looking for a solution to replace the metal halide fixtures and withstand the heat of its facilities, while maintaining enough lumens to create visibility in its dimly lit locations.

With over 45,000 employees, the company has industrial operations in 14 countries - in the Americas, Europe and Asia - which together represent an installed capacity of over 25 million metric tons of steel per year.


© maxoidos/Dollar Photo Club

Gerdau's Knoxville steel mill in the Lonsdale community has operated for 110 years under various names and owners, and Gerdau took over the mill's operations in 1999 and employs nearly 240 local residents there.

The steel re-bar company reached out to EverLast Lighting to find a solution that would meet their lighting specifications where LED had failed. "Gerdau had tried to replace the metal halide fixtures with different LED lines in all three of their plant locations in Knoxville, and were not pleased with the performance of the LEDs," explained Bruce Sizemore, Representative of Sizemore Performance located in Walland, Tennessee. "Based on their findings, we knew that we had to find a fixture that would be able to perform in their facility, with little maintenance."

Specifically, the LED fixtures were not able to withstand the heat or the environment of the Gerdau facilities. "The ceilings in the plant are about 140-160˚ and the lens on the LED fixtures began to melt off," explained Steve Trefethen, green technician at Gerdau Steel. "We also have a lot of steel dust that floats in our air and eventually the dust begins to compile onto each fixture. The result of the weight of the compiled dust ultimately unhinged each fixture from the area it was installed sending it crashing to floor."

As a result of the LEDs failing to meet specifications, Gerdau moved forward with replacing several hundred metal halide fixtures with EverLast induction high-bay fixtures and were very pleased. "In addition to a plethora of product and application issues, the LED was extremely expensive, and the light output was not as optimal as the EverLast Induction fixtures. Furthermore, Gerdau needed a fixture that was compatible with DC power, and we were able to convert from AC to DC with the EverLast line pretty easily," commented Sizemore.

EverLast induction light fixtures last up to 100,000 hours, which is double the life of an LED. They are also available with a dimmable option, providing even more energy savings while areas are vacant. "Gerdau is now enjoying about a 70% savings on their overall energy consumption compared to their previous fixtures, and are very pleased with the induction technology," stated Sizemore.

The EverLast high-bay fixtures are commonly used in large-scale facilities and can be found installed in COBO Hall in Detroit, Michigan, the Tulsa Expo Center in Tulsa, Oklahoma, and Lambeau Field, home of the Green Bay Packers in Green Bay, Wisconsin.

USB charging module

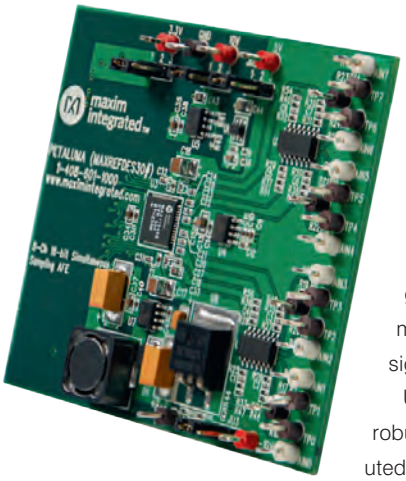
The Legrand Excel Life Dual USB charging module is suitable for charging multiple mobile devices simultaneously at their maximum speed, from the convenience of a powerpoint or switchplate.

With a 4.2 A maximum total charging capacity - 2.1A (or 10 W) per USB socket - this dual connection design allows charging of any combination of mobile devices, including two tablets, smartphones, digital cameras, MP3 players and GPS without the need for the original manufacturer's charger.

To assemble, the user has to insert the dual USB charging module into the extra hole of any single or double Legrand Excel Life powerpoint, or one to six-gang switchplate configuration. The installation then simply involves wiring the active and neutral cables with the mains cable, then inserting the charger into the wall cavity to complete the installation.

Featuring surge protection, any connected mobile devices are safe from power surges and other voltage disturbances while charging. Overload protection also limits the current supplied to a mobile device, in case of a short circuit on the USB cable, protecting valuable devices from any electrical damage.

HPM Legrand
www.hpmlegrand.com.au



Grid data management solution

Utilities and infrastructure providers can now simultaneously and accurately measure distributed power grid data with Petaluma, a subsystem reference design from Maxim Integrated Products.

Petaluma is a high-speed, simultaneous-sampling, 8-channel analog input front-end (AFE) that monitors grid data simultaneously from all phases, so grid managers can optimise their distribution automation signal chain.

Utility organisations worldwide are deploying more robust applications that require highly accurate distributed grid status data to leverage distributed generation technologies such as solar and wind power.

Voltage and current measurements must be gathered simultaneously for all lines, so the utility can understand the timing among phases and ensure maximum uptime across the grid. Petaluma is tuned to the 50 to 60 Hz signal to match power grids around the world. The simultaneous sampling of three phases is done with low power consumption in the 1 W range. Its high-speed sample rate (250 kSps per channel) comes with 16-bit accuracy, allowing for quick responses to grid fault conditions. Petaluma performs well in any application that requires multiple simultaneous sampling of utilities and infrastructure providers.

Avnet Electronics Marketing
www.avnet.com.au

CASE STUDY

HVAC optimisation provides savings at shopping centre

Mount Pleasant Shopping Centre, one of two major retail centres serving the city of Mackay, Queensland, was facing significant energy-efficiency issues. The hot, humid climate, ageing buildings and relatively inefficient HVAC technology presented a challenge in lowering the carbon footprint of its retail facilities. To reduce the cost of operations, Mount Pleasant management selected BuildingIQ.

The shopping centre includes more than 65 retail stores, which together occupy some 23,000 m^2 of commercial space. Pedestrian traffic flowing through the centre averages 4 million person-trips per year.

The overriding challenge was to establish a strong working relationship and technology buy-in by the owner and operator whereby BuildingIQ would connect indirectly with the metering system through the SkyFoundry interface. The HVAC system used by the shopping centre employed direct expansion (DX) technology, which involves distributed cooling plants rather than central cooling with distributed air. DX systems are typically less efficient and less effective than centralised, chilled water (CHW) systems. As a result, operational improvements with DX technologies were much harder to come by and were typically much smaller than those possible with CHW systems.

Mount Pleasant's management chose BuildingIQ for its energy-efficiency and Predictive Energy Optimization (PEO) systems, and because the PEO model can engage seamlessly with virtually any building management system (BMS). The strategy for implementation employed by BuildingIQ was that of an individualised zone-temperature target system. The optimisation sequence had to be varied throughout the centre because of the heavy foot traffic and thermal loading in key areas, such as the food court, where comfort is a critical factor in the customer's dining experience, and where the allowable temperature band is relatively tight.

© Igor Terekhov/Dollar Photo Club

The BMS which BuildingIQ's PEO was eventually linked to is an Airmaster system, using Tridium R2 at the front end. Although the initial interface took the better part of a year because of the interface creation with the R2 version, early results have been encouraging, with savings up to 10%.

Once the BMS interface was complete, BuildingIQ was able to tap into the historical metering database to begin charging the PEO model. The transitional learning phase accelerated, and within 2-3 weeks, the optimisation procedures were initiated. Energy savings were immediate, positive and growing. Typically, the algorithms underlying optimisation become more astute as the PEO model masters the thermal dynamics of the buildings.

The central challenge of establishing a solid working relationship with the management of Mount Pleasant was successful, largely because of good will, team dedication, the successful integration of vendors and the demonstration of immediate savings with the promise of greater rewards ahead. The implementation at Mount Pleasant was done in early 2014, and after just 30 days of implementation the centre saved more than 10%.

ECD ELECTRICAL+COMMS+DATA SOLUTIONS

ELECTRICAL DISTRIBUTION

DIN rail mount power supplies

The PULS CPS20 series is said to be the smallest 480 W, 1-phase DIN rail mount power supply available. The units are compact having a width of 65 mm and are available in 12, 24, 36 and 48 V versions.

The power is available over a wide temperature range from -25 to +60°C. Additionally, there are power reserves of 20% included, which may even be used continuously at temperatures up to +45°C. For short-term peak loads with a maximum length of 15 ms, the units can deliver four times the nominal output current.

The units are equipped with a wide-range input circuit from AC 100 and AC 240 V and have a 94% full-load efficiency and good partial-load efficiencies.

Other features include Active Power Factor correction, DC okay LED indication and the claimed highest lifetime expectancy of any 20 A DIN rail mount power supply.

All models in the CPS20 range have IECEx approval and there are also dedicated DC input versions that can take voltages between 88 and 360 VDC.

Control Logic Pty Ltd

www.control-logic.com.au

Test and measurement range

FLIR Systems has launched a line of test and measurement equipment that includes a True RMS digital multimeter, two power clamp meters, an NCV detector/light, a moisture meter and a videoscope.

The range includes three electrical meters - the DM93, CM83 and CM78. All feature large/clear LCD, bright dual-LED worklights to illuminate dimly lit work areas, Bluetooth connectivity to Android and Apple mobile devices running the latest FLIR Tools Mobile app, and the ability to connect with METERLiNK-enabled FLIR thermal cameras so that users can embed electrical readings into their thermal images.

The DM93 is a rugged DMM designed with advanced VFD filtering and shielding that help professional users accurately analyse non-traditional sine waves and noisy signals found in VFD-controlled equipment.

The CM83 industrial power clamp meter with power analysis and advanced VFD filtering accurately tests three-phase systems and VFD-controlled equipment.

The CM78 is a 1000 A clamp meter that combines a True RMS digital multimeter and non-contact clamp meter along with an IR thermometer with laser spot and a Type K thermocouple.

The VP50 compact, CAT IV-rated NCV detector features an additional dual-LED convenience light at the probe tip.

The MR77 is a rugged moisture meter incorporating a pinless sensor and a wired pin probe to capture moisture readings up to 0.75″ below the surface of various building materials, a spot IR thermometer with laser pointer and a field-replaceable temperature/humidity sensor.

The VS70 is a rugged videoscope with intuitive handset controls that let users manoeuvre the narrow camera probe into tight areas to deliver clear video and images to a large 5.7″ colour LCD.

FLIR Systems Australia Pty Ltd
www.flir.com.au

Data transfer system

The latest Fluke Connect system transfers measurement data from test tools to smartphones and the cloud, improving maintenance team communication, safety and productivity.

Maintenance teams make better, faster decisions by having immediate access to historical records of the machinery they are maintaining and being able to review measurements in real time with team members and supervisors. Yet historical data is usually only accessible back in the office, and team members are rarely in the same place at the same time.

The Fluke Connect system solves these problems while increasing the safety of technicians working with energised equipment. The system is a set of tools and a smartphone app that let maintenance technicians capture, securely store and share data with their teams from the field. It helps them make better decisions faster by being able to view all temperature, mechanical, electrical and vibration measurements for each equipment asset in one place.

More than 20 Fluke tools connect wirelessly with the Fluke Connect app. Compatible tools include digital multimeters, infrared cameras, insulation testers, process meters and specific voltage, current and temperature models.

The app can be downloaded for free from the Apple App Store and the Google Play Store.

Fluke Networks

www.fluke.com

Managed switches

The advanced managed switches in the Phoenix Contact 7000 series are particularly suitable for use in EtherNet/IP networks because the industrial ethernet switches are the first to be equipped with the Common Industrial Protocol (CIP).

The switches can be configured and diagnosed from the EtherNet/IP control system. The switches support the Device Level Ring (DLR) redundancy mechanism. With DLR switching, times of less than 3 ms can be achieved if failure occurs; this increases the availability of the network. Up to six non-DLR-enabled devices can be integrated into the ring with the FL SWITCH 7000 switch.

In addition, functions such as IGMP snooping, multicast source detection and auto-query port for intelligent multicast filtering are also available on the switches to enhance network stability.

Phoenix Contact Pty Ltd

www.phoenixcontact.com.au

Three-phase 3000VA DC/AC inverter

The ODX-3000 series of inverters from Premium provide a three-phase sinusoidal voltage output waveform that is suitable for motors and does not cause the same stress on motor windings that square wave output inverters can create. The series is suitable for industry and railway applications.

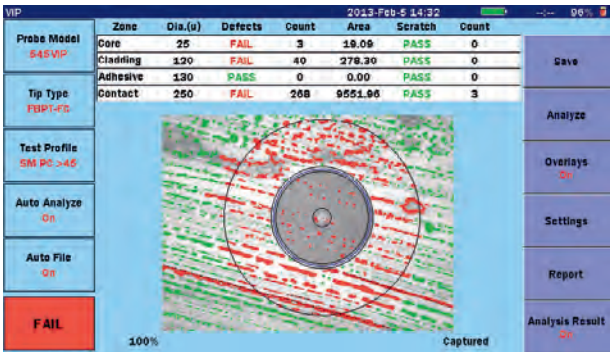
The output frequency can be selected to be either 50 or 60 Hz via a DIP switch making it suitable for use with either 50 or 60 Hz motors. The inverter also has a soft start function where during start-up the output voltage rises linearly from zero to nominal voltage, which helps reduce voltage dips on the network as well as producing less mechanical shock to the motor and equipment coupled to it.

The inverter gives the user the ability to monitor the status of the input and output voltages via two separate solid-state relays and with the ability to both set and monitor parameters via RS232.

There is a railway and industrial version of the device available where the railway version has been designed to the standards specified in EN50155.

Control Logic Pty Ltd

www.control-logic.com.au



Visual inspection probe for optical connectors

Damaged or dirty optical connectors can adversely affect network performance. Scratches, chips and contamination on optical fibre connector end faces reduce transmission quality and increase errors. This leads to additional installation and maintenance work and costs.

The G0306A video inspection probe can reduce these issues by verifying the condition and cleanliness of connector end faces during the installation phase. The connector image and detailed pass/fail status are displayed as defined by IEC 61300-3-35, ensuring quality and consistency from connector to connector, technician to technician.

The 400x G0306A is available for use with Anritsu's MT9083x2 series access master, MT9090A network master series μOTDR and for Windows-based PCs, and features one-button PDF report generation from the OTDR or PC.

Anritsu Pty Ltd
www.anritsu.com

Conduit U bolts

Anchorage Group has extended its range of Long Leg U-bolts.

Anchorage now processes U-bolts with leg lengths in excess of 1500 mm to suit conduit sizes from 100 NB and up. The company provides a full coating service for its extended leg U-bolts, including galvanised and powder-coated finishes.

The conduit supports are available with linings, such as neoprene, that prevent abrasive wear points, where vibration of pipes and conduits may be an issue. Anchorage also produce extra-long U-bolts in 304 stainless steel, where required.

SWIFT Metal Services Pty Ltd
www.swiftmetal.com.au

Test and tag print kit

The PAC3760 DL tester stores test results that download to any PC spreadsheet or database program. No special software is required to generate an electronic logbook to replace the handwritten logbooks.

The PAC3760DL appliance test and tag print kit also connects to the battery-powered PAC-OPT printer to print test tags. The printer's 'Plug N Print' operation simply requires connection to the PAC3760 DL via serial cable. No time-consuming set-up is required as the printer prints a generic test tag.

The tester is based on the PAC3760 series of portable appliance testers used in testing and tagging Australia-wide for over 12 years. The DL's data logging and tag printing version builds on the range's popular features.

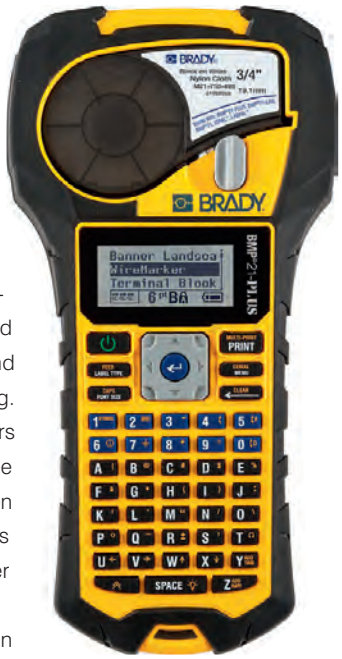
The tester conducts earth bond, insulation and polarity tests, as well as leakage current tests for Class I and Class II appliances and leads, and carries out trip time tests of 10 mA and 30 mA portable and fixed RCDs with the in-built isolation transformer. When used in conjunction with the optional PAC-TPL three-phase adaptor, the tester can also carry out three-phase leakage testing of 10 A, 16 A, 20 A and 32 A three-phase appliances. It operates under mains or battery power.

The unit is designed with simple 9-button operation: Class I, Class II, Leakage, 10 mA RCD, 30 mA RCD and three-phase test buttons; as well as a button to save results, recall/download results and print test tag. Results are displayed as a pass or fail as well as actual readings. Once the user selects the required test, the tester conducts an automatic sequence of tests, eliminating the need for complicated on-screen menus. Other features include automatic sensing of IEC or extension leads which adds a polarity test to the sequence and automatic detection of whether the appliance is switched 'on'.

Emona Instruments Pty Ltd

www.emona.com.au

Label printer



Brady Australia has released the BMP21-PLUS handheld label printer. The on-the-job labeller is suitable for datacom, electrical, telecom and general industrial environments.

The shape of printer has been re-engineered for enhanced durability and ergonomics, with a centre balance and ridges for easy gripping and handling. The high-visibility yellow and black colours and protective rubber bumpers give the printer job-site visibility backed by proven performance. The company says it has passed shock and vibration testing, per MIL-STD-810G Method 5.16.6 S4.6.5.

The printer features a lithium-ion long-life battery, a large back-lit LCD and a graphics library with 104 symbols for electric, smart home, safety and datacom applications. It also has auto-matic label formatting for nine common applications, including wire markers and patch panels, allowing users to simply drop in a label cartridge and begin printing - no set-up is required.

Brady Australia Pty Ltd
www.bradyaust.com.au

LED troffer

The Emerald Planet LED troffer offers a minimalist professional look with its white frosted lens and pearl white steel finish.

Using the latest technology, the troffer uses an 'Epstar' LED chip set on a steel heat sink that enables it to run cool, guaranteeing a long lifetime.

The LED troffer comes in 1200 x 300 mm and 600 x 600 mm versions designed to fit directly into an existing drop ceiling or is available with a ceiling-mount kit for surface mounting. With a 120° beam angle, the 6400K LED tube throws a wide, even, natural light. Other colours are available on request.

The product is available in 32 W (2600 lm) and 44 W (3600 lm) and comes with a 3-year warranty.

Emerald Planet Pty Limited
www.emeraldplanet.com.au

MASTER ELECTRICIANS AUSTRALIA

Recall insurance could be your umbrella on a rainy day

Malcolm Richards CEO

© freeimages.com/profile/asifthebes

As many electrical contractors are aware, our industry has experienced a number of alarming product recalls of late. These include the recent Avanco brand DC isolators and the Infinity brand cable recalls.

While the electrical contracting industry takes every precaution to guard against the possibility of faulty electrical products that do not meet Australian standards, this process is unfortunately not foolproof, as with the above situations.

Master Electricians Australia (MEA) has been contacted by a number of electrical contractors who have unfortunately and unknowingly installed these faulty products and now face the possibility of having to absorb the cost of the added work and time required to replace them.

MEA is aware of electrical contractors who have installed hundreds of these products. This is why our organisation has worked with insurance brokers Comsure to develop a tailored business insurance package that can be specifically applied to recalls and is exclusively offered to Master Electricians members.

The MEA Liability Cover has been designed following consultation with our members and the MEA Executive team, so members can be assured their cover suits their business needs. When applied to recalled products, this means that an electrical contracting business with recall insurance would be able to replace all recalled electrical products at no additional cost to themselves or their business, and at the same time be compensated for their work and time.

For a small electrical contracting business, this could be a lifeline in the event of a major product safety recall. Comsure has also set up a new trades division especially for Master Electricians members to provide further advice on insurance cover.

While incidents such as these are often out of our control, having the right insurance can be your umbrella on a rainy day and ensure your business isn't caught short, both legally and financially.

If you are a contractor who is required to replace Avanco DC isolators, MEA recommends you contact the receivers urgently and register as a creditor. The MEA Liability Cover with Comsure Insurance Brokers is exclusively offered to Master Electricians members.

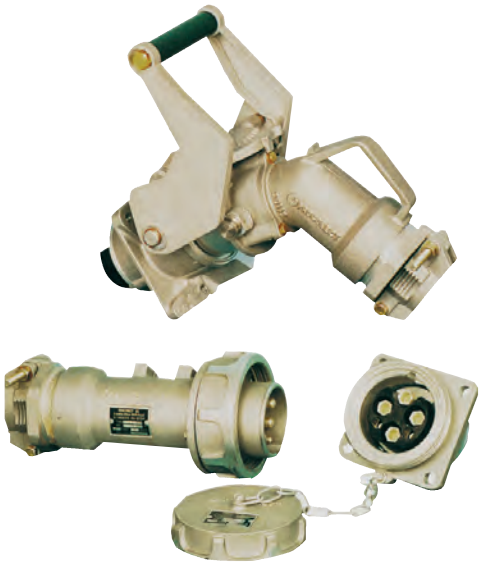
www.masterelectricians.com.au

ECD SOLUTIONS ELECTRICAL+COMMS+DATA ELECTRICAL DISTRIBUTION

Plugs and sockets

The Proconect 3PV/3PX range is an extension to the existing Proconect Deconnector plugs and sockets range, suitable for mining, harbour, transportation and commercial applications.

The plugs and sockets are available in either a screw ring (3PV) or push-pull connection (3PX) system where regular use or high vibration is expected. With current ratings starting at 160 A with a maximum of 660 A (at 3.3 kV), the 3PV/3PX also features IP67/IK10 ingress and impact protection for the harsh Australian environment. Made with corrosion-proof tempered cast aluminium including stainless steel fastenings, the 3PV/3PX range is suitable for the most arduous applications.



A full range will be available and featured in NHP's upcoming plugs and sockets catalogue. This includes: appliance inlets, socket outlets, straight plugs, angled plugs, extension sockets; three-phase, earth and two pilots pins or three-phase, neutral, earth and two pilot pins; crimping or screw terminal style cable connection, suiting cable cross-section from 16-300 mm^2; medium voltage range up to 11 kV is also available on request.

NHP Electrical Engineering Products Pty Ltd

www.nhp.com.au

LCD budget camera system

The Preco K7000BP budget LCD colour camera system offers a 7.0″ LCD high-resolution colour monitor with an included sunshade and remote control.

The K7000BP's CMOS colour camera has 18 infrared LEDs that deliver good picture quality even in low-light conditions, while the sturdy design features IP69K moisture and dust ingress protection. Unobtrusive installation is easy without compromising the viewable screen area and the system is expandable up to two cameras.

APS Lighting and Safety Products

www.aps-supply.com

Mixed domain oscilloscopes

The Tektronix MDO3000 series oscilloscopes are packed with timesaving tools to help users discover, capture, search and analyse problems in their design.

The device features six integrated instruments, including a spectrum analyser, logic analyser, protocol analyser, arbitrary waveform generator and digital voltmeter. It provides users with the ability to capture analog, digital and RF signals with one scope.

Features include: wave inspector navigation; serial and parallel bus triggering and analysis; integrated digital voltmeter and frequency counter; and a small form factor.

element14

au.element14.com

NEWS

Renewables generation grows to 15%

Renewable energy provided 14.76% of Australia's electricity in 2013, enough to power the equivalent of 4.9 million homes, according to The Clean Energy Australia 2013 report.

Hydro produced the most clean energy of any source during the year (55% of the total), primarily through Hydro Tasmania's network of power plants and the Snowy Hydro Scheme in NSW. Tasmania's largest hydro plant at the Gordon Dam produced substantially higher levels of electricity during 2013 compared to previous years, helped by a wet period between July and November with repeated heavy rains and flooding. The largest wind farm in the Southern Hemisphere, the Macarthur Wind Farm, opened in 2013. In total, Australia's 1639 wind turbines across the country provided enough electricity to power the equivalent of 1.3 million homes, according to the report.

While 2013 saw some exciting developments in large-scale solar and early-stage technologies such as geothermal and marine energy, these have not yet reached the scale to make a noticeable contribution to Australia's overall energy generation.

"This report shows that this is an industry poised to unlock tens of billions of dollars in investment, if the national Renewable Energy Target remains in place following the current review process," said Clean Energy Council Chief Executive David Green.

Renewable energy now powers the equivalent of almost five million Australian homes, and 1.25 million homes and businesses now have a solar power system. Green said analysis by ROAM Consulting for the Clean Energy Council showed that power prices will actually be lower by the end of the decade if the Renewable Energy Target was left in place than under a scenario in which it was removed.

"This is because without the Renewable Energy Target we would need to get more of our electricity from gas, which the Australian Industry Group and the NSW Government predict may as much as triple in cost this decade," he said.

Approximately 21,000 people were directly employed by the renewable energy industry in a construction, installation, operations or maintenance role at the end of 2013. While the number has grown significantly over the last decade, it is slightly down on the year before due to a contraction in the market for rooftop solar power - the source of more than half of the sector's employment. The drop in solar jobs was partly offset by higher employment in the wind industry.

"The Clean Energy Australia Report 2013 shows what the Renewable Energy Target has already achieved. All it needs now is to be left alone to do the rest of its job. With the right policy settings for a stable investment environment, clean energy will help Australia's economy go from strength to strength."

Are you an electrician who subcontracts to an electrical contractor?


© Lisa F. Young/Dollar Photo Club

Many trades, particularly in the building industry, work on a subcontract basis for a primary contractor instead of working as employees.

However, if you are an electrician carrying out electrical work under a subcontract for another electrical contractor, you must hold an electrical contractor licence, reminds Queensland Government Electrical Safety Office. This is to ensure that those responsible for electrical work are clearly accountable.

For example, an electrical contractor has a large contract to conduct the electrical installations for a number of homes for a builder, and that electrical contractor does not have the workforce to complete all the buildings on time so they may subcontract out the electrical installation work on a dwelling-by-dwelling basis.

Those who take that subcontracted electrical work are carrying out a business or an undertaking that includes the performance of electrical work under s56 of the *Electrical Safety Act 2002*, and therefore must have an electrical contractor licence. The original primary electrical contractor should also check their subcontractor has an electrical contractor licence.

The subcontractor for the electrical installation, as the person who carried out the electrical work, is responsible to ensure that the electrical work complies with the wiring rules and any other applicable standards, and that it is tested to ensure it is electrically safe. The subcontractor must also provide a certificate of test for the work carried out to the primary electrical contractor who subcontracted them.

Beware of counterfeit converters

Mornsun is warning customers to be aware of fraudulent companies offering counterfeit or fake Mornsun products, often presented on websites as CART100 and Alibaba.

Fake Mornsun PWB2403CS converters were recently found in Russia. When the customer tested the modules, the DC/DC converters failed.

The counterfeit products are smaller and the Mornsun and RoHS logos are different. All Mornsun product labels use laser marking, not screen print. The counterfeit modules are poor quality and unsafe.

The company reminds customers to obtain converters exclusively through authorised distributors or sales channels. Customers who doubt the authenticity of the already purchased Mornsun converters can contact the company directly at info@mornsun.cn and feedback will be provided as soon as possible to test the converters for free.

Light bulb hacked

Researchers at Context Information Security have exposed a security weakness in a Wi-Fi-enabled, energy efficient LED light bulb that can be controlled from a smartphone.

By gaining access to the master bulb, Context was able to control all connected light bulbs and expose user network configurations. The bulb manufacturer LIFX has since worked closely with Context to promptly patch the issue, which is now available as a firmware update.

A spokesperson, Simon Walker from LIFX, says that, "Prior to the patch, no one other than Context had exposed this vulnerability, most likely due to the complexity of the equipment and reverse engineering required."

The work by Context, a company with offices in Australia, UK and Germany, is part of ongoing research into the security of the emerging Internet of Things (IoT) and raises some questions. "It is clear that in the dash to get onto the IoT bandwagon, security is not being prioritised as highly as it should be in many connected devices," said Michael Jordon, Research Director, Context.

"We have also found vulnerabilities in other internet-connected devices from home storage systems and printers to baby monitors and children's toys. IoT security needs to be taken seriously, particularly before businesses start to connect mission-critical devices and systems."

The LIFX bulb was launched in September 2012 with crowd funding through the Kickstarter website. The architecture, based on the 802.15.4 6LoWPAN wireless mesh network, requires only one bulb to be connected to the Wi-Fi at a time. Context researchers found that they were able to monitor packets on the mesh network and identify the specific packets which shared the encrypted network configuration among the bulbs.

The fix, developed with the help of Context, is included in the new firmware available at http://updates.lifx.co/ and now encrypts all 6LoWPAN traffic, using an encryption key derived from the Wi-Fi credentials. It also includes functionality for secure 'on boarding' of new bulbs on to the network.

The detailed steps of gaining access to the device involved accessing the firmware by physically interrogating the device's embedded microcontrollers to identify and understand the encryption mechanism in use. Armed with knowledge of the encryption algorithm, key, initialisation vector and an understanding of the mesh network protocol, Context was able to inject packets into the mesh network, capture and decrypt the network configurations, all without any prior authentication or alerting of its presence.

"Hacking into the light bulb was certainly not trivial but would be within the capabilities of experienced cybercriminals," said Michael Jordon. "In some cases, these vulnerabilities can be overcome relatively quickly and easily as demonstrated by working with the LIFX developers. In other cases the vulnerabilities are fundamental to the design of the products. What is important is that these measures are built into all IoT devices from the start and if vulnerabilities are discovered, which seems to be the case with many IoT companies, they are fixed promptly before users are affected."

For more details, visit: http://contextis.co.uk/blog/hacking-internet-connected-light-bulbs/.

Construction code fee eliminated

The decision of Commonwealth, state and territory ministers to eliminate the purchase price for electrical contractors to obtain the National Construction Code has been applauded by the National Electrical and Communications Association (NECA).

An in principle agreement to eliminate the NCC fee and to make the 2015 edition available online was adopted at the Australian Building Ministers' Forum.

"This agreement to eliminate the $400 fee to purchase a copy of the National Construction Code not only reduces the cost burden for the thousands of businesses within the electrical construction industry across Australia, but also helps to raise the standards of safety and compliance across the sector in the long run," said NECA CEO Suresh Manickam.

Construction information mobile app

BCI Australia has released its construction information mobile app that delivers project leads directly to an iPhone or iPad.

The app provides members with a fully functional sales-lead management application that integrates seamlessly with the company's LeadManager system. Sales teams can identify projects 'near me' to create new opportunities and manage their sales pipelines on the go. Account managers will benefit from finding companies 'near me' and be the first to know when updates are found on projects involving their clients.

Other features, such as the tap-to-call functionality and having notifications 'pushed' directly to an iPhone or iPad, allow users to work efficiently and effectively wherever they are.

The app is available from the Apple store to BCI members with a valid subscription and log-in details.

BCI Australia Pty Ltd
www.bciaustralia.com

LED drivers

Recom Lighting has released two high-power, dimmable, constant current AC LED driver series - the RACD100A series and RACD150A series - for applications that require a high output voltage to drive long LED strings.

The RACD100A series offers constant output currents of 1400 or 700 mA at voltages from 50 up to 142 V. The RACD150A offers constant output currents of 1400, 1050 or 700 mA, but with voltages from 60 up to 210 V. Both LED driver series support dimming via PWM or 1-10 V signals and are fully IP67 sealed for outdoor as well as indoor applications.

With the wide input voltage range of 90 to 305 VAC, the drivers can be used worldwide on 115, 230 and 277 VAC supplies. The drivers operate with full load efficiencies of more than 93%, feature low THD (15%) and active PFC with power factors exceeding 0.98 and are fully protected against short circuit, overload and overtemperature conditions.

They are suitable for applications in high-power area lighting as well as car parks, warehouses or security lighting. The LED drivers are UL8750 and EN61347 certified and comply with FCC and European EMC standards.

RECOM Asia Pte Ltd
www.recomasia.com

CABLING BETWEEN BUILDINGS

Terry Phillips, former member of the various Wiring Rules committees 1991-2013

The new customer cabling rules came into effect in July 2013. With the new rules came a new clause, 17.3.1, that sets out requirements for cabling between separate buildings. To some cabling providers, this clause seemingly precludes the use of twisted pair cable for cabling between buildings. However, this is a misinterpretation of the clause. This article clears up some prevalent misconceptions.

The abovementioned clause is poorly written, which is presumably why it is being misinterpreted. I am allowed to be critical about the composition of this clause because I am the one who drafted it. In paraphrase, what the clause really states, after factoring in the cross-references and the notes but omitting a few esoteric details that most cabling providers won't understand, is this:

Where any equipment is to be interconnected between separate buildings, the connection may be made by one of the following methods:

(a) using cabling that does not contain electrically conductive elements (eg, optical fibre cable with non-metallic strengtheners);
(b) using wireless technology;
(c) using coaxial cabling, in which case: the coaxial cable should be connected to the indoor cabling via an isolator that provides a minimum isolation of 3 kV rms and 7 kV impulse; and the outer conductor of the coaxial cable should be earthed on the outdoor cabling side of the isolator in accordance with Clause 20.18.4;
(d) using twisted pair cabling, provided that:
  (i) the manufacturer or supplier of the equipment to which the cabling is intended to be connected has not indicated that: only 'internal' (indoor) cabling is to be connected to the equipment or an equipment port; or 'external' (outdoor) cabling is not to be connected to the equipment or an equipment port; or
  (ii) if subparagraph (d)(i) does not apply:
- the cabling provider assesses the need for surge suppression for the protection of the end user as required by Clause 10.1; and
- if the risk of injury to the end user is assessed as high under Clause 10.1, as required by Clause 10.2 the cabling provider installs surge suppression in accordance with Clause 10.2 and the applicable requirements of Clause 10.3 and Clause 10.4; and
- the cabling is connected to equipment or an equipment port that is classified as 'external'; or
- if the equipment or an equipment port is classified as 'internal', the cabling should only be connected via a suitable line isolation unit (LIU).

In the case of subparagraph (d)(i), the cabling provider is precluded by Clause 5.2 (b) from using twisted pair cabling between the buildings to interconnect the equipment. Most ethernet equipment, ethernet ports and IP-based (eg, VoIP) service ports are classified as 'internal' and are not designed to be connected to outdoor cabling.

There are no mandatory requirements in Clause 17.3.1 itself, merely cross-references to other mandatory clauses that apply independently of Clause 17.3.1, namely Clauses 10.1 to 10.4 (surge suppression) and Clause 5.2 (manufacturer's instructions). Only Clause 5.2 (b) may preclude the use of twisted pair cabling between buildings for the connection of certain equipment. Clause 5.2 states:

Manufacturer's instructions

Cable and equipment installed for connection to a carrier's telecommunications network shall be installed:

(a) in accordance with the manufacturer's instructions including, in the case of cable, such things as cable bend radius, tension, cable tie pressure, colour code, etc; and

ANY CABLING INSTALLED BETWEEN BUILDINGS WILL HAVE SOME EXPOSURE TO POSSIBLE LIGHTNING ACTIVITY AND, IF BOTH BUILDINGS HAVE MAINS POWER CONNECTED, POWER DIFFERENTIALS.

(b) in accordance with the instructions of the manufacturer or supplier of any equipment to which the cable or equipment is to be connected.

Under Clause 5.2 (b), if the installation instructions or operating manual for the equipment states that the equipment must only be connected to metallic cabling that does not leave the building in which the equipment is located, this becomes a mandatory requirement under AS/CA S009.

There are circumstances where it is perfectly safe to use twisted pair cables between buildings. There are also cases where the use of twisted pair cabling is essential, eg, to remotely power IP cameras or other low-power devices using Power over Ethernet (PoE). For these reasons, the use of twisted pair cabling between buildings is not prohibited by AS/CA S009. However, if the purpose of such cabling is to connect equipment whose manufacturer or supplier expressly forbids the connection of metallic outdoor cabling to the equipment (eg, some Telco FTTP NTDs), the cabling provider should use another medium (such as Wi-Fi or optical fibre) to make the connection.

FTTP NTDs are usually earthed, which makes them particularly susceptible to damage from lightning or power system surges induced into outdoor cabling - and they are expensive to repair or replace. Other equipment with ethernet or VoIP ports, such as modems, gateways, routers and switches, are not usually earthed yet they still may be damaged by the same surges - but these are cheaper to replace and are the customer's responsibility.

The installation of twisted pair cabling between buildings can be risky for the end user. Any cabling installed between buildings will have some exposure to possible lightning activity and, if both buildings have mains power connected, power differentials. These can cause what are broadly described as surges or overvoltages. There are three things to consider in the case of lightning or power surges/overvoltages (in order of importance): the safety of the end user, the risk of fire and equipment damage.

AS/CA S009 directly addresses (a) and is indirectly concerned with (b) and (c) simply because fire is a risk to personal safety and property, while (c) can ignite a fire which invokes concern (b) and may also affect end-to-end performance (network integrity).

Let's look at each of these in the context of AS/CA S009.

Safety of the end user

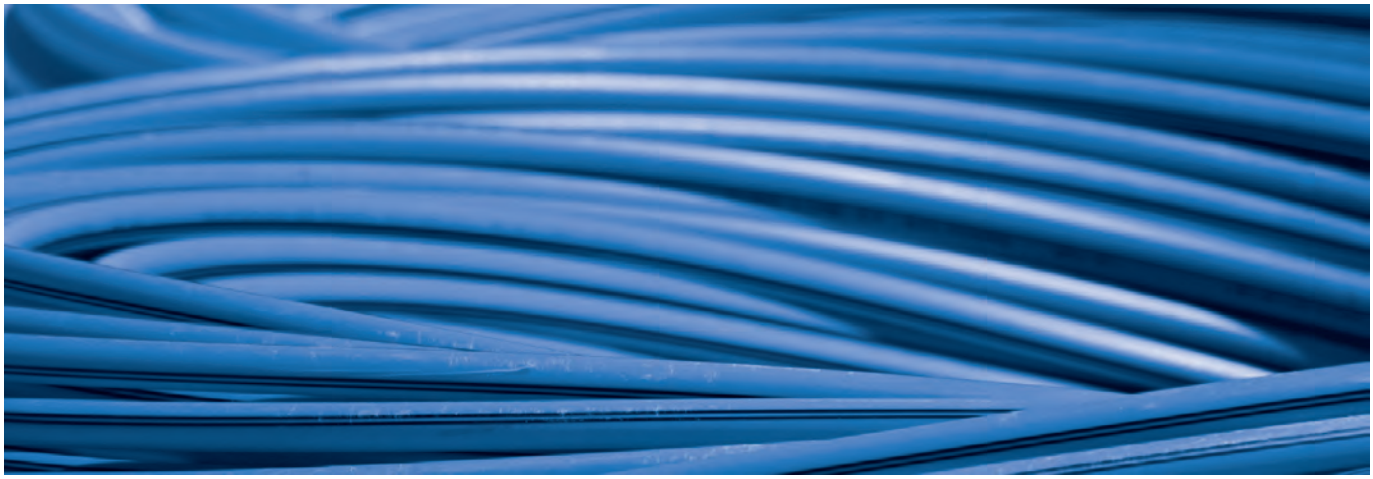
Clause 10.1 of AS/CA S009 requires the cabling provider to assess the need for surge suppression for the protection of the end user of a telecommunications service in accordance with Australian Standard AS 4262.1, Telecommunication overvoltages Part 1: Protection of persons, where: twisted pair customer cabling is provided to a building or structure; the network boundary is not located in or on that building or structure; and the cabling will be used to connect 'terminal equipment' in or on that building or structure.

'Terminal equipment' is defined as peripheral equipment operated by the end user to access a telecommunications service, such as a telephone instrument, headset, fax machine, modem or other equipment that may be handled by the end user. Equipment that is not usually handled by the end user, such as a fixed IP camera, is not terminal equipment.

Where the risk of injury to the end user is assessed as high, Clause 10.2 requires the cabling provider to install surge suppression in accordance with the relevant requirements of AS 4262.1. In assessing the safety of the end user per AS 4262.1, it is always assumed that the end user is in an earthed environment, ie, standing on a concrete floor or touching an earthed object like plumbing or an earthed electrical appliance (refrigerator, toaster, etc) and touching telecommunications equipment at the same time (eg, a telephone handset). There are three potential sources of overvoltage that may cause injury to the end user in such circumstances, explained below.

1. If there is a power surge or a lightning strike to the power lines (anywhere within the power grid, not just at the premises), the overvoltage will be shunted to earth via the mains supply neutral which is earthed via the neutral-earth (MEN) link at the electrical switchboard in the premises. This will momentarily raise the local earth potential many thousands of volts. This means any object in electrical contact with the local mass of earth (eg, concrete floor slab) or connected to the protective earth of the electrical switchboard (eg, refrigerator, toaster, etc) will be at the raised earth potential. If the end user also happens to be touching an object electrically connected to a telecommunications line (the most common example being a telephone handset) and that line is remotely connected to an earth (eg, at the distant telephone exchange or at another building), there will be a potential difference (voltage) between the locally earthed body of the end user and, via the telecommunications equipment, the distant earth on the telecommunications line. Most overvoltages originate from the power lines, not the telecommunications line. Experience has shown that significant overvoltages may occur regardless of whether the telecommunications lines or power lines are aerial or underground. Without protection measures, voltage V may be tens of thousands of volts.
2. If there is a lightning strike to the telecommunications line (anywhere within the telecommunications network, not just at the premises), the overvoltage will appear on the telecommunications line and, if the end user is in contact with the local earth, as in item 1, there will be a potential difference (voltage) between the locally earthed body of the end user and, via the telecommunications equipment, the overvoltage on the telecommunications line.
3. Finally, if there is a nearby lightning ground strike (including a strike to a tree or structure), the electrical potential of the local mass of earth - and, via the local electrical earth electrode, all earthed electrical appliances - will be momentarily raised many thousands of volts and the effect will be the same as described in item 1. The remedy to protect the end user from any of the abovementioned overvoltages is to install a surge suppressor on the telecommunications line that will operate (conduct) under overvoltage conditions to bring all of the abovementioned elements (including the end user) to about the same electrical potential.

In reality, the voltage difference will, at best, be limited to about 1500 V due to the threshold ('trigger') voltage of the gas arrestor and the inductance of the bonding conductor. In Australia, the handsets of telephones are required to have a minimum breakdown voltage of 7000 V. A handset is the most likely telecommunications object that the end user will be holding. Surge suppression is designed to limit the potential difference (voltage) between the local earth and



the telecommunications line to less than 7000 V to minimise the risk of injury to an end user holding a handset to his/her head. If any equipment that the user may touch has a breakdown voltage of less than 7000 V (most other equipment), the user may receive an electric shock. If the end user is holding a cordless handset (which is not electrically connected to the telecommunications line), the risk of electric shock is eliminated - unless the user also happens to be touching the cordless base station.

The voltage depends on the length of the bonding conductor between the surge suppression device and the earthing bar of the electrical switchboard. In cases of lightning-generated overvoltages, the voltage drop along the bonding conductor (due to inductance) will be significantly greater than the surge suppression device trigger voltage. The total value of V is assumed to be about 1500 V peak but must not exceed 7000 V peak. The bonding conductor length must not exceed 10 m or voltage V will exceed 7000 V.

The same factors that may create a shock hazard for the end user in the main building are present in the separate building, namely: an earthed environment; a metallic telecommunications line entering the building; and usually, electrical power lines entering the building.

Therefore, assessment of risk at the separate building is required in accordance with AS 4262.1. A momentary voltage difference between the separate earthed environment in each building or between the metallic line and one or both earths may create a hazard.

Risk of fire

The surge suppression described above will not entirely prevent overvoltages occurring between any telecommunications conductors or between the conductors and earth. At best, the overvoltages may be reduced to around 1500 V (although a 'spike' exceeding this voltage may also get through the surge suppression due to the time it takes to operate). Therefore, if the equipment or equipment port is not designed to withstand an impulse voltage of at least 1500 V, damage to the equipment may occur. In some cases, this could result in arcing or sparking that could ignite a fire. However, such cases are rare for lightning-induced surges, which are of a very short duration.

Another overvoltage condition that is more likely to cause a fire is referred to as 'HV contact', ie, where an aerial high-voltage power line falls onto LV power lines or telecommunications lines carried on the same poles. These may produce a more prolonged, low-frequency overvoltage condition that is more likely to ignite a fire at the customer premises. This situation is unlikely to occur in customer cabling.

"THE SAME FACTORS THAT MAY CREATE A SHOCK HAZARD FOR THE END USER IN THE MAIN BUILDING ARE PRESENT IN THE SEPARATE BUILDING, NAMELY: AN EARTHED ENVIRONMENT; A METALLIC TELECOMMUNICATIONS LINE ENTERING THE BUILDING; AND USUALLY, ELECTRICAL POWER LINES ENTERING THE BUILDING.

AS/CA S009 does not directly address the risk of fire in the above cases but there is a general mandatory requirement that would apply if there is a known or suspected risk of fire, property damage or injury to any person. This is Clause 5.1, which states:

5.1 Safe and sound practice

Customer cabling shall be installed in accordance with principles of safe and sound practice.

Equipment damage

Apart from the slight possibility of fire as described above, there is generally no significant safety risk associated with damage to the equipment (ie, usually it simply doesn't work anymore).

The concerns are primarily operational and economic, ie, loss of service and the cost of repair or replacement. However, this does affect end-to-end performance (network integrity) and it is incumbent upon the cabling provider to minimise the risk of damage to cabling or equipment in accordance with Clause 5.4 of AS/CA S009, which states:

5.4 Protection against damage

All parts of an installation shall be adequately protected against damage which might reasonably be expected to result from mechanical injury, exposure to weather, water or excessive dampness, corrosive fumes, accumulation of dust, steam, oil, high temperature, or any other circumstance to which they will be exposed under the conditions of their use. It is the last provision in this clause that may be relevant to damage caused by overvoltages (ie, any other circumstance to which they will be exposed under the conditions of their use).

The article was first published on TITAB Australia, a not-for-profit cabler registry, and is reprinted here with permission. www.titab.com.au

CASE STUDY

Lighting upgrade for a strata property

The Marine Apartments is an eight-storey, 43-apartment complex, set back from Port Philip Bay. The owner corporation of the 16-year-old building had been actively seeking ways to reduce the building's energy consumption for close to five years.

In 2009, Marine Apartments was one of ten apartment complexes to sign up to the first round of the City of Port Philip's SOCs & Blocks (Sustainable Owners Corporations and Apartment Blocks) program. The program aims to encourage the uptake of sustainable technologies and practices in the City of Port Phillip. The free program offered a council-engaged consultant to undertake a sustainability assessment.

A lighting upgrade of common-area lighting was highlighted as one of the actions that offered the best return on investment, prompting the owner's corporation to investigate a range of lighting technologies. The lighting upgrade was split into two stages - the back-of-house areas, including a two-level car park, approved for stage 1, and the front-of-house areas, including foyers and internal lift lobbies, for stage 2.

The standard emergency lighting in the car park featured a mixture of single and twin 36 W T8 fluorescent tube fixtures driven by electronic ballasts. The lights operated 24/7 and had no energy-saving controls. The corporation assessed the following technologies: T5 fluorescent tubes, LED tubes with networked controls system and Chamaeleon LED light.

The decision was made to go with the Chamaeleon LED light as it offered 85% energy savings and reduced maintenance stemming from the product's 50,000 hour lifetime, according to owners corporation committee executive James Rodrigo. The light also had a lower redundancy factor than other lighting solutions with separate control systems, reducing the risk of failure, which could result in a whole zone of lights failing.

The Chamaeleon light operates on a standby mode when unoccupied. The average standby usage is 7.5 W, which increases to 28 W when a presence is detected in the area via a microwave sensor.

The basement and ground levels in the car park required 24-hour lighting, including emergency lighting. The existing 159 T8 fluorescent tubes and six compact fluorescent lights were replaced with 104 Chamaeleon lights, including 19 emergency lights, generating lighting levels above those specified in the Australian standards for car park driveways. The ceiling-mounted 10-chip Chamaeleon light was specified by Enlighten following a site audit and installed by Delmore Electriks.

Prior to the retrofit, car park lighting accounted for 24.4% of the Marine Apartments' total electricity bill. Front-of-house lighting (foyers, lift lobbies) accounted for a further 34% of the bill. Following the car park lighting retrofit, the average annual consumption per dwelling dropped by 40%, from 2487 to 1490 kWh.

The building's executive committee applied for Victorian Energy Efficiency Certificates from the project under the Energy Savings Incentive (ESI) Scheme, as the Chamaeleon has been accepted for use in commercial lighting upgrade projects. The project's Accredited Certificate Provider, Ecovantage, generated 136 certificates returning a net sum of $1080 to Marine Apartments.

"We have achieved an $8700 saving per year whilst improving the light output in our car park by 20%. We made further savings by cancelling a works order to replace 26 of the 120 fluorescent fixtures that were not working and we no longer have to deal with escalating maintenance costs of the 16-year-old fluorescent light fittings," said Rodrigo.

enLighten Australia Pty Ltd
www.enlighten.com.au

Double power outlet with twin USB charging stations

The Jackson PT9822 provides two standard power outlets plus two USB charging outlets. The device is the same size as a standard Australian power point and can directly replace an existing power point.

It provides a simple and easy way to charge all your gadgets including phones, tablets, GPS devices, digital cameras, MP3 players and many more. Features include: supply rating 240 VAC ~ 50 Hz; current 10 A; power rating 2400 W; USB outlet 5 VDC 2 A.

Jackson Industries
www.ji.com.au

Microwave sensor

The MWS6 low profile is a mid-range microwave presence/absence detector for the automatic control of lighting, heating and ventilation.

The 2-channel version (2CH) can be commissioned by the installer to control one channel on absence and the other on presence detection. Mounted at 2.8 m, coverage is up to 16 m on the ground.

The low-profile design allows flush mounting into a ceiling tile, or surface mounting using a detector back box. Its reduced head size makes it unobtrusive to occupants. The microwave sensor is sensitive to movement. The simple plug-in connections reduce installation time. The optional infrared remote handset allows the user to override the set-up from the ground. All functionality is fully programmable using either the UHS5 or UNLCDHS handsets.

Selected switching detectors are available with the following options: low voltage 12-24 V AC/DC; voltage-free contact; 2CH with lux on one channel, normally closed for fail-safe applications.

CP Electronics Australia
www.cpea.com.au

CASE STUDY

Lighting controls drive down energy costs

Screen Australia, the Commonwealth Government agency, moved into a new office at 45 Jones street, Ultimo, with an aim to increase staff comfort and reduce operating costs. The building was used as a wool store until the 1950s before being converted to premium offices in 2005.

The building has a 4.5 star NABERS energy rating and the fit-out designed by Hassell is light, bright and takes advantage of the high cathedral-like roof space. Energy-efficient LED lighting is used throughout the office with further efficiencies gained from presence detectors.

Lighting controls

At Screen Australia, the move to the new Ultimo office was made under strict budgetary provisions. When Aston Consulting pared the design brief down to its essential elements, they realised that the desired functionality of the lighting control system did not revolve around set operating scenes as a networked solution would do, but rather around the need to have the right lighting available in the immediate area only when users were present.

Aston Consulting worked closely with mySmart to design the lighting controls, and by using mySmartSensors, the company was able to implement a solution that reacts to the movement and flow of people around the Screen Australia office ensuring that the minimum amount of energy is used. If no-one is present then the lights are switched off and no energy is being consumed. The time delay between when the last person leaves an area and when the sensor switches off the lights is also adjustable from 3 seconds up to 99 minutes. To reduce energy consumption even further with daylight harvesting and modern high-performance photocell sensors the lights can also be automatically dimmed to be operating using the minimum amount of energy possible.

Responsive vs predictive lighting control

The biggest difference between presence-based and preset scene-based lighting is that a scene-based lighting control system is designed as a prediction of what lighting the occupants of a space will require. Responsive lighting control, as the name suggests, is designed to respond quickly and effectively to changing occupancy levels and users can easily fine-tune the programming of the sensors if needed.

Installation

mySmartSensors either directly connect to one light or control a limited number of lights in the immediate area. This reduces

investment in materials and labour, especially that spent on control cables. Heritage buildings like 45 Jones Street can increase the savings even further as costs for traditional cabling can easily blow out due to the difficulty in running cables and complying with heritage order restrictions.

Reporting: do you really use it?

Many networked lighting control solutions offer the ability to output performance and diagnostic reports; however, for most smaller buildings and tenancies they are either not required or seldom used. For Screen Australia, given the relatively compact floor plan, they decided that such detailed reporting didn't suit their needs.

Payback period

As noted previously, Screen Australia was under strict budgetary restrictions in its move to the 45 Jones street offices. The mySmartSensors presence detectors cost Screen Australia less than 60% of an equivalent networked solution. Given that the energy-efficiency savings will be very similar, the payback period in this case is reduced significantly.

Project details

Type of building: Heritage commercial offices
Fit-out architect: Hassell
Electrical consultant: Aston Consulting
Electrical contractor: EDV
Fit-out contractor: Sherington project management
Project manager: Hamilton Projects

mySmartCTI
www.mysmartCTI.com.au

Residential distribution solution

Hager's golf enclosures are suitable for all residential and multiresidential installations. The enclosures are swiftly and easily mounted and offer space for a large number of modular devices.

Benefits include: flush or surface mount, opaque or transparent door options available; 1 to 4 rows from 4 to 72 modules; ample wiring space between the modular devices and terminals as well as behind the DIN rails; clean and convenient wiring thanks to patented integrated cable management system.

Optional patented neutral and earth link terminals provide an easier, safer and faster connection for the installation, saving time and money.

All golf enclosures are supplied with standard 63 A brass links with the option of 100 A where higher ratings are needed. Optional patented neutral and earth link terminals provide an easier, safer and faster connection for an installation, saving time and money.

Hager Electro Pty Ltd
www.hagerbr.com.au

Professional thermal imager

The thermal imager testo 870 was specially developed in cooperation with electricians, heating constructors, building contractors, service engineers and facility management specialists for applications in, for example, detecting leakages, localising cold bridges or visualising overheated connections.

Due to its large display, high-quality detector, wide field of view and the uncomplicated operation, the thermal imager allows users to work even better, faster and more productively.

The device includes an in-built digital camera and comes with a professional high-quality case.

Features include: infrared resolution 160 x 120 pixels; large 3.5″ display; integrated digital camera; automatic recognition of hot-cold spots.

Testo Pty Ltd
www.testo.com.au

PRYSMIAN'S NEW CEO EXPLAINS PLANS FOR GROWTH

The Italy-headquartered cable manufacturer Prysmian Group recently hired Frederick Persson* as chief executive officer for Australia & New Zealand. *ECD Solutions* speaks to the new CEO about the current market conditions and future plans.

Persson takes the reins at a time that is exciting and challenging for the cable manufacturing industry.

Nexans Olex, one of Prysmian's biggest competitors, recently decided to shut down its manufacturing facility in Tottenham, Victoria, due to a high dollar and reduced demand.

Rising input prices, uncertainty in downstream markets and challenges surrounding the NBN have contributed to the uncertainty in the Australian wire and cable manufacturing market, according to research firm IBIS World. The research firm expects the industry revenue to decline 3.5% to an estimated $1.7 billion in 2013-14.

Cable manufacturers, like most other businesses in the manufacturing industry, may be under pressure but opportunities still exist.

What's your growth plan?

We plan to grow the business through continued focus on power utilities, telecommunication carriers, electrical wholesalers and contractors, OEMs, the mining industry and petrochemical facilities.

It's also important to have a customer-focused culture. We need to respond more quickly to customers' requests for quotations. I'd also like to simplify internal administration, encourage people to take decisions and make sure we turn around calls faster.

In May this year, Prysmian was awarded a $44m contract by Ausgrid, for 132 kV underground high-voltage cables for the North Shore cable upgrade project. This contract came on the back of a separate smaller ($8m) related contract awarded in September 2013.

The NBN is one of our key customers. Prysmian's high fibre-count ribbon cables are helping the government in achieving its goal of creating a fibre-to-the-node network that will connect 93% of the country's residential and commercial buildings.

What are the key differences between the Australian and the Swedish market?

Compared to Sweden, Australia has a very export-driven competitive market that is fragmented and decentralised. Logistics is a big issue here - it plays a much bigger part of the game. The other key challenge is cheap imports - they pose a serious threat to the industry. While cheap price doesn't necessarily mean cheap quality, the recent electrical product recalls raise concerns about the safety and quality of imported electrical products.

Do you manufacture locally?

Around 80% of Prysmian's products are produced locally, and the company also has a design team in Australia to address the local market requirements. While we may consider increasing our imports, we see value in local manufacturing. It's easier to maintain quality in the local market and there is also a lot of risk in shipping cables between continents.

The company has a strong focus on health and safety - it costs money to produce and sell quality products and we are prepared to pay. We need to improve marketing of locally produced products and make sure our customers are aware what they are paying for is worth it.

What are you most passionate about?

In business, it's speed - it's important to be quick. And in life, I'd say it's cycling.

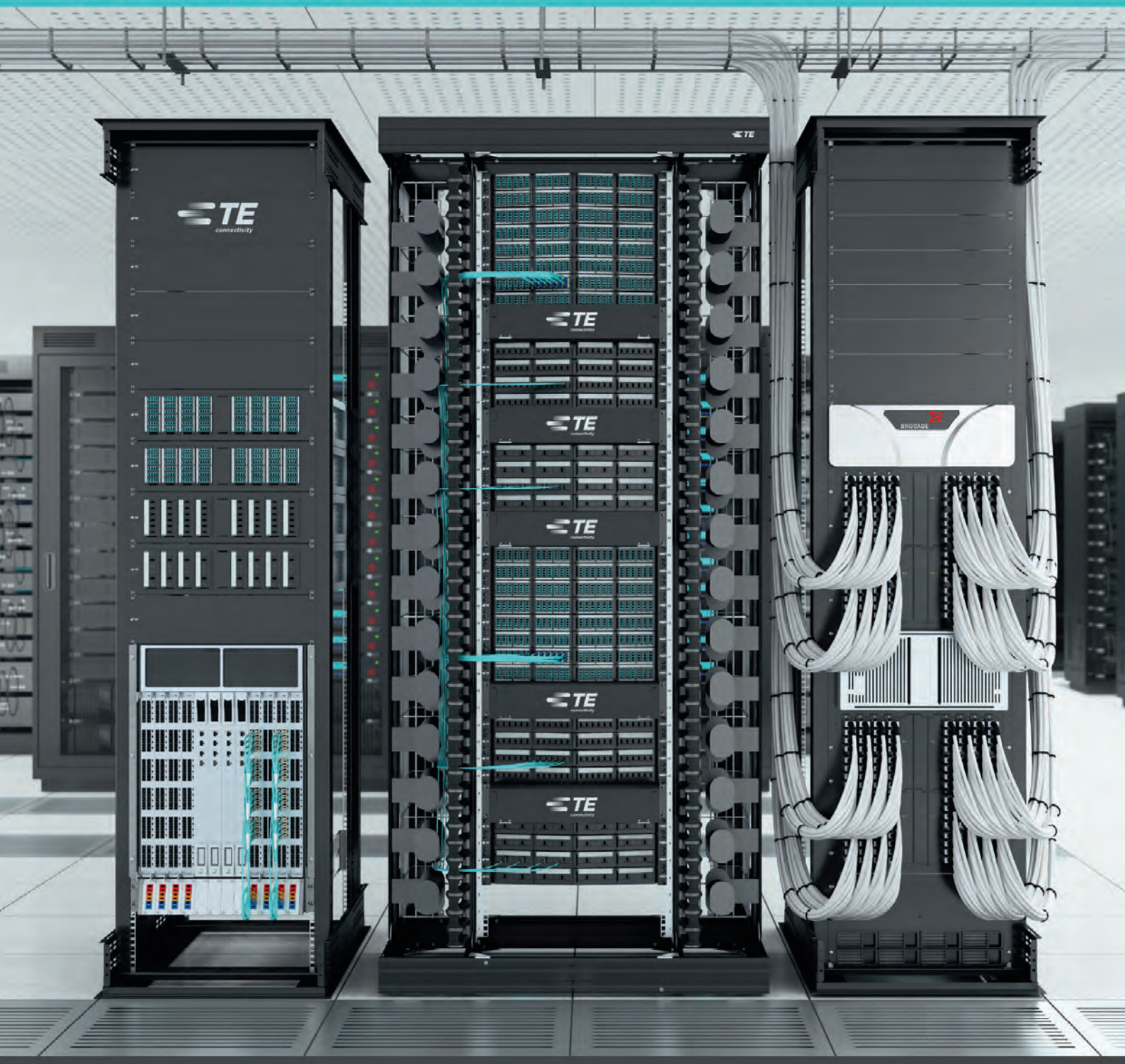
**Frederick Persson commenced employment with Prysmian Group as CEO in Sweden in 2010. He was appointed as CEO of the ANZ business in March 2014. He started his career with a Swedish steel manufacturer, SSAB. Persson held various positions, mainly in sales, and progressed to CEO of SSAB, Canada. Persson moved to the stainless steel industry becoming the MD of the French wholesaler company IMS in Sweden. He has a degree in Bachelor of Science in Logistics, studied in Vaxjoe Sweden, in 1996.*

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

ECD SOLUTIONS

ELECTRICAL + COMMS + DATA

COMMS + DATA



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Local production, design and distribution

TE connectivity

CONNECTING AUSTRALIA & NEW ZEALAND FOR OVER 30 YEARS

TE Connectivity is the sole manufacturer in Australia & New Zealand providing ITC solutions from Data Centre to Enterprise buildings. KRONE has been designing and manufacturing products in Australia and New Zealand for more than 30 years. Products such as the ever-lasting disconnect module and the locally-made RJ-45 outlets for Australian faceplates.

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Contact us: 1800 TE INFO (1800 83 4636) | email: infoanz@te.com
www.te.com/bns

TE connectivity

FIBRE-OPTIC CONNECTORS: THE MAKE OR BREAK OF A NETWORK

The phrase 'fibre-optic technology' conjures visions of information speeding around the world at the speed of light, of high-tech data centres and previously unimagined capabilities in communications. What it does not evoke is visions of connectors. But without being able to connect fibres effectively, a network just wouldn't exist.

Optical fibre connectors are used to join optical fibres where a 'connect' and 'disconnect' capability is needed. The connector terminates the end of the optical fibre and then mechanically couples with another connector, aligning the fibre cores so that light can pass through with little or no loss. Continuing research and development has resulted in the market release of over 100 differing fibre connectors since the mid-1980s, but they all contain four central elements.

The 'ferrule' is a long, thin cylinder through which the optical fibre is threaded.

In a connection, two ferrules physically touch, allowing the fibres to be accurately aligned and mated. Typically of metal or ceramic construction, the end-face of the ferrule can be polished to a convex shape that allows the fibres to physically touch when mated together. The end-face of the ferrule may also be polished with an 8° angle to further reduce reflection (high return loss).

The ferrule sits inside the connector housing, constructed of metal or plastic, which serves to make the connector easy to handle and keeps the connector firmly attached within a connection. The cable attaches to the connector housing and is the point of entry for the fibre. Typically, a strain relief boot is added over the junction between the cable and the connector body, providing extra strength and protection to the junction.

Optical fibre connectors do not use the male-female configuration common to electronic connectors. Instead, a coupling device such as alignment sleeve is used to mate the connectors. Similar devices may be installed in fibre-optic transmitters and receivers to allow these devices to be mated via a connector.

The original mass-utilised Straight Tip, or ST connectors, have a bayonet mount and a 2.5 mm ferrule, and mate via a mating adaptor. Subscriber Connectors (SC) also use a 2.5 mm ferrule but have a simple snap-in latch, and are widely accepted in multimode LAN applications.

Increasing demands for higher density applications drove the development of Small Form Factor (SFF) connectors, the most successful of which has been the Local Connector, known as LC. The LC uses a smaller ferrule of 1.25 mm, allowing more fibre ports per unit of rack space.

The high density demand soon resulted in the development of MPO, or multifibre push-on connectors. Based on the single ferrule technology, MPO connectors are used with ribbon or mini-round cable and can provide up to 24 fibre connections in a single con-

Common connector types		
Type	Typical loss (dB)	Applications
ST singlemode	0.3	Legacy industrial applications, patching and equipment interfaces
ST multimode	0.3	Legacy industrial applications, patching and equipment interfaces
SC singlemode	0.2	Telco, video, LANs and WANs, angled version for low RL (return loss)
SC multimode	0.2	LAN applications, patching etc new industry standard in multimode
LC	0.2	SFF - LAN,WAN, telco, high-density networking, data centres and storage networks
MU	0.2	SFF - telco applications
MPO/MTP	0.2	Multifibre/array - 40/100Gb ethernet, data centre, high-density LAN, storage or telecommunications x-connects
Less common connector types		
SMA	1.0	Obsolete industrial LAN
FDDI	0.6	Obsoleted duplex connector used for direct interfacing to FDDI equipment
ESCON	0.6	Duplex connector purely used for direct interfacing into IBM equipment
FC	0.2	Singlemode telco and infrastructure networks. Angled version for low RL
DIN	0.5	Found on superseded European telecommunications equipment
VF45 Multimode	<0.75	No ferrule SFF connector, LAN, fibre to the desk
VF45 Singlemode	<0.75	No ferrule SFF connector, LAN, fibre to the desk
MTRJ	0.5	Superseded SFF LAN connector, LAN equipment interface and fibre to the desk
E2000 Singlemode	0.3	Optical interface found on European telecommunications equipment

nection point. MPO connectors are commonly used in data centre cabling systems in conjunction with LC fanouts.

Different connector types have different characteristics, different advantages and disadvantages, and different performance parameters. In general, a good connector should:

- cause little or no loss of optical power across a junction point (low insertion loss and high return loss);
- be easily and quickly installed;
- be able to be connected and disconnected many times without changes in loss;
- have a consistent and calculable level of loss.

While a well-engineered connector can minimise loss due to air gaps or misalignment, the reality is that a speck of dust can undo the designer's good work. Dust, oil or dirt on the fibre can partially or even totally obscure an optical fibre connection. Dust caught between fibre end-faces as they are pressed together in mating can cause irreparable damage to both fibres. Keeping connectors clean is vitally important - best practice involves cleaning connectors prior to each connection and using dust caps to protect unused connectors and couplers.

Connectors certainly aren't the most glamorous element of a fibre-optic network, but they can make or break it. So while you're envisioning the magic that is fibre-optic technology, spare a thought for the humble connector, without which a fibre-optic network would just be a mass of glass cables.

AFC Group Pty Ltd
www.afcgroup.com.au

ECD SOLUTIONS — COMMS + DATA

Handheld 10-channel data logger

Available to rent, the Hioki LR8431-20 HiLogger data logger is capable of simultaneous recording across all 10 fully isolated analog channels.

The handheld unit is suitable for pulse or rotation signal, voltage and thermocouple measurements. Enhanced noise suppression ensures quality data.

Features include: 10 ms sampling; USB and Compact Flash card interface for data storage; Logger Utility software for multichannel support via PCI; widescreen, colour LCD.

TechRentals offer a set-up and download service for this product.

TechRentals
www.techrentals.com.au

Stream full HD to multiple screens with HDMI for Networks

NEW | NETWORK

HDMI for Networks

For clubs, pubs, restaurants and retailers, there's a smart new way to deliver a HDMI signal across dozens of screens. HDMI for Networks sends crystal-clear HD content to multiple locations using your existing LAN. Because it integrates with IP, it can be used for web based entertainment too. Effectively, you're able to broadcast content to as many screens as you choose. Simply plug the cable into the switch and encoder, and using your existing LAN system, you're up and running in no time.

Perfect solution for:

- Hospitality venues: Using a single source, easily transmit the café menu, special events, video content or any other digital media, wirelessly to multiple screens or devices.
- Retail Stores: Multiple TVs displayed in a retail environment can display the same content from a single source like a Blu-ray player or laptop.

Features:

- HDMI over IP technology which is a first for the Australian market. It's the most up-to-date technology for HDMI distribution, offering greater flexibility.
- A greater signal distance of 120m, and even more where required.
- Delivers Full HD 1080p at a fraction of the cost of competitor's products.
- Uses LAN infrastructure which means it's not a closed system.
- Easy to install. No network switch configuration required – simply plug the cable into the switch and encoder and decoders.

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A&TV

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HILLS™

Optical and ethernet test solution

The VeEX VePAL FX300 is an optical and ethernet test solution for technicians installing, testing, troubleshooting and restoring FTTx/PON, mobile backhaul and related converged network infrastructures. The solution integrates the right combination of optical tools and ethernet test features so that a fibre link and its services can be qualified in a single platform, eliminating additional truck rolls.

The multimode/singlemode OTDR solution helps locate and characterise fibre link, splice and connector losses. It features: fibre fault finder - quickly find breaks and bends; power meter and light source - perform power and loss measurements; visual fault locator - check patch cords and enclosures for light leakage; fibrescope - check dirty and/or damaged connectors; ethernet analyser - perform service activation and SLA validation per ITU-T Y.1564 standards.

The optical tools offer: FTTx/PON-optimised parameters for dead zones for 1xN splitters and normal reflective events; multimode and singlemode wavelength test options - 850, 1300, 1310, 1490, 1550 and 1625 nm; filtered 1625 nm OTDR port for in-service measurements and live fibre detection with embedded power meter. The solution offers high dynamic range up to 45 dB for long haul fibres and testing through high-port-count PON splitters, Telcordia GR-196 and SR-4731.sor file formats, link characterisation (multipulse widths) and full event table. Other features include: sampling points up to 128,000; event dead zone <1 m, attenuation dead zone <4 m; built-in visual fault locator, fibre inspection probe, PON power meter and stable laser source options.

TelecomTest Solutions
www.telecomtest.com.au

Automated tool control system

The Snap-on Level 5 automated tool control system toolbox helps end foreign object damage (FOD). This is a tool storage and control system used to automatically track individual tools by user without barcodes, scanners, RFIS tags or other add-ons.

It offers electronic, keyless entry. Each employee's ID/keycard is coded so that ATC can continuously record exactly who enters the box and when. Simply remove or return any tools. ATC automatically detects which tools have been returned or removed and then confirms which tools are being issued and/or returned. Lastly, the system input is accepted.

With every tool accounted for, accurate asset management is assured, along with FOD compliance. The system provides a one-touch listing of all tools out, who they are issued to and where they are being used. Comprehensive analysis and reporting can be performed from administrator workstations located anywhere on the network. ATC works hand in hand with our TC MAX inventory tracking software so inventory records can be tracked in real time from any chosen location.

Snap-On Tools Aust Pty Ltd
www.snapontools.com.au/industrial

Underground fibre enclosures

AFC's dome-style underground fibre enclosures are a quick and effective way to join or repair fibre cables in harsh environments such as in underground pits or aerial applications. All cable entry and exit ports are sealed and accessed as required.

The enclosures include splice cassettes for fusion splicing and they can easily be accessed without the need for special tooling. They feature a lockable clamp to prevent unauthorised entry and can be pole and wall mounted.

Features include: UV-resistant thermoplastic with IP67/68 rating for maximum performance; heatshrink cable fixing ensures the IP rating is not compromised; oval port for cable expressing, ie, when a single tube may require breaking out and terminating; individual cable entry ports for retrofitting of additional cables; expandable cassette stacking system for additional cable splicing.

The enclosures are suitable for: fibre cable fusion splicing in pits, aerial or pole mounting, fibre cable joining or repairs and/or fibre cable expressing.

AFC Group Pty Ltd
www.afcgroup.com.au

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Warren and Brown Technologies is now leading the way in solutions and design for Data Centre, Enterprise networks, Mining and Industrial networks, Mobile networks, Carrier and FTTH networks.

To find out more about the Warren & Brown HypaConnect ICS please visit our website.

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www.warrenandbrown.com.au

Fibre certification solution

Available to rent, the Fluke multimode (CFP-MM-ADD) OLTS modules for the DSX-5000 measure fibre-optic attenuation, length and propagation delay.

Features include: built-in visible fault locator (VFL); provides tier 1 certification at 850 and 1300 nm in 3 s. A set reference wizard ensures correct reference settings and eliminates negative loss errors.

The set also provides automatic pass/fail analysis to industry standards or custom test limits. Other features include: interchangeable power meter adapters available for all connector types to enable the most accurate 1-jumper reference method; dual wavelength measurement capability on a single fibre; encircled flux compliant as required by ANSI/TIA and ISO/IEC.

TechRentals offer a set-up and download service for this product.

TechRentals

www.techrentals.com.au

Home networking enclosures

B&R Enclosures has introduced enclosures that meet the requirements of the new NBN Co Residential preparation and installation guidelines. Providing a solution for fibre-to-the-home (FTTH) connectivity, this range is suitable for both fibre and copper lines. With the ability to surface or flush mount, these enclosures are supplied complete with a double GPO and 8-port RJ45 Cat5 patch unit.

Features include: suitable for mounting internally; complete with double gang GPO; provisional space for additional patch units; segregated fibre wall outlet mounting area; mounting provisions for all NBN equipment; surface or flush mounted with flushing kit; mounting holes for DIN rail; window option for Wi-Fi signal transmission; available with window front door or full steel door option.

With integrated ventilation for mounting NBN equipment, the enclosures offer a neat and simple solution to house all equipment required for in-house connectivity.

B&R Enclosures (B&R) has been recognised as a leading supply partner servicing the Australian telecommunications market after taking out the 2014 NBN Co Chairman's Award for Supplier Excellence and Innovation. The award recognises the company for its outstanding business conduct, design innovation, engineering excellence, supply reliability and consistent high quality.

B&R Enclosures Pty Ltd

www.brenclosures.com.au

Fibre-optic connector inspection system

The Focis Wi-Fi fibre-optic connector inspection system combines the fibre connector inspection and analysis capabilities of the Focis and Focis Pro systems with the capabilities of a smartphone or tablet.

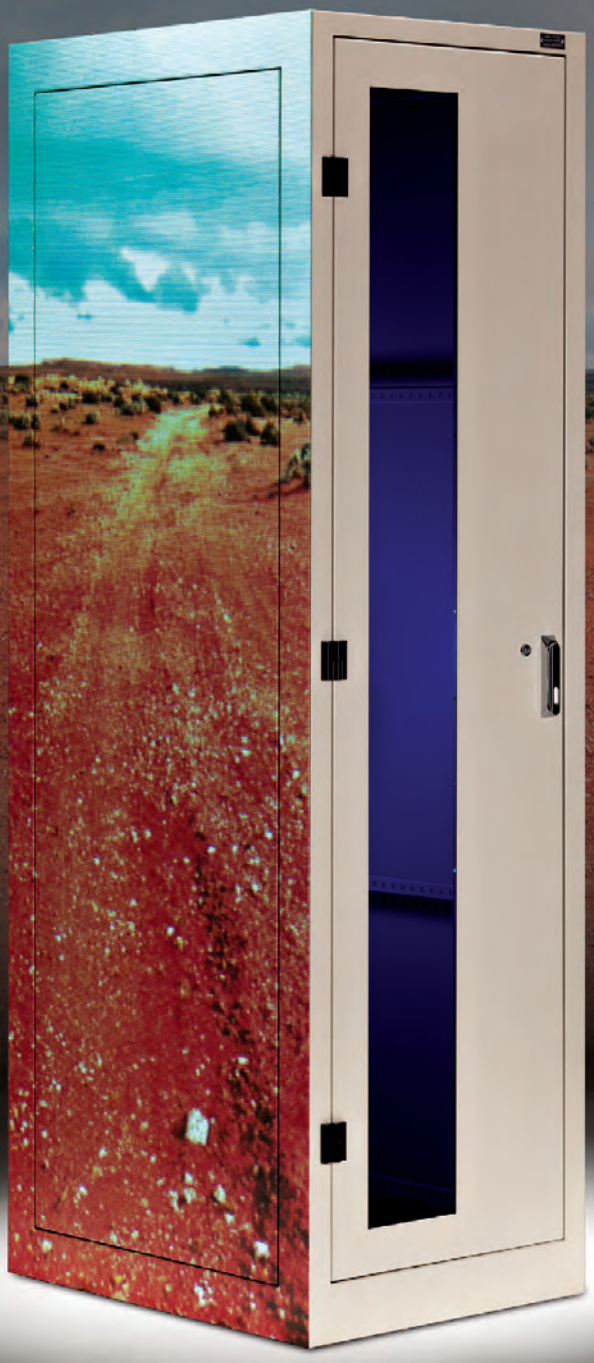
Focis Mobile is a free companion application that users download from Google Play or the App Store to a smartphone or tablet. This application enables users to connect to and control the Wi-Fi system, to define system settings and user preferences, and to use the smartphone or tablet to view, store and share images and test results as permitted by the system purchased.

Features include: automatic analysis of fibre connector integrity; IEC 61300-3-35, AT&T TP-76461 and user-defined pass/fail inspection; comprehensive reporting, saving and sharing capabilities via mobile device email, text and web browser; free smartphone/tablet apps via Google play and the App Store; provides (USB) backup power for mobile devices.

Applications include: data centre patch panels, trunks, patch cords and equipment terminations; central office and head-end connections; campus and enterprise network connections; long-haul and metro core network nodes and pops; metro-e and mobile backhaul nodes; access network cabinets, pedestals and drops.

Australian Tel-Tec Pty Ltd

www.teltec.com.au



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90 kV VLF/DC test set

Available to rent, the HV Diagnostics HVA90 test set has both VLF and DC test capabilities combined in one unit and is designed for testing cables (XLPE, PE, EPR, PILC etc), capacitors, switchgear, transformers, machines (IEEE 433), insulators and bushings.

The device allows for fully automatic or manual cable test sequences complying with international standards/guides such as IEEE 400.2, VDE 0276, CENELEC HD620 S1, NEN 3620, SANS 10198 and IEC 60060-3.

Safety features of the test set include: short circuit protected, status display of all important safety functions and messages, safe and easy to use with emergency off switch and key switch lockout, and fully integrated discharge circuit to safely ground the DUT after testing.

Other features include: VLF testing from 0.1 to 0.01 Hz; easy-to-use, ergonomic user interface; real-time display of actual output waveform; storage of test results for later retrieval or download to a PC/laptop.

TechRentals

www.techrentals.com.au

Cables

Madison Technologies' Garland and Roadworx cables were recently identified as compliant with the Vinyl Council's Best Environmental Practice (BEP) Guidelines. This compliance means that under the Green Building Council of Australia's (GBCA) Green Star rating tool, a building project can claim up to two points towards its Green Star rating.

Projects where the vinyl flooring and resilient wall coverings, cable, pipe and conduit (which together account for the majority of PVC use in buildings) meet the compliance requirements of the Best Practice Guidelines for PVC in the Built Environment Guidelines are eligible to claim the two points.

The Vinyl Council of Australia's criteria have been developed to demonstrate Best Environmental Practice (BEP) PVC. In order to earn points under the credit, PVC pipe, conduit, wire and cable, wall coverings and flooring products must be independently verified as meeting the BEP criteria.

Madison Technologies

www.madisontech.com

Web-based management system

The VeExpress web-based management system can be used to manage the TX300S all-inclusive test platform at a lower cost.

VeExpress manages the test sets, licences (test functions) and workflow in real time. Users no longer need to purchase test sets loaded with extra features, just in case, or have to place multiple orders for specific configurations according to different groups of users. Users can reduce CAPEX by buying only what is necessary and can proactively managing their software and hardware assets.

Benefits include: VeExpress helps manage and share test features from a licence pool, whether those options are purchased, leased-to-own, rented; keeps all test sets up to date with the latest approved SW version; tracks deployed hardware and software options.

TelecomTest Solutions

www.telecomtest.com.au

Racks and cabinets

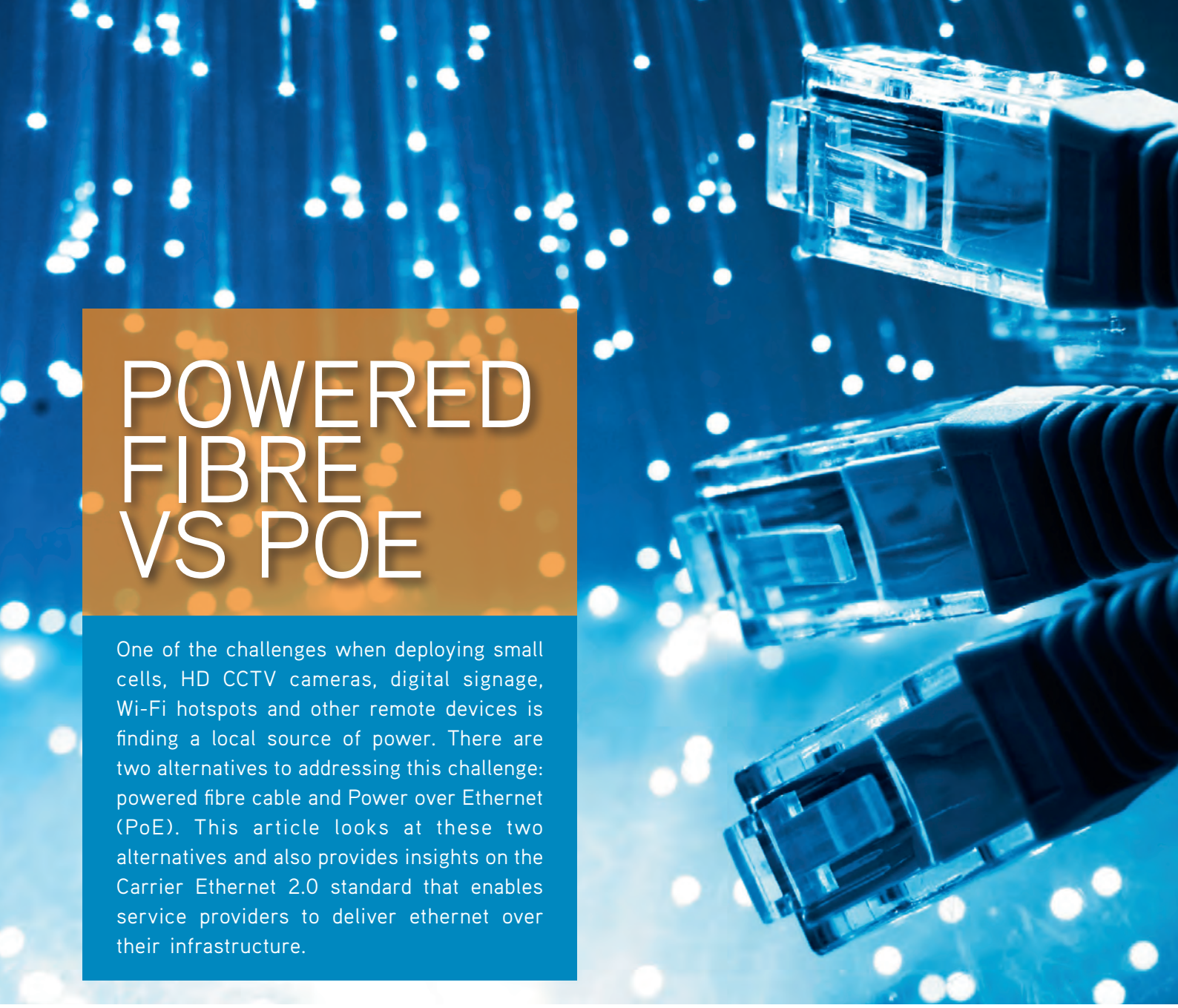
Computer Room Solutions' racks and cabinets are compatible with all standard 19″ servers, UPS units, data storage, back-up devices, environmental and cable management systems.

They are designed and made in Australia to local and international manufacturing standards. Each CRS rack or cabinet can be customised with a range of compatible accessories and options to produce individual solutions for each project, or custom designed to suit the requirements of the design brief. The company has developed industry-specific clip-in or tool-less features, such as a vertical 19″ rail adjustment, cable management systems, power distribution units and shelving systems.

CRS installations can be designed and fabricated with or without a raised floor, utilising both in-row coolers and computer room air conditioning (CRAC) units. CRAC units are replacing standard air conditioning in data centres as they are more dynamic systems that monitor and maintain the temperature, air distribution and humidity instead of just blowing cold air.

Computer Room Solutions (CRS)

www.crsolutions.com.au



POWERED FIBRE VS POE

One of the challenges when deploying small cells, HD CCTV cameras, digital signage, Wi-Fi hotspots and other remote devices is finding a local source of power. There are two alternatives to addressing this challenge: powered fibre cable and Power over Ethernet (PoE). This article looks at these two alternatives and also provides insights on the Carrier Ethernet 2.0 standard that enables service providers to deliver ethernet over their infrastructure.

Gaining access to local power is a difficult and time-consuming process. For example, a major mobile operator may be planning a small cell deployment to supplement 4G services. The problem is access to power.

The carrier must negotiate access to local power with building owners and utility companies for wall- or pole-mounted small cells. Some utility companies and building owners want the carrier to put electrical meters on each small cell so the meters could later be read and the electric bill paid each month.

Even without the need for meters, the negotiations about access to power can take weeks or months, requiring the planning team to make phone calls, visit sites, etc. Once access to power is negotiated, the carrier must deploy electricians to the sites to bring power to the remote small cell or other device.

An elegant solution to this problem is to deploy power at the same time as deploying connectivity. This requires a hybrid cable that combines communications with an electrical supply. By delivering power with connectivity, the network operator eliminates the need to negotiate local power for remote devices.

Let's look at two approaches to this solution:

Powered fibre

A powered fibre cable combines single- or multi-mode fibre along with a copper power cable. The cable system includes a rack-mounted power and optical fibre termination point, the cable, and a remote termination node for each device that plugs into the cable. The system uses plug-in electrical connectors.

In a powered fibre system, each cable is capable of powering a 25 W device at a distance of up to one kilometre, giving the system much farther reach than PoE systems. An optional media converter allows the powered fibre cable system to be used for PoE if desired.

The system incorporates DC/DC conversion technology to eliminate DC line powering calculations, and it features primary, secondary, and tertiary electrical protection for use in harsh outdoor environments as well as indoor venues.

Power over Ethernet

Another approach is to use PoE. The PoE 802.3at standard can provide up to 25.5 W of power over distances of up to 100 metres on CAT 5 cable. To provide power for PoE, the ethernet switch must have an additional power supply delivering typically 1480 W solely for PoE ports.

One big advantage of PoE is that it supplies power and connectivity over one cable as long as the remote device is designed to accept power in that manner. IP phones and IP cameras are often set up for PoE. A disadvantage is that it's an ethernet cable standard, so it precludes using fibre, which is needed for high-bandwidth applications such as backhauling small cells.

In addition, given the relatively limited reach of PoE, it is often not suitable for deployment in head-end stations or other serving offices where base station and controller equipment for small cell networks is located. Typically, the ethernet switch that provides the power and connectivity is located in the same building or in a wiring closet near to the remote devices being powered.

Carrier Ethernet 2.0 (CE 2.0)

In addition to providing power with connectivity, service providers need a way to deliver ethernet over their fibre infrastructure. The Metro Ethernet Forum's Carrier Ethernet 2.0 (CE 2.0) standard enables service providers to transport ethernet over fibre infrastructure.

Since 2012, CE 2.0 has been having a significant impact on the market. CE 2.0 greatly expands from three services in CE 1.0 to eight services, two of each respectively in E-Line, E-LAN, E-Tree and E-Access (defined in MEF Standards MEF 6.1, 22.1, 33).

Features of CE 2.0 include:

- The industry's first standardised Multi-CoS with application-oriented CoS Performance Objectives, new metrics (MEF 6.1, 10.2, 20, 23.1)
- Interconnect through the integrated delivery of MEF Service Attributes (MEF 10.2, 26.1, 33) allows ubiquitous deployment spanning multiple providers
- Manageability, (MEF 7.1, 16, 17, 30, 31) plus additional specifications

For service providers, CE 2.0 is a set of MEF CE 2.0 certified network elements that connect to transport carrier ethernet services for all users, locally and worldwide. Carrier ethernet services are carried over physical ethernet networks and other legacy transport technologies.

Carrier ethernet has enabled a transformation of the delivery of business services from legacy TDM, SONET and STM. In 2012, the total bandwidth of ethernet services exceeded all other legacy technologies worldwide and has generated uninterrupted, double-digit service revenue growth since its inception.

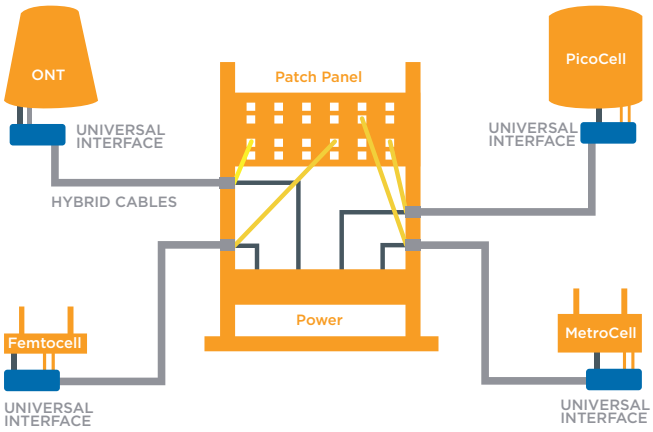


Figure 1: Powered fibre cable system components.

CE 2.0 and powered fibre

Carrier Ethernet 2.0 enables key applications from cloud services to mobile backhaul over all technologies using traditional or SDN approaches. On its face, CE 2.0 is a service delivery standard, and does not address the need for local power at the remote equipment site. For example, CE 2.0 has been used to backhaul traffic from small cells, but it does not generally provide power for those small cells.

However, when transported over powered fibre cable, the CE 2.0 protocol stands to provide the best of both worlds: it delivers carrier services with class of service, interconnect, and manageability, and would deliver power to remote locations, so that providing local power is no longer a problem.

Conclusion

The powered fibre system innovation allows a reconsideration of how to deploy remote IP devices for several applications and areas. In particular, in combination with singlemode fibres and an applicable length up to 3000 m the system makes installations of devices easy and economical.

TE Connectivity
www.ampnetconnect.com.au

Class EA 500 unshielded jacks

With fast termination and easy installation, the UMJ unshielded jacks are easily mounted into standard outlets and patch panels. The UMJ CAT6A unshielded jacks are easy to terminate and install in less than a few minutes.

Performance characteristics include: Class EA 500 permanent link acc to ISO/IEC 11801/EN 50173-1 (except Cat5e and USB); universal, worldwide available installation dimension for mounting cut-outs - 19.3 x 14.7 mm; 10Gb ethernet compliant (IEEE 802.3an); fully automated production of Class EA 500 RJ45 core to guarantee a uniformly high-quality standard (transmission characteristic values); optically monitored inspection of the RJ45 contact heights; 25-year warranty. The jacks are said to provide excellent performance for copper structured cabling networks which exceeds ISO11801 and AS/NZS standards.

Warren & Brown Technologies
www.warrenandbrown.com.au

CATV network testing

Equipped with the same base feature set as the CX100+, the VePAL CX150+ D3+ CATV networking testing system is fitted with a built-in DOCSIS 2.0 compliant cable modem that is capable of linking up with a cable modem termination system (CMTS). With an embedded DOCSIS 3.0 cable modem, the CX150-D3+ supports full upstream and downstream 8x4 channel bonding, IPv6 addressing and Advanced Encryption Standard (AES) encryption used in next-generation DOCSIS 3.0 networks.

Cable modem emulation offered by both units provides valuable statistics pertaining to the upstream and downstream paths and related servers for video, internet and VoIP traffic. Triple play services can be verified on either the RF and/or LAN interfaces while the unique pass-through mode provides true modem emulation and ethernet traffic statistics. The remote view option allows viewing of the return path monitoring results from a CX180R headend system.

Wireless connectivity has been enhanced: field technicians have the option to upload test results via Bluetooth, 802.11b/g/n Wi-Fi or 3G UMTS connections (in addition to USB memory stick and FTP capabilities already supported).

Benefits include: intuitive presentation of measurements with test graphics; high-resolution colour touch screen viewable in any lighting conditions fitted with protective cover; robust, handheld chassis.

Features include: frequency analysis from 5 to 1000 MHz; supports Annex A and B signal formats; comprehensive SLM features including single channel measurement, system scan, tilt, and installation check; measure power level of NTSC, PAL and SECAM video signals; carrier-to-noise (C/N), adjacent channel measurement ratio; MER and Pre/Post BER measurements of QAM carriers with Constellation diagram and Histogram; forward and reverse path ingress scan to detect noise and/or CSO/CTB interference.

TelecomTest Solutions
www.telecomtest.com.au

Spindle cable

The CF270.UL.D. single-core bending resistant conductor cable, made of fine strands, has been developed for flexible operation in energy chains used in machine tools. This is a space-saving alternative to the usual space-consuming 4-wire servo cables for such applications.

Spindle drives in machine tools are becoming larger and more efficient. To guide such higher energy streams, larger conductor cross-sections are required. The consequence is that servo cables are becoming increasingly thicker so that the radius of the energy chain goes beyond the permissible space of the machine tool.

In accordance with the requirements for energy chains, the outer jacket is made of an adhesion-poor PUR material making it oil-resistant, notch-resistant, halogen-free and also usable in deep-temperature applications. The spindle cable is available in six different conductor nominal cross-sections, outside diameters and copper numbers.

Treotham Automation Pty Ltd

www.treotham.com.au

Push-pull connectors

Sreada connectors offer a Lemo- and Hirose-compatible, self-latching, push-pull mechanism at an affordable price point. Once mated, this style of connector is secure and will not be unmated by vibration or an axial pulling force on the cable.

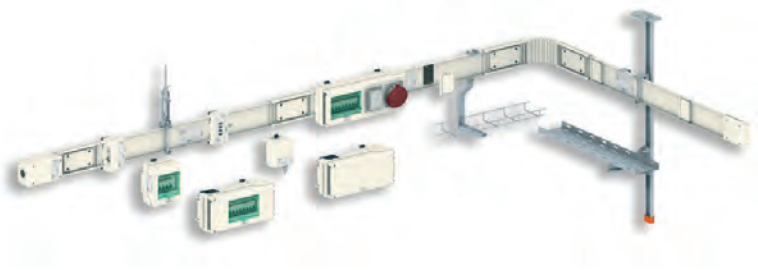
Lemo- and Hirose-style connectors are often selected for their push-pull coupling mechanism which allows quick, easy mating and unmating. The connectors are precision-engineered, small-format, low-current, multipole, push-pull connectors. The lower price of Sreada versions is said to make them more cost effective for use in general industry as well as traditional areas such as on medical and test equipment.

Mating cycle testing of Sreada connectors with their standard gold plate thickness has shown no serious wear after 5000 cycles. The standard gold thickness for all Sreada contacts is 0.1532 μm; however, 0.5 or 1.0 μm thicknesses (similar to Lemo) are available on request.

There are two main series. The SRD001 connectors are the Sreada equivalent of Lemo push-pull connectors which are suitable for applications requiring frequent/rapid connections and separations such as general electronics, instrumentation, video processing, medical and other equipment.

Connector-Tech ALS Pty Ltd

www.connectortech.com.au



Prefabricated busway solution

The Schneider Electric busway range is a comprehensive system of busbar trunking for lighting and power distribution in all types of buildings.

As an integral part of the Schneider Electric offer, and an alternative to traditional cabling, the busway enhances the safety of people and equipment, and provides installation continuity of service, upgradeability and simplicity. For those working with rack distribution, there is a specific offer component called I-Busway for data centres.

Features and benefits include: easy-to-handle modular components aid simple installation; fitting time reduced by more than 50% compared with traditional cable installations; branching points allow power to be supplied to new loads as and when needed; easy to dismantle and 100% reusable; connect or disconnect tap off units while still energised without interrupting operations; tap off units positioned close to the line; all energised parts are entirely protected: IPxxD; connections made completely safe via poka-yoke devices and interlocking; busway and tap-offs are fully type tested.

Schneider Electric Buildings Australia Pty Ltd
www.schneider-electric.com.au

FTTN communications cabinet

Eaton's Active Bullet FTTN communications cabinet is designed to provide a secure and environmentally friendly housing for FTTN equipment.

The telecommunications cabinet has the capacity to support up to 190 subscribers. The cabinet is NES (National Environmental Standards) compliant and is built complete with the latest high-efficiency telecommunications-grade DC power system and backup batteries. The cabinet has also sufficient capacity for a 3U fibre feed and can support fibre to the home and a splitter mount if required.

The system includes 55 Ah batteries, external genset input and a meter for AC power and AC RCD outlets. The cabinet also features up to 12 h of backup, suitable for suburban and rural environments. Supporting user requirements for ADSL, VDSL and gigabit ethernet, the cabinets have a heat capacity of 450 W at 10° above ambient with an equivalent sun loading of 2.5 kW. The cabinets use a maximum of 100 W for cooling purposes while a quiet air-to-air heat exchanger removes waste heat.

In addition, the cabinets can accommodate 800 pairs of copper disconnects. The cabinets are 1 m high and are manufactured from corrosion-resistant, marine-grade aluminium providing years of maintenance-free service for outdoor communications equipment. They also have high seismic withstand capability providing users with a robust solution in potentially high-risk locations.

Eaton Industries Pty Ltd
www.eatonelectric.com.au

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CASE STUDY

No gambling with energy at Crown

Attractive opportunities exist to reduce energy use, cuts costs and improve returns.

Crown Melbourne's three different departments (sustainability, food and beverage, and maintenance) recently approached AE Smith team in Melbourne to help them achieve a range of objectives: improve energy efficiency; meet legislative requirements and also understand the cost savings of replacing R22 in their plants; improve equipment monitoring for more effective food management and reporting.

AE Smith's Adam Godino saw the opportunity to facilitate discussion between the different Crown departments. "We wanted to find one solution to meet everyone's needs. A trial was agreed to, focusing on one refrigeration unit servicing two cool rooms. As Crown has over 120 cool rooms/freezer rooms with 90 refrigeration condensing units, the findings from this energy-saving trial have huge implications - both on capital [CAPEX] and operational expenditure [OPEX]," said Godino.

The trial was carefully planned with each of six stages focused to isolate the impact of each individual change to the refrigeration unit. In this way the most valuable changes to Crown as a whole and to each department could be identified and prioritised. The first stage of the trial was to identify baseline energy usage. Meters were installed on all equipment to be able to log data on equipment performance and energy use.

"We needed to establish the baseline so that each department understood the starting point. That way, the cost as well as the benefit of each subsequent stage could be correctly apportioned," Godino said.

The first change was to replace refrigerant gas R22 with R507. R22 is legislated for phase-out in Australia due to its negative environmental impact. It was a priority for Crown to switch across to a new, reliable refrigerant as soon as possible because as supplies decrease, purchase costs continue to rise. Stage three, four and five focused on introducing new parts to the refrigeration system, such as electronic TX valves, a variable speed drive (VSD) controller and replacing the coils in the evaporators. These measures improved refrigerant flow responsiveness, enabled independent pressure and temperature control for each cool room and improved the effectiveness of old equipment. In stage six, product probes were installed in the cool rooms to provide air temperature data to inform operation of the evaporator fans.

"By law, the core temperature of food and beverage must be maintained between 3-5° [C]," explains Godino. "During the day, lots of people come in and out of a cool room, so the air temperature needs to be set lower. In the middle of the night, we can increase the air temperature by a degree and still keep the product at the right temperature. This can result in sizable energy savings over time."

The entire solution is integrated to a control system called Carel, previously tested by the Crown food and beverage team during a new restaurant install. The combination of technologies has the potential to eradicate human reporting error, reduce food spoilage and automate government reporting.

The refrigeration unit involved in the trial consumed 30% less energy. All three departments at Crown and AE Smith can now use the data from each individual stage to make informed decisions and allocate budget to the most effective measures. Considering the potential cost savings across 120 cool rooms/freezer rooms, this is looking to be an energy-saving winning streak for Crown.

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Audited Media Association of Australia cab

March 2014 Total CAB Audited Circulation (Aust + NZ)
7,001 (67% personally requested)

ECD Solutions: ISSN 2201-2702
Printed and bound by Bluestar Print +61 2 9748 3411

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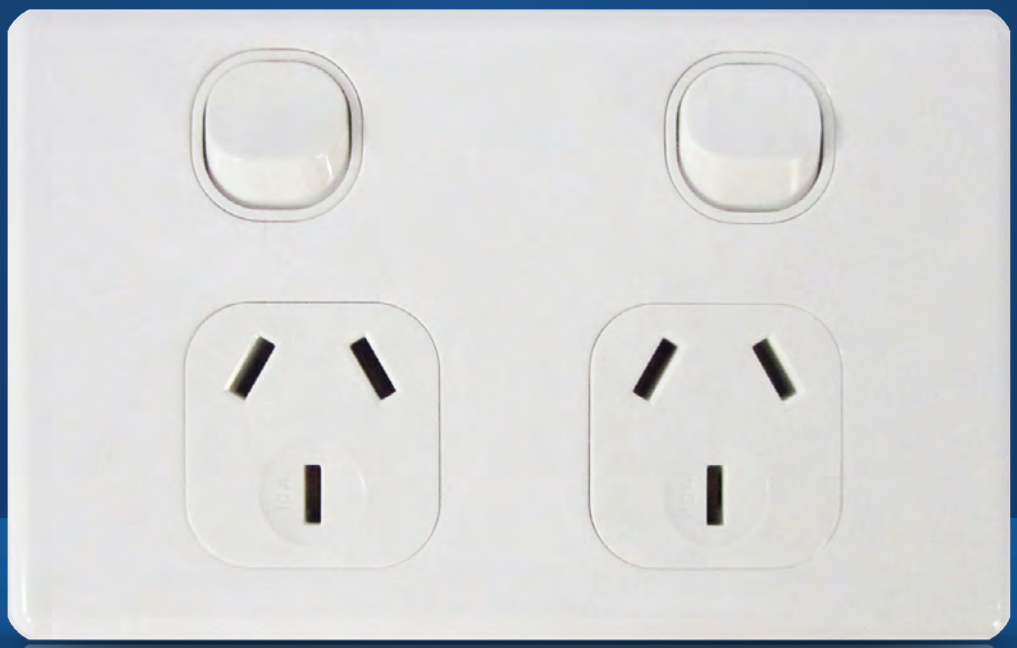

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