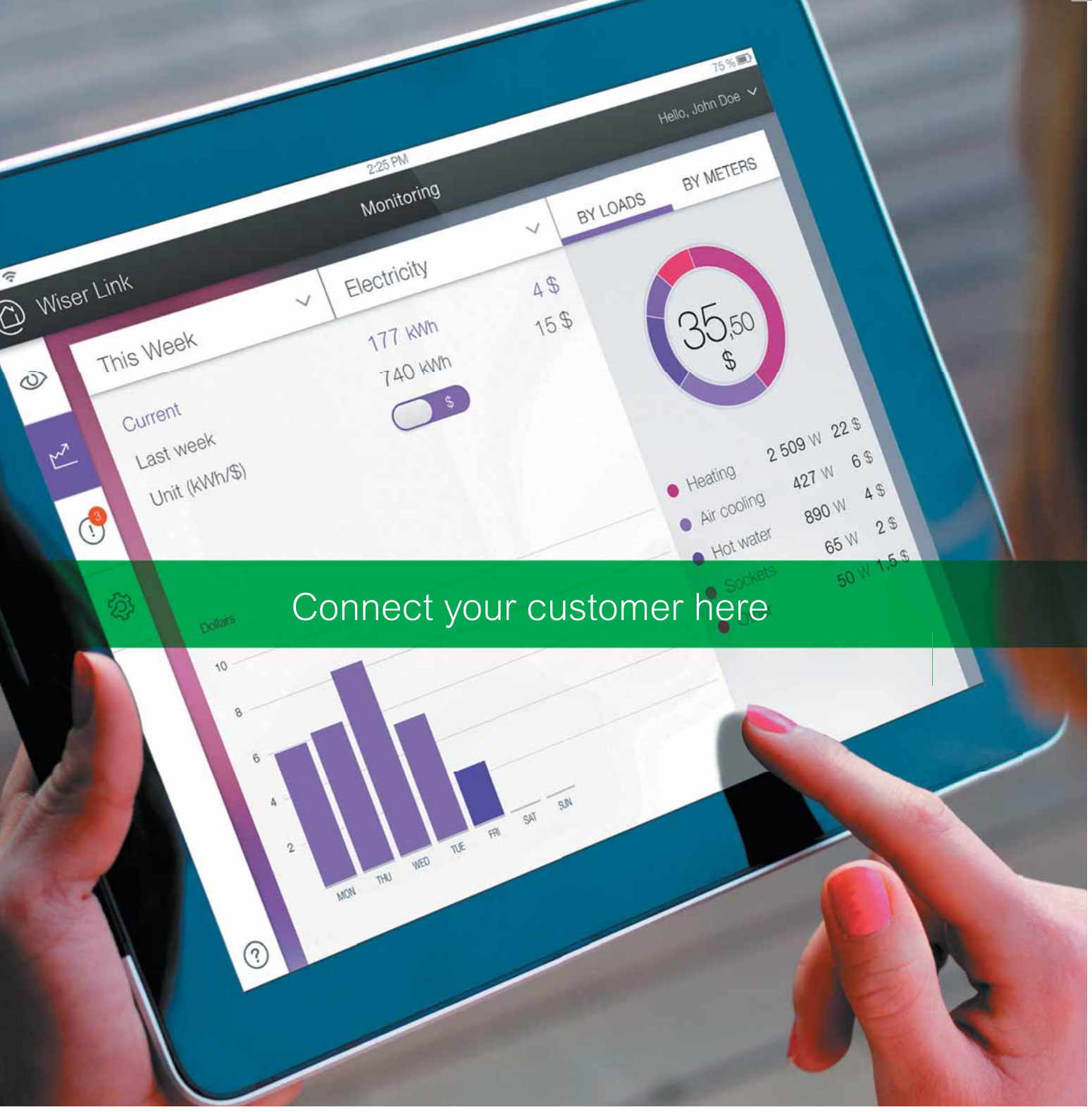
ELECTRICAL CONNECTION

WWW.ELECTRICALCONNECTION.COM.AU

AUTUMN 2016

TRADING TRADIES

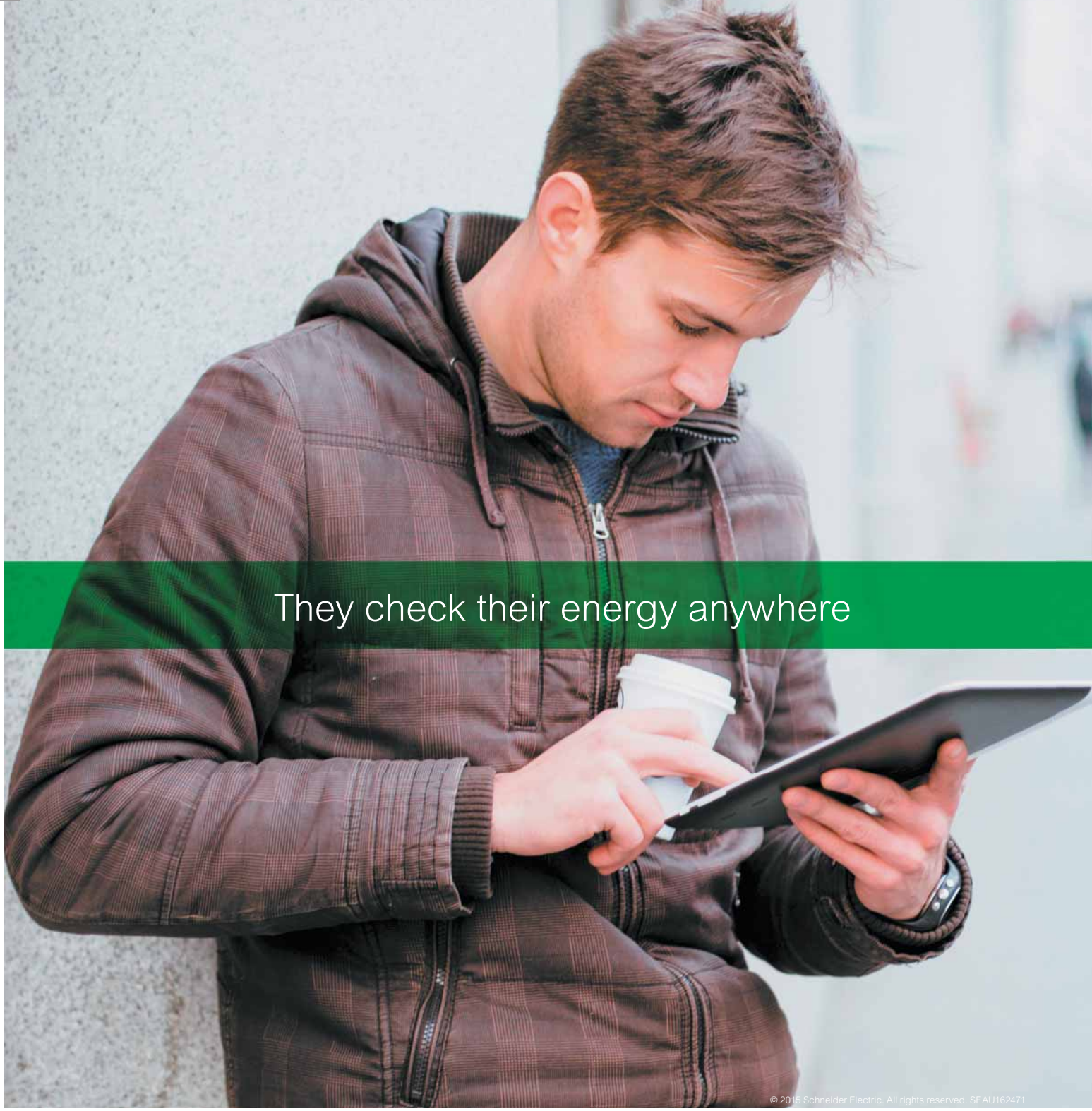
EFFICIENCY YOU CAN TAKE TO THE BANK



Wiser Link Energy Management System

Wiser Link lets your customers measure and monitor their home's energy anywhere, anytime.

clipsal.com/wiserlinktrade



Life Is On

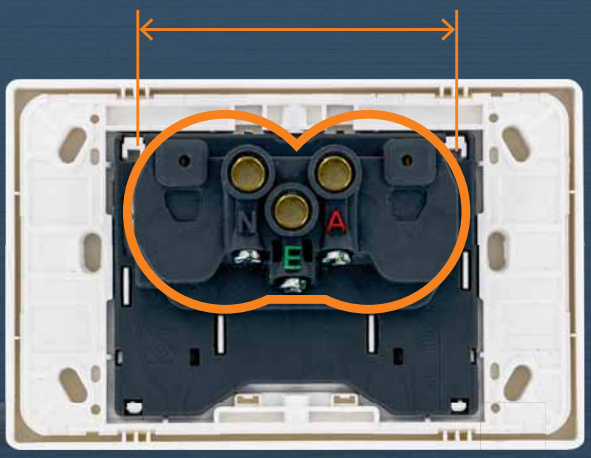
CLIPSAL™
by Schneider Electric


New
innovations
EXCEL life
SUPER JOB
SUPER FAST

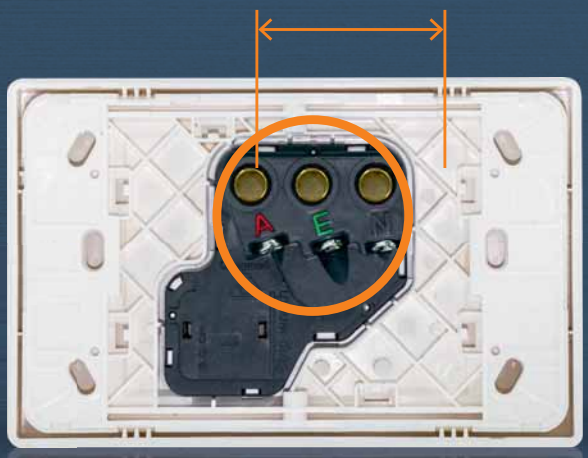
NEW METICULOUSLY ENGINEERED POWERPOINTS

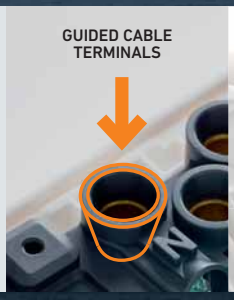
From the screw heads to the mounting holes, we've meticulously re-engineered our powerpoints to make them faster and safer to install than anything else on the market.

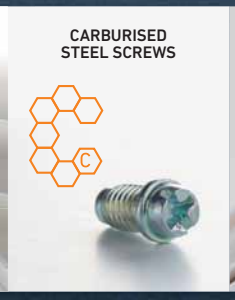
Small Footprint
Fits into 2 x Ø40mm holes

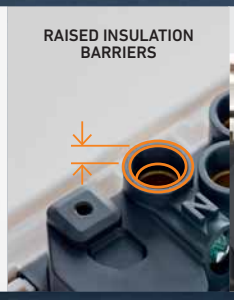


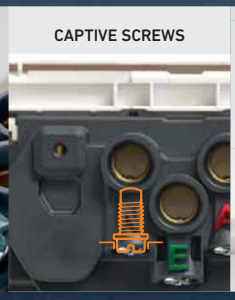
Small Footprint
Fits into 1 x Ø40mm hole











Plus hundreds of range functions that add value

SUPERFAST 2 X 2.4A!

USB Powerpoints

Illuminated LED Rings

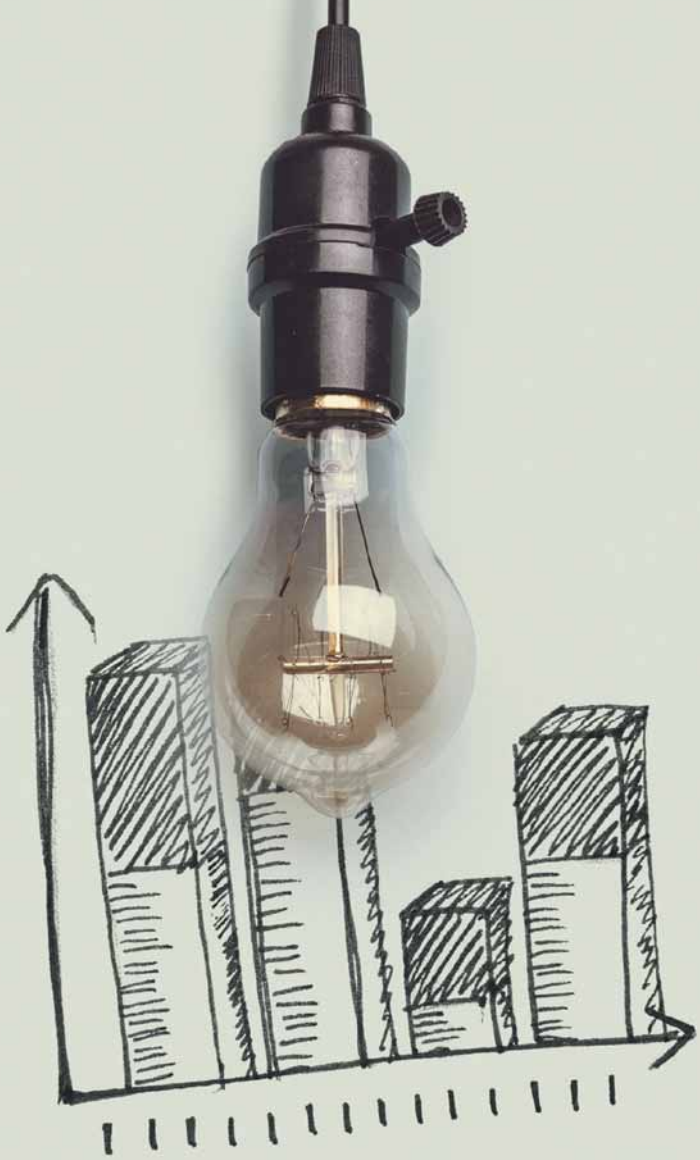
LED Dimmers

Electresafe RCD Powerpoints

Antimicrobial

visit excellife.com.au today

legrand®



Certifying trade

Need a cash flow boost? Renewable energy certificates mean you can get thousands of dollars for a few pieces of paper.

22

Features

ELECTRICAL CONNECTION

CABLING CONNECTION

Regulars

ATT ACROSS THE TRADES

Electrical Wholesale & Energy Solutions

QUALITY Products
QUALITY Suppliers

CNW maintains close relationships with a select group of trusted and proven suppliers which allows us to offer high quality, cost effective and reliable products to our customers.

For peace of mind, think CNW!

Ph: 1300 010 010

Proud to be an Aussie!

www.cnw.com.au

THE ENERGY STORAGE SPIN CYCLE IS HERE

It is a long held belief that energy storage will be the future of the electrical contracting market. The rising cost of electricity, the increased awareness of energy efficient technologies – in particular solar – and the desire for energy independence at a national level are all driving us towards a greater proliferation of home batteries.

Electrical Connection, for one, has been harping on the subject for some time now. And we're not alone.

But much like LEDs before it, the battery market is starting to be inundated with dubious and unsubstantiated claims from suppliers trying to cash in on the burgeoning market.

Specifically, some suppliers claim their products can be charged by the grid or a generator while they can only be charged by solar panels. Others don't work at all in periods of grid power loss.

One of the reasons these claims enter (and are allowed to confuse) the market is that there are no clearly defined installation or performance standards for the new solutions. On the plus side, Standards Australia is working on some but in the meantime spurious claims will continue.

In this instance, electrical contractors need to act as an educational resource for the community, explaining the ins and outs of the technology. This means you need to learn as much as possible about it too.

TESLA IS HERE

Recently, a number of companies announced 'exclusive' partnerships with Tesla to supply the company's Powerwall to the Australian market.

For about $10,000, consumers now have access to what is being touted as the next best thing since sliced bread.

But, is it? Or is Tesla the Apple of the electrical industry? Is Powerwall its iPod moment?

The Powerwall isn't a new concept – others have been working on similar ideas for a while now, but it has caught the public's attention (just like the iPod). It's very pretty (like the iPod) and more expensive than some of its competitors (also like the iPod).

The biggest challenge facing Powerwall's popularity among contractors is that it isn't coming through the wholesaler market. Instead, retailers are now having a crack at going direct. This could mean that someone somewhere overseas in a call centre will try to specify a system for a property they have never seen and have no understanding of the home owners' consumption pattern.

This will lead to a lot of dismayed customers who blame the industry as a whole and give up on the technology.

Now is the ideal time for contractors and wholesalers to come together to figure out how they can be the arbiters of energy storage in Australia.

Until next time,

Paul Skelton

ELECTRICAL CONNECTION

MANAGING DIRECTOR
Jeff Patchell
jeffpatchell@build.com.au

GENERAL MANAGER
Jeremy Sweet
jeremysweet@build.com.au

EDITOR
Paul Skelton
03 9542 9016
paulskelton@build.com.au

EDITOR – ACROSS THE TRADES
Jacob Harris
jacobharris@build.com.au

STAFF WRITERS
Jacob Harris, Joe Young

GRAPHIC DESIGNER
Kylie Mibus

PRODUCTION TEAM
Sam Elliott, Gail Dwyer

CONTRIBUTORS
Phil Kreveld, David Herres, Gary Busbridge, Patrick McLaughlin, Kate Jordan, Andrew Spence, Steve Arthur, Brian Seymour, Ian Millner, Susan Neill

ADVERTISING **1800 063 371**
Simon Clark
0428 733 248

TO SUBSCRIBE
Australia Freecall 1800 623 214
New Zealand 613 9542 9000
Fax (with credit card details) 03 9542 9090
By mail, please write to the address below

PUBLISHED BY:
Connection Magazines Pty Ltd
Unit 2/18-22 Lexia Place,
Mulgrave, Victoria 3170
AUSTRALIA

ISSN 1839-2288

We connect.™

At AFL, we make connections possible through the latest communications cabling technology. Using fibre optics we integrate voice, data and video applications into solutions that keep our customers connected. We develop solutions that solve our customers' unique technology and application challenges.

AFL

1300 232 476
www.AFLglobal.com/au
www.AFLglobal.com/nz

CONTRIBUTORS

PHIL KREVELD

Let's Get Technical

Phil Kreveld is an electrical engineer with broad experience in electrical and electronic instrumentation, including relay testing power and power quality analysis.

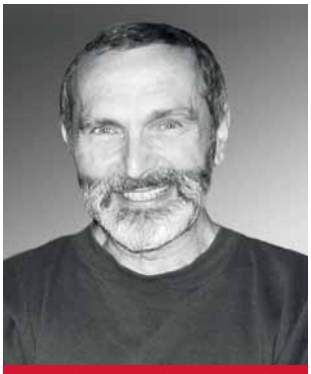
> See pages 38 and 50

GARY BUSBRIDGE

The Buzz

Gary Busbridge has been with Clipsal for more than 40 years. Since 1997 he had been involved with Standards Australia and has held memberships in several Standards committees.

> See page 46

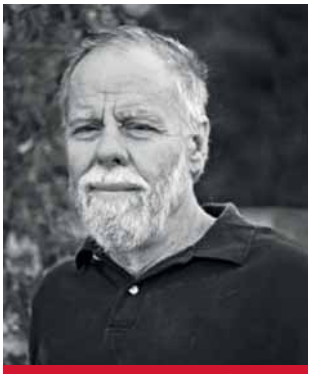


GEORGE GEORGEVITS

Troubleshooting

George Georgevits manages his own engineering consultancy, Power and Digital Instruments. PDI specialises in lab and field testing and troubleshooting of cabling systems and components.

> See page 42



DAVID HERRES

Maintenance

David Herres is author of two books published by McGraw-Hill and has wrtitten over 80 articles for electrical and electronic publications throughout the world.

> See pages 44 and 54

BRIAN SEYMOUR

Estimating

Brian Seymour MBE, industry consultant, author of *Electrical Estimator's Labour Unit Manual* and *Starting Out*, conducts regular industry training programs throughout Australia on behalf of the electrical and air conditioning industries.

> See page 60

STEVE ARTHUR

Guiding Light

Steve Arthur has been involved in the electronic component and lighting industry for more than 15 years in Australia and internationally. Steve has previously led the OEM business for Philips Lighting in Australia and is now its trade channel manager.

> See page 58

IAN MILLNER

Networking

Ian Millner has over 30 years' experience in business, telecommunications and vocational training. He established (and later sold) Milcom Communications, a Registered Training Organisation, and is now a consultant.

> See page 66

PAUL SKELTON

Editorial

Paul Skelton is a multi-award seeking journalist and magazine editor. For the past nine years he has been actively involved with the electrotechnology sectors, looking for ways to help readers build their businesses.

> See page 8

PRYSMIAN

Summer's here!

But you don't have to get hot under the collar.

AUSTRALIAN MADE®

Don't forget the essentials: sunblock, sunnies and to stock up on Prysmian flat white Air-Conditioning cables. It's just another way to use safe, Aussie-made cables, manufactured to Australian standards.

Material code: 5011746 Cable Description: 450/750 1.5x3C +E FLAT WH

For more information contact your local BDM or call us on:
Ph: 1300 300 304 Fx: 1300 300 307
E-mail: sales.au@prysmiangroup.com
www.prysmiancable.com.au

A brand of the
Prysmian Group

NECA ANNOUNCES STUDENT OF THE YEAR AWARD WINNER

The National Electrical and Communications Association (NECA) has named Reece Jongenelis (pictured left) as the 2015 winner of the NECA School Student Commitment to Industry award.

"Reece is clearly a high-achiever," said judges Stuart Diepeveen and Tom Emeleus, each of whom head up NECA Group Training Organisations.

"We weren't surprised when we found out that Reece had also won several other awards this year. He is exactly the kind of student we welcome to our industry."

Not only has Reece taken first prize in the NECA School Student Awards, but he has received five additional accolades:

- Marist Scholarship 2015 Recipient.
- South Australian School-based Apprentice of the Year 2015.
- 2015 SA Training Awards People's Choice Winner.
- Finalist 2015 Australian Training Awards.
- Marcellin Apprentice of the Year 2015.

This year's runner up was Jodie Crayden – from Woodvale Secondary College, Western Australia. Christopher Cover – from Groves Christian College, Queensland came in third.

SOUTH AUSTRALIA LIGHTS THE WAY ON ROAD TO RENEWABLES

The South Australian Government's announcement that the state will produce zero net emissions by 2050 is a commitment that will drive positive change and unlock many economic opportunities over the next 35 years, the Clean Energy Council (CEC) says.

CEC chief executive Kane Thornton says the South Australian Government continues to show strong leadership that is delivering renewable energy investment and cutting emissions, and its plan to be a net exporter of renewable energy is extremely welcome.

"A long-term transition plan for a cleaner energy sector with strong market signals will attract major private sector investment to the state. It is certainly achievable and the South Australian example to date shows that much higher levels of renewable energy are possible throughout the rest of the country," Kane says.

"This goal will need to be accompanied by smart energy market reform that ensures the state can run on progressively higher levels of renewable energy and continue to operate a stable energy system.

"Currently about 40% of the power across the state comes from renewable energy, and the Australian Energy Market Operator says the system will remain secure and meet its reliability standards in the coming years – meaning at least 99.98% of power demand will be served.

"Policymakers, regulators and market operators need to take a more strategic approach to prepare for the necessary changes in our electricity system, and the renewable energy industry looks forward to working constructively and collaboratively with these groups."

MELBOURNE TO HOST THE NATION'S LARGEST TRADES AND SKILLS CHALLENGE

Australia's finest young apprentices, trainees and students are gearing up for the ultimate challenge: The 2016 WorldSkills Australia national competition, to be held this year in Melbourne.

Supported by the Victorian Government, the national competition will be held from 6 to 8 October 2016 at the Melbourne Showgrounds. Close to 500 competitors from all corners of Australia will compete in over 50 skill categories, including electrical.

Their journey began at the WorldSkills Australia regional competitions held in 31 regions across the country. As the regional competitions draw to a close, stand-out competitors will be selected to progress onto the national competition, where the pressure will be on as they undertake three days of intensive competition against the nation's best in the hopes of being named the national champion in their respective skill category.

The competitors that progress to the national competition will spend the coming months dedicating every spare moment to honing their skills with the support of their trainers and employers.

WorldSkills Australia will find its first national champions from 17 to 19 May at the Air Conditioning Refrigeration and Building Services (ARBS) exhibition, which will host the 2016 WorldSkills Australia National Refrigeration Competition.

TESLA POWERWALL NOW AVAILABLE IN AUSTRALIA

In December, a number of companies announced partnerships (several of which were 'exclusive') with electric vehicle maker Tesla, to import and sell the company's Powerwall home battery.

One of the companies, Origin Energy, says installation of the Powerwall system will commence in February 2016.

Origin chief executive of energy markets Frank Calabria says, "By offering rooftop solar with home batteries, Origin is able to provide households with greater control over their energy use than ever before.

"Customers can now also make their investment in solar work harder, as excess electricity produced during the day can be stored for use at a later time when the solar panels do not produce electricity."

Origin is bundling the Tesla Powerwall with Trina solar panels and the Solar Edge inverter as part of a home energy solution.

"Home batteries will not be for everyone at this early stage, but with more than 80% of solar owners in a recent survey indicating they would consider buying a home battery, Origin is ideally placed to help consumers find the right solution for them with its end to end offering," Frank says.

Energy retailer Simply Energy has also announced that it will begin to offer the Tesla Powerwall.

Part of the global ENGIE group, Simply Energy also expects to install the first Powerwall units in early 2016.

Simply Energy chief executive Carly Wishart says Tesla's home battery storage had attracted enormous interest.

"Coupled with our solar PV offering, we see home battery storage playing a major role in the transition to a low carbon economy," Carly says.

The Tesla Powerwall is attractively designed and is a conveniently-sized home battery capable of charging from a range of energy sources including solar panels or from the grid, when utility rates are low. Automated, compact and simple to install, Powerwall enables customers to maximise self-consumption of solar power generation.

CSR Bradford – a company perhaps best known for insulation – will also supply and install the Tesla Powerwall battery throughout Australia and New Zealand early in 2016 as part of a fully integrated and automated system, including PV panels and inverter.

Executive general manager Anthony Tannous says: "Just as Tesla has revolutionised electric vehicles, Tesla Energy's Powerwall will deliver consumers personal control and management of energy consumption. Savings in electricity are now easily achievable."

The Tesla Powerwall home battery unit is fully automated and simple to install, with no maintenance required. At 1.3m x 0.86m and a depth of only 18cm it features a sleek design to make it architecturally appealing. The Powerwall batteries can be installed indoors or outdoors and are controlled via a web and mobile app interfaced with the specialised inverter.

The Daily 7kWh Powerwall will cover most of an Australian family's power requirements during the evening, using energy stored from solar panels during the day. The Tesla Powerwall can provide an emergency backup in the case of a grid outage and multiple batteries can be scaled together to meet higher energy requirements if needed.

Widely praised as the future of sustainable living, home battery storage is considered the tipping point in making solar energy a practical and affordable solution for everyday Australians.

CSR Bradford's integrated power storage solutions will be available directly through its Bradford Energy Solutions, or through any one of its many Approved Installers.

SCHNEIDER ELECTRIC ENFORCES PATENT RIGHTS AGAINST CLIPSO

Schneider Electric has successfully enforced its registered patent rights against Clipso Electrical.

The Federal Court has made Orders in Schneider Electric's favour, to declare that Clipso Electrical's CLIPSMART USB charger infringed Schneider Electric's innovation patents.

Importation and sale of CLIPSMART USB products will cease, with all stock currently in the marketplace required to be delivered to Schneider Electric.

Clipsal and Schneider Electric Partner Business vice president David Gardner says: "This announcement from the Federal Court is a great step for Schneider Electric to protect the hard work we do in designing and developing reliable and innovative products for our customers. We value our intellectual property highly and are proud of the reputation associated with the Clipsal by Schneider Electric brand."

Clipso Electrical distributes a wide range of electrical products under the CLIPSO trademark in the Australian market.

Schneider Electric is continuing to pursue Clipso Electrical in legal proceedings for use of the CLIPSO name, infringement of Clipsal's DOLLY SWITCH trademark, infringement of Schneider Electric's registered design rights, contraventions of the Australian Consumer Law and passing off.

The case is scheduled to be heard in May 2016.

ACCC URGES BUSINESSES TO CHECK THAT THEIR CONTRACTS ARE FAIR

The Australian Competition and Consumer Commission (ACCC) is urging businesses to closely review the standard form contracts they use when dealing with other businesses.

A new law will take effect on 12 November 2016, following a 12 month transition period, that offers small businesses protections against unfair contract terms offered by other (usually larger) firms.

This law supplements the existing law on unfair contract terms for consumers. The ACCC, Australian Securities and Investments Commission (ASIC) and state and territory offices of fair trading are responsible for enforcing the law.

"This new law is a positive step for small businesses that are presented with standard form contracts," ACCC deputy chair, Dr Michael Schaper says.

"For every business that deals with small businesses, now is the time to check that your contracts are compliant."

The law applies to standard form contracts between businesses where one of the businesses employs less than 20 people and the contract is worth up to $300,000 in a single year or $1 million if the contract runs for more than a year. Standard form contracts provide little or no opportunity for the responding party to negotiate the terms – they are offered on a 'take it or leave it' basis.

"The new protections will help address significant imbalances or disadvantages to small businesses in their dealings with other businesses by allowing the courts to declare void unfair terms within standard form contracts," Dr Schaper says.

If you're from a small business and you're offered a standard form contract that includes a term you think is unfair, visit the ACCC website to find out about your protections under the law.

DESA AUSTRALIA JOINS THE ENGIE GROUP

DESA Australia has announced that global energy and services company ENGIE has formally assumed 100% ownership of the shares of the company through its subsidiary: ENGIE Energie Services S.A.

The DESA acquisition is in line with ENGIE's strategy to help customers achieve their energy efficiency, environment, operations and maintenance objectives by offering customers a one-stop shop for multi-technical services, asset-based energy performance and environmental solutions.

"With the ability to draw on ENGIE's extensive expertise and our other businesses in power generation and retail, we have the opportunity to grow DESA even further," says Jérôme Tolot, executive vice president in charge of the Energy Services Business line.

DESA chairman and founder Dennis Middleton said that the move into the ENGIE group created exciting opportunities for DESA's employees in terms of the diversity of services the business will now be able to offer its customers.

"It's a great step forward for DESA and puts the business in a unique position in our industry. It will also generate exciting development opportunities for staff," Dennis says.

DESA managing director Gerard Whitely paid tribute to the role Dennis and his co-founders Stephen Scott and David Dewar had played in building DESA into what it is today.

"Dennis, David and Stephen have built a fantastic business as evidenced by ENGIE's interest in it. They will always be recognised as the founders of the business and I know they look forward to seeing what the business can achieve under ENGIE's ownership," Gerard says.

EVS TO POWER HOMES IN WA

The Government of Western Australia has enabled owners of home batteries and electric vehicles to export electricity to the grid.

The state's Energy Minister, Dr Mike Nahan, told a conference that he has embraced the 'Uber-fication' of the electricity sector, saying it was important to challenge the largely state-controlled market.

"This arrangement now means eligible customers can install battery storage or EV facilities to complement their solar systems and export unused electricity onto the network," Dr Nahan says.

"This is an important development given the emerging future trends which forecast widespread installation of PV plus storage systems."

RECALL: MR16 DIMMABLE LED DRIVER

There is a product recall on LEDified's 10W MR16 dimmable LED driver. An internal fault in the driver can cause it to fail.

Identifying features

Batch numbers 1351, 1418 and 1424 for model numbers MR1650270700D and MR1650400700D.

What are the defects?

An internal fault in the driver can cause it to fail, which may expose live parts or cause a fire.

What are the hazards?

Risk of electric shock and fire.

Dates available for sale

1 January 2014 to 31 December 2014

Where the product was sold

Victoria

Traders who sold this product

This product sold direct to customers through LEDified only.

Supplier

LEDified Lighting Corporation Pty Ltd

What should you do?

If possible, avoid using the downlights. LEDified Corporation will be contacting the affected consumers. For further information on this recall, contact LEDified Corporation for replacement of LED drivers.

AUSTRALIA'S FIRST G.FAST TRIAL A SUCCESS

nbn has successfully completed its first trial of G.fast technology, providing faster speeds over copper networks.

The trial, conducted in Carlton, Melbourne, hit speeds of over 600Mbps over 100m of existing copper wire.

G.fast technology will:

- Make gigabit-level aggregate bit rates possible by adding spectrum to copper lines. The technology is equivalent to adding extra lanes to a highway. Current VDLS2 lines use spectrum up to 17MHz. G.fast widens this spectrum to 106MHz. Anticipated amendments will use frequencies up to 212MHz and take bit rates to 1Gbps and beyond. Current lab tests have hit 967Mbps on 20m of copper wire.
- Provide fibre to the premises (FTTP) equivalent speeds without the intrusive nature of an FTTP rollout. The distance between homes and the node, or last mile, becomes far less important with G.fast as it is able to achieve higher network speeds over longer copper line distances.
- Be used in conjunction with the fibre to the basement (FTTB), fibre to the distribution point (FTTdP) and fibre to the node (FTTN) rollouts under the nbn.

Tony Cross, chief architect of the nbn, announced the new technology at the Broadband World Forum in London.

"We are very excited about the potential that G.fast offers. It has the potential to give us tremendous flexibility in delivering very fast speeds to end users in a wide range of different environments," he says.

"This is fantastic news because G.fast can deliver exciting new services such as symmetrical speeds, which will offer new possibilities for both residential and commercial end users. We look forward to working alongside our global peers to further develop our understanding of this great technology."

Other jurisdictions exploring G.fast services include Taiwan, where Chunghwa Telecom has launched commercial G.fast services, and BT in the UK which is in the final stages of trials.

Retail service providers are due to begin trials of G.fast technology in the first half of 2016, with the launch of commercial services anticipated in 2017.

RECALL: CABLEPI (WIRE ALERT)

There is a product recall on CablePI - a device that detects an electrical fault known as a broken neutral and has been in use in Tasmania for almost five years. In some circumstances, the device may overheat causing the outer case to distort and/or melt.

Identifying features
Serial number ending in 13.

What are the defects?
In some circumstances, the device may overheat causing the outer case to distort and/or melt.

What are the hazards?
The defect may cause smoke or ignite causing a fire.

Dates available for sale
1 December 2013 to 30 June 2014.

Where the product was sold
Tasmania

Traders who sold this product
The device was distributed by Aurora Energy Pty Ltd (Tasmanian Networks Pty Ltd has now taken responsibility for CablePI (Wire Alert) devices).

Supplier
Tasmanian Networks Pty Ltd

What should you do?
Consumers should immediately stop using any device with a serial number ending in 13. Tasmanian Networks Pty Ltd should be contacted on 1300 361 811 (between 9am to 5pm AEDST) to arrange the return of the device and a replacement.

NBN LAUNCHES FIRST BROADBAND SATELLITE INTO ORBIT

Blasting 36,000kms into space from Guiana Space Centre in South America, Sky Muster is one of the world's most-advanced communication satellites and will play a critical role in providing fast broadband access to around 400,000 Australian homes and businesses.

Over the coming months the satellite will undergo final technical testing ahead of its commercial launch scheduled for mid-2016. Once available, the service is expected to provide wholesale speeds significantly faster than those currently used now.

nbn chief executive Bill Morrow says the satellite will provide access to fast broadband for the parts of Australia that need it most.

"With the launch of Sky Muster, we're one step closer to changing the digital face of our nation," he says.

"The ability to video conference friends and family, study courses online and visit doctors from your lounge room will all be possible in areas which have traditionally struggled to access basic internet services like online banking and shopping.

"Many homes and businesses in regional and rural Australia still rely on dial-up level speeds and have little or no access to a commercial broadband service – this satellite will help to close the divide and ensure no-one gets left behind."

TE REOPENS IN CHRISTCHURCH

The Prime Minister of New Zealand, the Rt. Hon John Key, has officially opened TE Connectivity's new facility in Hillsborough, Christchurch.

The building has been custom designed to meet very high standards and to enhance employee health and wellbeing with a light, airy, flexible and futureproof fit-out.

TE Connectivity's new building is across the road from its former premises, which was badly damaged in the earthquakes.

AUSTRALIAN SOLAR COUNCIL PATRONS ANNOUNCED

The Australian Solar Council has named three eminent Australians as its inaugural Patrons.

ACT Deputy Chief Minister and Labor MLA Simon Corbell, former Federal Liberal leader Professor John Hewson and former Senator and Greens leader Christine Milne all agree that support for solar energy should be beyond partisan politics.

"Solar is absolutely central to Australia's economic future," Australian Solar Council chief executive John Grimes says.

"Australia has the world's best solar resource and the world's best solar brains. We can and should be the world leader in solar.

"After a positive start the Solar Council calls on the Turnbull Government to end moves to abolish the Climate Change Authority, the Clean Energy Finance Corporation and the Australian Renewable Energy Agency (ARENA) and calls on all political parties to commit to more ambitious greenhouse emission reduction targets, and a positive solar plan for Australia."

LIGHTING COUNCIL AUSTRALIA PUBLISHES AN INTRODUCTION TO LIGHTING CONTROL

The peak body for Australia's lighting industry has prepared an introductory guide outlining the benefits of lighting control.

Lighting Controls Introduction explains the part that lighting control systems play in achieving an energy efficient lighting design; increased comfort, safety, convenience, health and well-being of building occupants; aesthetic appeal of building interiors and exteriors; and installation cost reductions, building flexibility, maintenance improvements and compliance with building regulations.

Lighting Council Australia chief executive Bryan Douglas says using lighting control can cut energy bills, reduce greenhouse emissions and make a lighting system flexible and convenient to use.

"For example, using a light level switch to control external building lighting will mean that external lights are not left on in the day time," he says.

"Occupancy sensors and automatic light dimmers can switch or dim lighting automatically so that spaces are lit to pre-determined illumination levels and only when occupied.

Overriding such systems is possible.

"Research is starting to affirm that productivity benefits and increased learning outcomes can result from varying lighting intensity and colour due to reinforced circadian rhythms."

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

RECALL: 240W LED HIGH BAY LUMINAIRE

The 240W LED high bay luminaire from Beijing Hua Xin Liu He Investment (Australia) Pty Ltd has been recalled after it was discovered that the luminaire has a flexible supply cord that may be tied in a knot and used as an anchorage. This means there is risk of electric shock and potential fire hazard.

Identifying features

The 240W High Bay LED Luminaire under recall can identified by the model number: FK-GK240.

This can be found on the label sticker on the top of the LED luminaire.

What are the defects?

The luminaire has a flexible supply cord that may be tied in a knot and used as an anchorage. The terminal block on the secondary driver may be prone to charring. In addition, the accessible metal fins on the LED luminaire may not be earthed.

What are the hazards?

Risk of electric shock and potential fire hazard.

Dates available for sale

17 May 2012 to 1 October 2014

Where the product was sold

- Queensland
- Western Australia

Traders who sold this product

- WA – Brooks Construction
- WA – Solar Harness
- QLD – Commercial Solar Group
- QLD – Haymans Electrical Toowoomba
- QLD – OzLED
- QLD – Auzion

Supplier

Beijing Hua Xin Liu He Investment (Australia) Pty Ltd

What should you do?

Stop using the lumainaire immediately by switching off the power at the socket outlet and unplug it from the socket outlet. Remove the luminaire safely and contact your supplier.

Please direct any queries concerning this recall to Beijing Hua Xin Liu He Investment (Australia) by calling 08 6555 1815 or emailing service@zeus.com.au.

FROM
1800+
LUMENS

LED

WAVE
IP65 commercially rated Tri-proof ceiling batten. Featuring IK07 Vandal Resistant rating. Available in 20W & 40W.

SEE YOUR WORLD IN A NEW LIGHT

At Mercator, we are committed to providing the latest Lighting and Air Movement products to both home and industry. That's why our latest LED innovations set the standard for performance, quality and reliability. With a strong focus on ensuring our products are easy to install, saving time and money, these new LED items are the ideal solution for your next project.

LED

ZIP
Slimline modern Panel light available in 20W & 40W. Square and rectangle designs.

FROM
1500
LUMENS

LED

UNIGLOW
3 in 1 Heater / Exhaust with 6W LED R80 light, Silver. Available in White.

650
LUMENS

UP TO
220
M³/H AIR
EXTRACTION

HELIX
High Performance Exhaust fan, available in White.

UP TO
750
M³/H AIR
EXTRACTION

WWW.MERCATOR.COM.AU / 1300 552 255

Contact your local wholesaler for the Mercator Trade Product Catalogue.

To find out more about Mercator products, find us on:

Lighting Council
AUSTRALIA MEMBER 2016

MERCATOR
Leaders in quality lighting and fans

PUBLICATION OF SA/SNZ TS 1158.6 AND MODIFIED ADOPTION OF IEC 60598.2.3

Standards Australia (SA) Technical Committee LG-002, *Lighting for Roads and Public Spaces*, has completed a multi-stage process to revise AS/NZS 1158.6:2010, *Lighting for Roads and Public Spaces – Part 6: Luminaires*.

SA has now published SA/SNZ TS 1158.6, *Lighting for roads and public spaces - Luminaires - Performance,* and AS/NZS 60598.2.3, *Particular requirements - Luminaires for road and street lighting*.

This began as a process to revise AS/NZS 1158.6:2010 to accommodate LED technology requirements. Following multiple rounds of public and stakeholder consultation, it was decided that the most appropriate way forward was a modified text adoption of IEC 60598.2.3 by technical committee EL-041, *Lamps and Related Equipment,* to address safety requirements for luminaires, and a technical specification regarding performance requirements by LG-002.

AS/NZS 60598.2.3 covers the minimum safety requirements. It is a modified adoption of the IEC standard, due to the varying operating and environmental conditions found in Australia and New Zealand.

SA/SNZ TS 1158.6 forms part of the AS/NZS 1158 series, which covers lighting schemes for the generality of roads and outdoor public areas. The document defines enhanced luminaire performance and durability provisions to account for extreme Australian and New Zealand conditions.

NBN RELEASES LEAD-IN TRENCHING GUIDE FOR NBN

nbn has recently released its *Lead-in Trenching Requirements* guide that outlines its requirements for lead-in trenching from the nbn boundary to the building entry point.

The document is intended to provide guidance to property developers, consultants, builders and customers on how to locate the nbn property entry point and the nbn lead-in requirements for the premises.

nbn requires the property developer, builder or customer to provide a suitable trench for the installation of nbn lead-in cabling between the nbn property entry point and the building entry point.

nbn states in the document that the trench must be constructed and reinstated (together with any termite barriers and other building elements) in accordance with all relevant laws and regulations (which may vary between states and territories).

For new building construction, nbn recommends the use of a trench provided for, or to be shared with, another service (e.g. the electrical mains power).

For established premises, the nbn trench must be kept well away from any other existing underground services for safety reasons and to avoid damaging the other services.

REVISION OF INSTALLATION REQUIREMENTS FOR GRID CONNECTION OF ENERGY SYSTEMS VIA INVERTERS

Standards Australia has recently published AS/NZS 4777.2, *Grid connection of energy systems via inverters – Part 2: Inverter requirements*. Prepared by Technical Committee EL-042, *Renewable Energy Power Supply Systems & Equipment*, this standard replaces AS 4777.2-2005 and AS 4777.3-2005.

Much anticipated by industry, it defines minimum performance and safety requirements. Its scope focuses on the design, construction and operation of inverters intended for use in inverter energy systems for the injection of electric power through an electrical installation into the grid.

"With more than 1.4 million inverter energy systems already installed Australia wide and another 130,000 inverter energy systems being added each year ,this standard is important for all Australians," EL-042 chairman Nigel Wilmot says.

This standard falls within AS/NZS 4777, which will shortly see the addition of AS/NZS 4777.1, *Grid connection of energy systems via inverters – Part 1: Installation requirements*.

Publication is anticipated for 2016.

VET FEE-HELP REFORMS APPROVED

The Federal Government's *Higher Education Amendment (VET FEE-HELP Reform) Bill 2015* passed through the Senate last week with the support of the Opposition and minor parties.

The new rules, which came into effect on 1 January 2016, provide greater protections for students and seeks to increase the standards of the VET sector through the stamping out of unscrupulous marketing and enrolment practices. These amendments include:

- providers must assess the student's capacity to undertake the course for which they are enrolling;
- stronger safeguards for under 18 year old students so that they cannot be signed up for a VET FEE-HELP loan without parental consent;
- new entry requirements for registered training organisations seeking to become a VET FEE-HELP provider;
- pausing payments to training providers for new enrolments until concerns about poor performance are addressed

NECA chief executive Suresh Manickam has welcomed the new measures as good news that seeks to address industry concerns about VET provider performance.

Drop it. Douse it.

Up to 8x longer battery life than the competition.

Need a high performance, high resolution digital multimeter (DMM)? Need a durable, general purpose DMM? Either way, Keysight has you covered. Introducing the Keysight U1280 and U1240C Handheld DMM Series. Not only are they intuitive, functional and durable, they offer truly outstanding battery life—up to eight times longer than its competition.

	Keysight U1280	Keysight U1240C
Resolution	60,000 counts	10,000 counts
Battery life	800 hours	400 hours
Ruggedness	IP-67 certified for dust and water protection 3-meter (10ft.) drop test	

Get your hands on the proof
www.keysight.com/find/U1280DMM

AUS: 1800 629 485 NZ: 0800 738 378

KEYSIGHT TECHNOLOGIES
Unlocking Measurement Insights

Agilent's Electronic Measurement Group is now **Keysight Technologies**.

CLAMP METER

Fluke
www.fluke.com.au

Often the most frustrating task for electricians and maintenance technicians is to troubleshoot intermittent faults because they rarely occur at convenient times. The new Fluke Connect-enabled 370 FC Series Clamp Meters log measurements to pinpoint intermittent faults precisely without the need for the technician to be present. Those measurements are then wirelessly transmitted to the Fluke Connect app on smart phones or tablets and automatically uploaded to the cloud, keeping technicians outside the arc flash zone and away from dangerous moving machinery, improving safety.

The CAT IV 600 V, CAT III 1000 V safety-rated clamp meters offer advanced troubleshooting performance to capture a wide range of measurements with a single tool, including proprietary in-rush measurement technology to filter out noise and capture motor starting current exactly as the circuit protection sees it, and an expanded measurement range to 2,500A AC with the iFlex flexible current probes, which provide access to large conductors in tight spaces.

TOWEL RAIL TIMER

CABAC
www.cabac.com.au

The S-Click Real Time towel rail timer kit from CABAC delivers warm and dry towels at the time you need them.

The timer automatically turns the power on every day at pre-determined times, then automatically turns off. The duration times can be pre-set from one to six hours. It will also remember routine times even after power failure.

Designed, engineered and manufactured in Australia the kit includes a CABAC HNS710RT 2-Wire Real Timer, a CABAC wall plate, cable clamp, CABAC/HPM-style push button, Clipsal-style push button, insulation breakdown sticker, HNS710RT instruction sticker and HNS710RT-Kit towel rail.

TEMPORARY SITE BOARD

Bovara
www.bovara.com.au

Bovara has launched a new range of temporary power site boards, DIN TYPE 400, which are a cost-effective solution for electrical contractors who want to have more DIN powerpoints in less space. They are fully wired, labelled and enclosed in a 400 x 400 x 170mm IP23 metal enclosure.

Laser cut and assembled with precision, they are engineered and designed to accommodate eight to 14 DIN powerpoints along with a one phase main switch or three phase outlet. In addition, they are workcover-compliant and are also available in different electrical configurations upon request.

The new temporary power site boards are also backed by a 12-month 'quality assurance'.

DUCTED AC

Fujitsu General
www.fujitsugeneral.com.au

Fujitsu General has launched three new high static single phase ducted air conditioning systems.

The indoor units can be split into two parts, making it easier to install within ceiling cavities. An automatic static pressure setting allows users to set the static pressure to match the installation, helping to maintain optimum airflow while reducing the time required for commissioning.

Key energy management features include a new V type indoor heat exchanger, high efficient DC fan motor with lower power consumption and a new airflow design.

UNIT ENCLOSURE

Siemon
www.siemon.com

Siemon has announced a new 24-port MAX zone unit enclosure designed to support cost-effective zone cabling in a variety of enterprise workspaces by enabling shorter, easy-to-manage connections to work area or equipment outlets.

The unit enclosure accepts ports using Siemon copper or fibre MAX outlets, Z-MAX Category 6A outlets or TERA Category 7A outlets to support a wide range of horizontal copper and fibre applications. It features foam gasketing to minimise vibration and prevent dust ingress and includes easy-to-remove knockouts to facilitate routing cables in and out of the enclosure.

PLASTIC PIPE LOCATOR

Subsurface Instruments
www.ssilocators.com

The AML PRO from Subsurface Instruments uses ultra-high radio frequencies to find differences in densities. This offers the best method for locating PVC and PE pipes, as well as nearly any other object that has an edge.

Weight just 1.1kg, the AML PRO features new microprocessor intelligence and patented radio wave technology in a durable ABS housing. It also comes with a rechargeable lithium battery and noise isolating headphones. Other features include a backlit display, GPS plotting and tracking, 32 sensitivity settings, a digital levelling meter and a digital targeting indicator.

ACTIVE FILTERS

Schneider Electric
www.schneider-electric.com.au

Schneider Electric has announced the availability of the AccuSine PCS+ and AccuSine PFV+ active filters.

AccuSine PCS+ is a flexible, high-performance active filter that stabilises electrical networks, providing ultra-fast, extremely accurate harmonic cancellation, power factor correction and load balancing. It exceeds all harmonic standards worldwide and is the only harmonic filter in the world to have THD(I) or THD(V) set points (it provides 3% THD(I) when 3% impedance and filter output is greater than 50% of its rating). Unlike passive filters, AccuSine PCS+ cannot be overloaded and is best applied as a system-wide solution to provide dynamic output that adjusts as the load changes.

DIGITAL MULTIMETER

Keysight Technologies
www.keysight.com

Keysight Technologies has announced two new handheld digital multimeters (DMMs). The U1280A and U1240C Series handheld DMMs are extremely rugged and come with an extended battery life of 800 and 400 hours respectively. Both are certified to IP 67 for complete protection against dust and immersion of water up to 1m, and are capable of withstanding up to a 3m drop.

With 60,000-count display resolution, the U1280 Series 4.5-digit handheld DMMs offer the precision and accuracy needed for installation and maintenance work.

The U1240C Series 4-digit handheld DMMs come with 10,000-count display resolution and provide a broad range of measurement functions for installation and maintenance work in industrial facilities.

SPRING CONTACTS

Treotham Automation
www.treotham.com.au

The ilme SQUICH CMSH 830V inserts are spring contacts that need no tools for connection and allow the tightening of the wire to be done by an actuator button.

The fast and simple system can be used with all types of enclosures. The inserts are available in 3-, 6- and 10-pole versions, with two auxiliary poles.

It is a simple system that doesn't require any special wire preparation or tools, except for a 0.5 x 3.5mm screwdriver. It therefore offers a reduced preparation and cabling time.

It can be used with flexible and rigid wires with a cross section between 0.14mm² and 2.5mm². It also offers a great fastening solution and excellent resistance to strong vibrations.

POLYCARBONATE ENCLOSURE

NHP
www.nhp.com.au

NHP has introduced Fibox ARCA polycarbonate enclosures designed especially for use in harsh and demanding environments.

Manufactured using glass-reinforced polycarbonate, this new combination is as strong as steel without any risk of corrosion, and at one-sixth of the weight. This means extended lifetime and increased possibility of one-man installation. The rugged ARCA range is also high-impact and UV resistant, aesthetically pleasing and provides excellent protection against vandalism.

With no requirement for complicated tools courtesy of patent pending, easy-to-use DIN-rail frame set design and innovative lockable inner door, customisation is easily achieved either on site or in the factory. Due to the polycarbonate based material there is no hazardous dust or swarf residue produced when drilling/cutting, ensuring it is safe and simple to install.

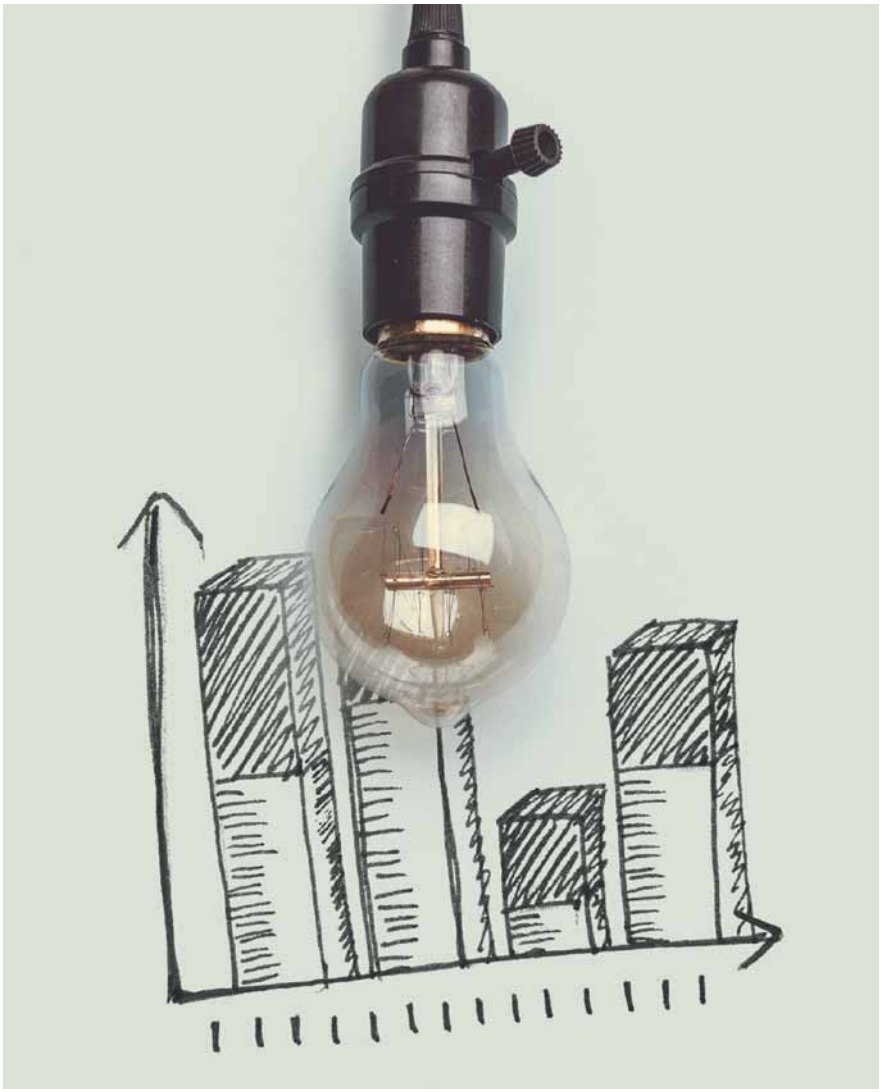
TRADE SECRET IS A CERT

NEED A CASH FLOW BOOST? RENEWABLE ENERGY CERTIFICATES MEAN YOU CAN GET THOUSANDS OF DOLLARS FOR A FEW PIECES OF PAPER. PAUL SKELTON TELLS HOW.

Are you struggling to compete with other sparkies in your area? Are they undercutting you, and you can't figure out how? Are you having difficulty with cash flow in your business as a result?

The solution to all these problems, in some way, could be the renewable energy certificate (REC).

RECs are the byproduct of the Howard Government's renewable energy target (RET) – a policy designed to ensure that at least 33,000GWh of Australia's electricity comes from renewable sources by 2020. (The RET was reviewed by the Federal Government in June 2015 and reduced from the previously legislated 41,000GWh to 33,000GWh.)



In addition to RECs, state-based energy efficiency schemes also offer environmental certificates that can add value to your business.

Under the various schemes, people can earn the following simply by making energy-efficient changes to their properties:

- RECs under the RET;
- Victorian Energy Efficiency Certificates (VEECs) through the Victorian Energy Efficiency Target (VEET); or,
- Energy Savings Certificates (ESCs) through the NSW Energy Savings Scheme (ESS).

The certificates can later be traded in for a cash rebate, potentially improving a contractor's cash flow and competiveness in the market.

"High energy users, carbon producers and energy retailers around the country have a liability under the RET, which came into effect in 2001 as part of the Howard Government's Climate Change Action Plan," Greenbank Environmental chief executive Fiona O'Hehir says.

"It started as a 2% target but has since increased to 20% by 2020.

"Now if you install, say, a solar water-heating system, then you're not contributing to greenhouse gas emissions, which means you're entitled to create RECs. RECs are worth money on the environmental market, which works similar to a stock exchange.

"So if you want to know why you're losing market share, chances are that your competitor is offsetting the cost of a system with RECs."

WHAT IS VEET?

VEET is a Victoria-based scheme and

is one of the energy efficiency schemes operating across the country to reduce greenhouse gas emissions.

It is also designed to encourage investment, employment and technology development in industries supplying goods and services that reduce consumer use of electricity and gas.

The scheme operates by placing a liability on large energy retailers in Victoria to surrender a specified number of VEECs every year. Each certificate represents one tonne of greenhouse gas abated.

The VEET Act and regulations allow for accredited entities to create VEECs when they help consumers make selected energy efficiency improvements to their home or business.

For example, LED lighting that meets the regulations is eligible for a deemed quantity of VEECs when installed by an accredited business.

"Electricians can now register with the Essential Services Commission – which administers VEET – so that installation of energy efficiency product can attract VEECs," a Victorian Department of Primary Industries spokesman says.

"When electricians involve themselves in the scheme, either directly or through a third party, the revenue created through the sale of certificates means they can offer discounts to their customers, thereby making themselves more competitive."

VEET is a market-based scheme, meaning the value of individual certificates is determined by supply and demand. Electricity retailers are required to purchase or generate VEECs to reach defined targets each year.

Greenbank settlements manager and head of energy efficiency Ben Redmond explains that the VEET was established as a residential scheme. Home owners could change their incandescent globes to CFLs or electric water heaters to instantaneous gas or solar, which would reduce their energy consumption.

"The number of tonnes of greenhouse gases you abated is how many certificates you earned," Ben says.

"The VEET program was then expanded into the commercial market, and the advent of LED meant that the most common way of earning VEECs was the replacement of halogen lamps with LED lighting."

WHAT IS THE ESS?

Just like its Victorian counterpart, the NSW ESS reduces electricity consumption in NSW by creating financial incentives for organisations to invest in energy savings projects.

"Energy savings are achieved by installing, improving or replacing energy savings equipment," a spokesman says.

"The ESS is governed by NSW legislation. It places a mandatory obligation on 'liable entities' (eg: energy retailers) to obtain and surrender ESCs, which represent energy savings.

"The development of the policy framework is the responsibility of the Office of Environment and Heritage and the Department of Trade and Investment, Regional Infrastructure and Services.

"When businesses invest in reducing their energy use, ESCs are created by voluntary scheme participants that have helped to implement those energy savings activities.

"Electricity retailers, which are mandatory scheme participants, then buy the ESCs to meet their own legislated targets, as required by law.

"The price of certificates varies due to supply and demand and can fluctuate considerably depending on market conditions. Historically, ESCs have traded between $14 and $32.

"There is no maximum price for an ESC; however, the penalty price acts as a practical maximum price: if a liable entity does not surrender the required number of certificates in a given year (excluding any shortfall it is allowed to carry forward to the next compliance year), it must pay a penalty."

THE SOUTH AUSTRALIAN SOLUTION

Most recently, in December 2015, the South Australian Government passed its own legislation that would make similar savings possible in the South.

The *Local Government (Building Upgrade Agreements) Amendment Bill 2015* is designed to overcome barriers to environmental upgrades of existing commercial buildings – upgrades that can reduce costs for tenants while improving the carbon footprint and environmental performance of existing buildings.

"This Bill has the potential to create hundreds – if not thousands – of important jobs and free up more than half a billion dollars in potential CBD capital investment," Climate Change Minister Ian Hunter says.

"It clears the way for building owners to begin revitalising our ageing building stock, which will have the added benefit of advancing our plans for Adelaide to become the world's first carbon neutral city.

"For commercial property owners, building upgrades can reduce operating costs, increase yields, help attract and retain tenants and improve asset values.

"Benefits to tenants include net reductions in operating costs, improved indoor amenity, staff productivity and contributions towards corporate social responsibility goals – not to mention greenhouse gas savings of up to 32%."

The Property Council of Australia's SA executive director Daniel Gannon says the legislation will lead to a number of benefits, in particular to tradespeople.

"The Building Upgrade Finance mechanism makes economic sense, not only for building owners and occupiers as a means of managing their utility costs, but for the businesses that can provide the clean technologies and solutions >

that lift building performance," he says.

"Financing such upgrades through Building Upgrade Finance may offer a number of benefits compared to other forms of traditional finance – the potential is limitless and could be applied to offices, shopping centres, hotels, healthcare facilities, university buildings, factories and warehouses."

HOW YOU CAN BENEFIT

"These state schemes are really set up to make energy efficiency more affordable," Ben says.

"The idea is that contractors can design and install an energy efficient system for $X, knowing that they'll earn a number of certificates from the replacement of the existing system, which can then offset the cost.

"This means they can give a 'discount' to the property owner.

"Once the system is installed, the contractor can come to Greenbank, which will create the certificates, and we will buy them from the contractor. Of course, the home owner could do this themselves but that is rare, with the installer/contractor acting on the property owner's behalf."

Greenbank is Australia's largest environmental certificate creator and trader. It essentially acts as an 'aggregator', purchasing RECs, VEECs and ESCs from contractors and property owners then selling them in large bundles to retailers to offset their liability

"Greenbank essentially provides installers with practically instant cash flow. Once we receive the signed forms and mandatory supporting documentation, we pay within 24 hours when our customers use our online REC portal and phone app.

"Once we have purchased the certificates, we adopt all compliance and pricing risk. That's why a service like ours is very appealing to installers. They don't have any compliance risk of the regulator saying something was filled out wrong and contractors have to go back to the site."

Ben says about 95% of solar installers already claim RECs, but a large number of hot water and lighting installations haven't been subject to a claim.

"A lot of credits are just going to waste.

"Installers need to understand that they can use these certificates as a sales tool. You can reduce the cost to customers without losing any income. Of course, because the certificates trade on the market, the price fluctuates, so that's a risk you'll need to manage.

"However, you have 12 months after a solar system has been commissioned to create and sell the certificates, so you can study price fluctuations the same way you would the stock market and sell when the price is high."

Ben notes that installers can generate their own certificates, but it's a lot of work – to the point where the value of the certificates is negated.

"It's so much easier to come to a company like ours."

The process is simple, he says. Contractors can simply set up an account with Greenbank online. Claiming RECs after opening an account can also be done online or via an app.

Given the increasing pressures facing tradies, remaining competitive and maintaining a steady cash flow is imperative for survival. As you are already installing energy saving systems, why not use all the tools at your disposal?

As Fiona says: "Where else can you get thousands of dollars for six pieces of paper?" ■

> **Greenbank Environmental**
> **www.green-bank.com.au**

Up to **10x faster**

onekonekt

onerange onebusbar onesolution

onekonekt residential devices - Easier Safer Faster

With an installation time up to 10 times faster than traditional wiring, Hager's onekonekt system is the most versatile & flexible solution to residential electricians on the market today. Hager provides a full range of residential protection devices - including the ADC3xxT single module RCBOs - that connect to the same busbar. So onekonekt is safer, easier and faster to install.

:hager

www.hagerelectro.com.au

Commitment to quality

Have you found old products installed?

Hager is known for our commitment to quality. That's why we chose to voluntarily recall and replace our old range of potentially faulty AD310T, AD316T, AD320T and AD325T single module RCBOs sold in Australia and New Zealand from 2010 to 2012. This voluntary recall resulted in the best rates of return in the industry's history. Despite this success, we'd like to do better. There is still potentially faulty products in the market and the Hager hotline and online registry is open to provide guidelines for identification, replacement with new products and compensation.

:hager

1300 786 685

www.hagerelectro.com.au/6862.htm

CATEGORY 8 QUESTIONS ANSWERED

AS INTEREST IN CATEGORY 8 CABLING APPLICATIONS INCREASES, PATRICK MCLAUGHLIN ASKS SUPPLIERS FOR INSIGHT ON THE NEW PROTOCOL.

As the Telecommunications Industry Association (TIA) TR-42.7 sub-committee works diligently toward finalising the specifications for Category 8 twisted-pair cabling systems, we asked several members of the subcommittee to answer some questions about Cat 8.

Q: Can you provide a summary of how a Cat 8 cabling system's capabilities compare to those of previous-generation twisted-pair cabling systems, such as Cat 6, 6A, 7, 7A, etc? (Please address bandwidth, channel configuration and channel distance, as well as other performance characteristics you deem appropriate. Please describe how, if at all, the TIA is approaching backward compatibility between Cat 8 and previous-generation twisted-pair systems.)

Answer provided by Leviton Network Solutions senior product manager Mark Dearing:

Since Cat 5e was introduced in 1999, one of the constants in structured cabling has been the 100m, four-connector channel. As data rates have increased, one of the primary differences between category systems is the frequency at which the signal is transmitted over the cable.

Cat 7/7A offers a 100m four-connector channel using shielded cabling and has been designed to transmit signals at a frequency of 1,000MHz. Even though Cat 7/7A operates at the higher frequency, there is no corresponding improvement in data rate over Cat 6A because 10GBase-T is still the fastest twisted-pair-based data rate recognised by IEEE 802.3. Therefore, even if a Cat 7/7A cabling system is installed, any available active equipment would be limited to 10Gbps performance. Cat 7/7A is not a recognised category by TIA. (See Table 1.)

Cat 8 is a significant departure from previous systems in that it uses a frequency of 2,000MHz, and is limited to a 30m two-connector channel. Unlike Cat 5e through Cat 6A, which could use either unshielded twisted-pair (UTP) or shielded cable construction, Cat 8 will require shielded cabling. The most likely cable construction for Cat 8 will be 22-AWG S/FTP cabling.

Cat 8 is also unique in that the International Organisation for Standardisation (ISO) standard will recognise two different classes of product. (This topic is covered in greater detail later in this article.) Class I is based on the traditional RJ45 connector, while Class II will accept non-RJ45 connectors similar to Cat 7/7A. While both solutions will offer backward compatibility in terms of transmitting the lower category data rates (1G or 10G), the Class I solution offers a migration path using the RJ45 connector platform. For example, a customer might install a Cat 8 jack-to-jack link now, but continue to use Cat 6A patch cords until the active equipment is upgraded. While the ISO standard includes both classes, the TIA Cat 8 standard will only recognise a Class I solution.

Q: Given Cat 8's capabilities, where and how is it most likely to be deployed (e.g. in a data centre vs. a corporate LAN, top-of-rack vs. end-of-row architectures)?

Answer provided by CommScope engineering senior principal Masood Shariff:

Cat 8 cabling is designed to support

TABLE 1

Attribute	Category 5e	Category 6	Category 6A	Category 7/7A	Category 8
Frequency	100MHz	250MHz	500MHz	1,000MHz	2,000MHz
Maxiumum data rate	100Base-T	1,000Base-T	10GBase-T	10GBase-T	25GBase-T 40GBase-T
Distance	100m	100m	100m	100m	30m
Number of connectors in channel	4	4	4	4	2
Cable construction	UTP or Shielded	UTP or Shielded	UTP or Shielded	Shielded	Shielded
Connector Type	RJ45	RJ45	RJ45	Non-RJ45	Class 1: RJ45 Class 2: Non RJ45

TABLE 2

ISO Cabling	ISO (components)	TIA (cabling and components)
Class D	Category 5e	Category 5e
Class E	Category 6	Category 6
Class E_A	Category 6A	Category 6A
Class I	Category 8.1	Category 8
Class F_A	Category 7A	No equivalent
Class II	Category 8.2	Class II

emerging IEEE 25GBase-T and 40GBase-T needed as server-to-access-switch interconnect applications. This need has been identified and available, or under development, over optical fibre links for longer reach (up to 500m), or twinax links for short reach (up to 7m).

The opportunity for balanced twisted-pair as a cost-effective viable media option for the intermediate distance needs between 5m and 30m, sufficient to serve 20 cabinets or racks in a data centre, led to the initiation and development of both the IEEE 802.3 application standards and the associated TIA as well as ISO/IEC Cat 8 cabling standards.

Q: What communication or collaboration is taking place between the TIA and the IEEE-particularly the 802.3bq Task Force-to ensure the TIA's Cat 8 specifications are in concert with the IEEE's 40GBase-T and 25GBase-T specifications?

Answer provided by Masood Shariff:

The IEEE 802.3bq Task Force is collaborating with TIA TR-42.7 and ISO/IEC/JTC 1/SC 25/WG3 to ensure consistency and compatibility of the cabling specifications within the 'link segment' specifications in IEEE 802.3bq applications. Liaison letters to clarify requirements or provide additional information are generated at most meetings and latest drafts of the TIA and ISO Cat 8 specifications are sent to the IEEE 802.3bq committee, where they are posted in a 'private', password-protected area for members to review and comment. The relationship between IEEE 802.3bq and its companion cabling standards organisations has been very positive and constructive, with several common members attending the meetings.

Q: Can you explain the relationship between the TIA and ISO/IEC groups working to define Cat 8 cabling specifications? Specifically, how are the two groups' efforts similar and how do they differ from each other? Observers of the standards-creation processes see terms like 'Class II', 'Cat 8.1', and 'Cat 8.2'. The meanings of these terms are not necessarily self-evident.

Answer provided by Siemon director of standards and technology Valerie Maguire:

The TIA TR-42 Telecommunications Cabling Systems Engineering Committee and the joint technical committee >

of the International Organisation for Standardisation and the International Electrotechnical Commission (ISO/IEC JTC 1) share similar missions of developing, maintaining, and promoting standards related to information and communications technology. However, while TIA standards represent the consensus positions of their North American corporate constituents, ISO/IEC JTC1 standards represent the consensus positions of their member countries.

As a result, voting within these organisations is also different, with TIA recognising one vote per member company and ISO/IEC recognising one vote per member country. A voting practice that accommodates regional preferences is the key reason why there are additional shielded options, such as Cat 7A/Class FA specified in ISO/IEC standards compared to TIA standards. (See Table 2.)

While specifications for same-bandwidth balanced twisted-pair copper cabling systems are well harmonised between TIA and ISO/IEC, there are a few differences that stand out-most notably the naming convention for these cabling systems. In ISO/IEC standards, structured cabling components (e.g. cables, connecting hardware, and patch cords) are characterised by a performance "category" and are mated to form a permanent link or channel that is described by a performance "class." In TIA standards, components and cabling are both characterised by a performance "category." ISO/IEC and TIA equivalent grades of cabling, arranged in order of increasingly more stringent transmission performance, are shown in the table.

Note that, although ISO/IEC Class I and TIA Cat 8 cabling systems are specified to 2,000MHz, they will not be electrical supersets (i.e. exhibit superior performance) of ISO/IEC Class FA cabling up to 1,000MHz.

Both the ISO/IEC JTC1 and TIA TR-42 are developing requirements for the balanced twisted-pair media that will support the 25GBase-T and 40GBase-T applications that are currently under development by IEEE 802.3. ISO/IEC is developing requirements for Class I cabling constructed from Cat 8.1 components, and Class II cabling constructed from Cat 8.2 components. TIA is developing requirements for Cat 8 cabling constructed from Cat 8 components and is also undertaking an initiative to develop Class II cabling requirements that will harmonise with ISO/IEC. Class I and Cat 8 cabling specifications support modular RJ45-style connectors. The performance associated with Class II cabling can only be realised when Cat 8.2 cables are used in conjunction with non-RJ45 interfaces such as the Siemon TERA connector. Draft ISO/IEC Class I and II, and TIA Cat 8 cabling specifications, are mature and currently circulating for industry comment and review.

Note that Class I, Class II, and Cat 8 cabling is characterised to 2GHz and intended to support 30m cabling channels that contain no more than two connectors. These channels and the emerging 25/40GBase-T applications that they support are specifically targeted for deployment at the data centre "edge," where server-to-switch connections are made. Data centre designers who can arrange their rack and cabinet layouts to support maximum 30m channel connections at these locations today will be well-positioned to migrate to 25/40GBase-T when the technology becomes available.

Q: What steps can a customer take today to design their facilities in such a way that they are "future-ready" to install Cat 8 when product becomes available?

Answer provided by Panduit product development manager Frank Straka:

Cat 8 is a 30m channel, comprising a 24m permanent link and up to 6m of patch cable. Therefore, when planning data centres with end-of-row or middle-of-row topologies, ensure that your jack-to-jack links are no more than 24m in length and that you do not need more than 6m of patch cords in total. What this means for patching is you could have two, 3m patch cords, a 1m and a 5m patch cord, or any combination that adds up to 6m or less.

For top-of-rack topologies, the 3m reach should be more than sufficient to cover any direct switch-to-server links, especially if the data centre had been using technologies like SFP+ that have a reach limit of about 5m.

Q: How similar can we expect Cat 8 products to be compared to jacks and plugs existing in the market today? Will products be field-terminable? And with Cat 8 being a shielded technology, are there any anticipated concerns for installers?

Answer provided by Frank Straka:

Cat 8 products are anticipated to be significant upgrades over existing Cat 6A products due to the four-times increase in bandwidth. However, these upgrades will primarily occur internally to the jack and plug in order to meet that bandwidth. Externally, they will be about the same form and fit as prior category jacks. This makes sense, as they need to work with the same patch panels, switches, and other equipment with which users are familiar today.

Cat 8 will be field-terminable. Now given that Cat 8 is shielded, field-terminable, and with a very high bandwidth, expect there to be at least some improvements made to how jacks are terminated in the field to both meet this new bandwidth and to ensure a good bond with the shield. For many contractors, the biggest change will be going into a shielded system and ensuring that the cable is properly grounded. If we connector companies do our job right, grounding the Cat 8 cables and connectors will be a seamless process for the installer. ■

This article originally appeared in Cabling Installation & Maintenance. *Reproduced with permission.*

A new level of style in
ENERGY EFFICIENT LED LIGHTING

Introducing the new range of LED pendants and wall brackets from Beacon Lighting Commercial

View the range and get a quote at **www.beaconlightingcommercial.com.au**

Melbourne	03 8415 0277
Sydney	02 9699 7255
Brisbane	07 3216 9039
Perth	08 9444 9653

Beacon LIGHTING COMMERCIAL

Distributor
GE Lighting

EXIT, STAGE LEFT

EVERY YEAR, FIVE MILLION NICKEL-CADMIUM (NICD) BATTERIES ARE SENT TO LANDFILL, DUMPING 90 TONNES OF CADMIUM INTO THE ENVIRONMENT. NOW, A NEW SCHEME AIMS TO RECYCLE THESE EMERGENCY AND EXIT LIGHTING BATTERIES INSTEAD. KATE JORDAN REPORTS.

Lighting Council Australia has launched a new battery recycling initiative to prevent cadmium, a highly toxic heavy metal, entering the environment.

Cadmium is used in approximately 90% of emergency and exit lighting batteries and is almost as toxic as mercury – and yet 90,000kg of this heavy metal is dumped in Australian landfills every year.

"It is very important that we begin to divert cadmium from landfill, collect it and recycle it," says Lighting Council chief executive Bryan Douglas.

"It's quite similar to mercury in its toxicity and there is insufficient attention given to address the potential hazards.

"Emergency lighting is ubiquitous. In almost every commercial establishment we see emergency lighting and that is why we have so many ending up as landfill. We need to address this problem now."

Lighting Council already has a similar scheme called FluroCycle that focuses on mercury-containing lamps. This nationwide voluntary scheme encourages commercial and public organisations to become signatories, committing themselves to recycling mercury-containing lamps and in return improving their environmental reputation.

On the back of the successful FluroCycle campaign, Lighting Council is working with the Queensland Department of Environmental and Heritage Protection on a voluntary pilot program to recycle exit and emergency lighting batteries.

While the main reason for basing the pilot in Queensland is the support of the local government, the Sunshine State also makes an ideal testing ground, Bryan says.

"Queensland is very suitable for this pilot project. It will provide valuable lessons for us in getting these batteries from both a major metropolitan area and regional centres to recycling centres," he says.

"At this stage it is a Queensland project, with the generous support of the Queensland government, but at the end of the 12 month pilot period, we do hope to migrate the initiative to a fully-fledged national scheme."

Lighting Council's role is to recruit signatories for the initiative, as it did (and continues to do) with the FluroCycle scheme. FluroCycle currently has more than 200 signatories, providing an excellent base of potential signatories for the new scheme to draw from. The success of the FluroCycle has certainly helped the launch of ExitCycle.

"FluroCycle provided some valuable lessons for us in rolling out a program like this and is probably one of the reasons why the Queensland Government chose to work with Lighting Council. We have built up a lot of experience with FluroCycle, and ExitCycle closely mirrors FluroCycle in its approach," Bryan says.

"The scheme will operate along very similar lines to FluroCycle, in that we will have a signatory category of 'battery collector'. Those collectors will collect the product and transport it to the recycling centres."

As yet, the scheme does not have any publicised goals.

"As this is a pilot program, we have not established recycling targets; however, recyclers are required to provide Lighting Council with recycling data as part of their signatory commitments," Bryan explains.

Lighting Council is acting on its own initiative in setting up the scheme; there's no push from government or environmental groups.

"We like to think we're acting responsibly as an industry and taking responsibility for the products our members are putting onto the market," Bryan says.

The Queensland Government is vocal in its support of ExitCycle.

"We are proud to support Lighting Council and encourage the use of environmentally appropriate solutions to managing our wastes," says Queensland Minister for Environment and Heritage Protection, Dr Steven Miles.

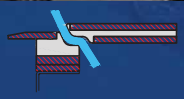
"A number of large businesses and organisations such as the Brisbane Convention and Exhibition Centre have already committed to battery recycling and should be commended."

> **ExitCycle**
> **www.exitcycle.org.au**

THE 'PROTECTOR' SERIES

Floor boxes designed for the new age with the end user in mind

Introducing a new age of safety and flexibility in floor boxes
THE PROTECTOR SERIES
with the *CableShield*™ Protection System



- *CableShield*™ frame assembly to prevent cables being guilotined or damaged (Patent Pending)

- Soft-close lid to stop lid slamming shut
- Suitable for Cat 6A & 7A data cabling

200 Series

Suits 2 No. switchplates

400 Series

Suits 4 No. switchplates

600 Series

Suits 6 No. switchplates

PROTECTOR Series stainless steel floor boxes with *CableShield*™

ECD

Electric Cable Duct Systems P/L
Phone: 1300 123 ECD (323) Fax: 1300 372 825
Emal: info@ecd.net.au website: www.ecd.net.au

SYDNEY **MELBOURNE** **BRISBANE** **PERTH**

A BATTERY OF SKILLS

AS ENERGY STORAGE SOLUTIONS ENTER THE MARKET, ELECTRICIANS SHOULD GET UP TO SPEED WITH THE NEW TECHNOLOGY. GSES DIRECTOR SUSAN NEILL EXPLAINS WHY.

Publicity relating to 'energy storage' emanates from all sectors of the energy market.

Industry journalists, network operators, energy retailers, equipment retailers, wholesalers, system designers and installers are all spreading the word.

As an engineering consultancy and training company, GSES understands that the knowledge and skills for competently operating in the energy storage market are extensive – and often glossed over with advertising generalities.

This rush towards a new technology raises the question: What base knowledge and skills would be considered necessary for this market?

Qualifications have been developed to ensure that appropriate knowledge and skills are developed in the industry. The available qualifications pathways are:

- An electrician's licence.
- Accreditation for design/install grid-connected (GC) photovoltaic (PV) systems.
- Accreditation endorsement for design/install GC PV systems with energy storage.
  Or:
- An electrician's licence.
- Accreditation for design/install stand-alone power systems.
- An engineering qualification.
- Accreditation for design of GC PV systems.
- Accreditation endorsement for design of GC PV systems with energy storage.
  Or:
- An engineering qualification.
- Accreditation for design of Stand-alone systems.

These qualifications represent the minimum knowledge and skill for anyone working in this market, and similar expertise should underpin any products offered by wholesalers and retailers.

WHAT CAN WE LEARN?

The energy storage industry is likely to undergo the explosive growth we have seen with GC PV.

The latter experience has revealed several facets that may threaten the storage industry's successful evolution:

- The compliance regime (Australian Standards, industry guidelines, and network regulations) failed to keep pace with the changing market, the products and the installation practices.
- Training institutions were not prepared for the industry's training demands and initially did not have enough educated and prepared trainers.
- The cost of PV was driven down as manufacturing competition and volumes increased. This created a positive feedback effect and resulted in rapid growth in the market that compounded the above two issues.
- Government policy on schemes designed to help the industry fluctuated. (Although there is no need for government schemes to further accelerate the energy storage market, there is uncertainty in the wider regulatory environment for electricity supply.)

WHY THE HYPE?

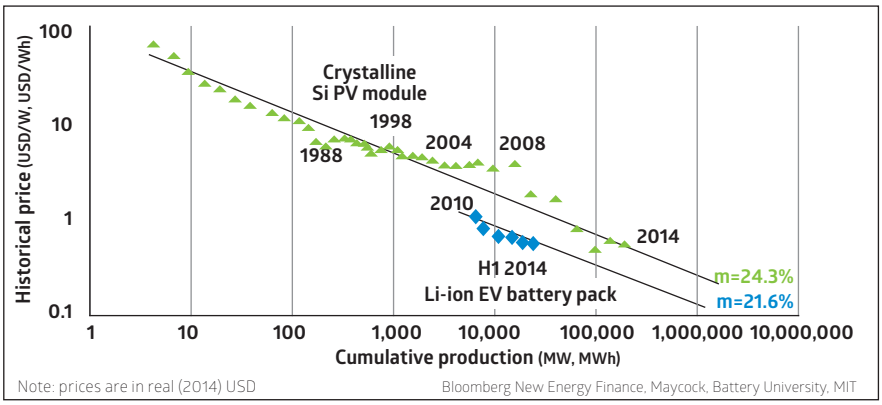
The continuing price decrease relative to shipped quantities of lithium ion batteries creates a market catalyst for energy storage.

Bloomberg New Energy Finance has been monitoring the experience curves of PV compared with lithium ion batteries, as shown in as shown in the accompanying graph. The cost reduction for Li-Ion technology in relation to production anticipates rapid demand for this technology similar to what happened with PV.

The global PV industry has struggled to manage technical and performance compliance in this rapidly evolving market. For PV industries in emerging economies this continues to be an issue.

To deal with the situation, new Standards have evolved – internationally cross-referenced so that countries don't have to develop the material individually.

However, the need for technician-level training is still noticeably absent. It is a high priority in some developing markets.



Lithium-ion EV battery experience curve compared with solar PV experience curve.

GC PV is now on a clearer growth path. The technical and compliance implications are more manageable, as experience, training regimes and trained personnel permeate all levels of the industry.

GROWTH

The industry consensus is that the energy storage market will match, if not exceed, the historical growth of the GC PV market.

It is important to note is that storage growth cannot necessarily be viewed as an extension of the GC PV market.

Industry, households and governments will investigate installing energy storage, and this will involve product and service providers with little or no experience in GC PV.

Such service providers must develop an underpinning knowledge of the technology and the market to service these enquiries.

TRAINING

The knowledge and experience requirement for the design and installation of energy storage in the current market consists of:

- Electrical work.
- GC PV theory, product and installation knowledge.
- GC PV energy storage theory, product and installation.
- Network connection.
- Financial assessments, etc.

Without an adequate understanding of the above topics and issues, systems will be installed that are not appropriate and are potentially unsafe.

Currently, it is only possible to complete the required units of competency that deal with battery installation if the student has first completed the units for GC PV.

Given that battery systems do not necessarily need to be installed alongside a PV system, how will these installers gain the required information and training?

In addition, the performance and product data quoted for equipment and storage units currently on the market are often inadequate and misleading. Training is therefore required to ensure that installers have a thorough understanding of the technologies they are installing, what the limitations are and how to properly assess the information in a datasheet.

CONFIGURATION

An energy storage system can be configured in several ways.

Is the energy storage system in addition to a new or existing GC PV system? Is the intended storage system stand-alone or GC? The system's designer, installer and equipment supplier all have to understand, quote and install the correct solution.

GSES has identified the following possible system configurations:

- Single hybrid inverter – provides functionality of GC PV and regulates the battery charge and discharge. Capable of providing some back-up for selected AC loads.
- Single inverter with separate solar controller – provides functionality of GC PV as well as some back-up for selected AC loads.
- Two inverters with connecting switching device – this configuration has both inverters, the specified loads and the grid all connected.
- Multi-mode and GC PV inverter – this is a simple configuration with a conventional GC PV system operating as normal, and a battery system essentially operating independently supplying specified loads.
- Multi-mode and GC PV inverter – both inverters are able to supply the specified loads independently of the grid.

In addition to any of these configurations, systems can be set up to optimise self-consumption of solar generation.

An external current sensor monitors the customer's mains to detect when power is being exported to the grid. This allows the multi-mode inverter to seamlessly switch between import/export to the batteries in order to minimise exporting PV to the grid.

ECONOMIC ASSESSMENT

The economic rationales and assessments that surround energy storage systems are varied and in many cases not defined by current practices, regulations and Standards.

There is much uncertainty about the technology's performance, capabilities and longevity.

The pricing of electricity and its supply is also subject to continual variations and performance stipulations. Therefore any proposed business models of energy storage companies could be inaccurate over time.

STANDARDS AND GUIDELINES

There are no Australian Standards or guidelines applying to energy storage as currently promoted in the market.

Standards exist for stand-alone systems, power systems and stationary batteries, but they deal only with lead/acid technology, not lithium ion (most GC battery products).

Revisions are under way, but energy storage systems are being sold and installed according to current Standards and laws. In many cases these are imprecise and not technology specific.

So, how will the industry monitor the state of health, performance and financial viability of energy storage systems? PV can be very forgiving, but energy storage does not provide the same comfort.

CONCLUSION

Regulations must catch up with energy storage, and products need to stabilise in the market.

Until then, there should be continuous professional development for all levels of the industry. Participants must be equipped to quote, supply and install acceptable and safe storage systems in the absence of specific Standards and guidelines.

- **GSES**
  www.gses.com.au

SPACES FOR IMPROVEMENT

A PROPOSAL TO INCLUDE A REQUIREMENT FOR IN-BUILDING TELECOMMUNICATIONS PATHWAYS AND SPACES IN THE NATIONAL CONSTRUCTION CODE HAS BEEN PUT FORTH BY THE AUSTRALIAN BUILDING CODES BOARD. JACOB HARRIS CAUGHT UP WITH IAN MILNER OF THE CABLING ADVISORY GROUP TO GET HIS STANCE ON THE SUBJECT.

Gone are the days when the simple act of connecting a telephone line saw your connectivity needs met. Indeed, as we come to rely more heavily on technological solutions for the supply of essential services, it is necessary to ensure spaces and pathways for the requisite telecommunications infrastructure are present in buildings at the time of construction.

To this end, the Australian Building Codes Board (ABCB) is running a consultation process on a proposal to require the inclusion of telecommunications pathways and spaces in buildings via the National Construction Code (NCC). The Cabling Advisory Group has been a part of this process.

"Currently there is nothing in the NCC that requires a developer to give any consideration to the supply of communication services to a building. A lot of existing buildings have had Telstra cable installed as part of the build but there's no pathway to lay new cables. Also, in many buildings there's no space to install the equipment the technology now requires," says technical consultant to the Cabling Advisory Group Ian Milner.

"Retrofitting is horrendously expensive and in a lot of cases [especially in the case of class 2 buildings] permission needs to be sought from the owner or body corporate before work can commence. All this can be easily avoided by considering the need for pathways and spaces from the outset."

While the proposal covers class 1, 2, 3, 5, 6 and 9c buildings, it recognises that the provision of telecommunications becomes more difficult the larger and more compartmented buildings become. And that multi-dwelling units (MDUs), such as class 2 buildings, present the greatest challenge.

These difficulties are compounded further when adequate pathways and spaces are not afforded at the time of construction. The proposal identifies these spaces as being: telecommunications entry points, telecommunications equipment rooms or floor distributors and telecommunications risers between storeys.

> The ABCB is looking at requiring the inclusion of telecommunications pathways and spaces in buildings via the National Construction Code (NCC).

For Ian though, pathways and spaces are only the beginning: an important first step but not the final solution.

"I personally think it doesn't go far enough. In 2015, it is very short sighted to only consider pathways and spaces if you don't also consider wiring or pre-wiring premises. We're no longer just looking at a telephone and access to the internet. Moving into the future, safety and security alarm systems, medical alerts, e-health and access to assistive technologies for the aged and the disabled – which allow people to stay at home for longer or disabled people to live more independently – will all rely on a connection to the internet.

"Wireless technologies are great if they're non-essential but if they're supporting an essential service – if, for example, they're monitoring someone's health, dialysis machine or oxygen levels – they're not reliable enough."

In Ian's opinion, communications have been an essential service, not a luxury, for a long time and the communications pathways and spaces that have been described in the proposals currently before the ABCB really only go as far as supporting the carriers getting services into the building.

"There's no use having a service in the building if you can't get it to the room it's needed in. It's an over-reliance on wireless. Mobile technology is brilliant but it doesn't come with the same level of functionality. For example, in the future there is going to be a range of essential devices and systems in many homes which require uninterrupted power. Now it's impractical to have an uninterruptible power supply (UPS) or little battery backup systems for every different service," says Ian.

"Ideally, users will have a central system to support all their essential services via Power over Ethernet (PoE), one UPS, and a programmable PoE switch. If you start thinking about it that way, pathways and spaces are great – we're heading in the right direction – but is that enough in 2015? I think it's short sighted." ■

The Temporary Power Board
Created as Temporary. Designed to be Permanent.

AVAILABLE MARCH

Energy Efficient

Coupled with CBI Hydraulic Magnetic Technology Switchgear makes for protection in harshest environments the best on the market.

25 Year UV Protection.

Part Numbers: Polytemp 01, Polytemp 03

Also available CBI Polybox 2 Door Distribution Pillars.

- Non conductive (OHS friendly) • Will not attract lightening strikes
- No sharp edges (OHS friendly) • Acid & abrasive resistant
- 30% Lighter • Will not corrode, rust, dent or scratch
- Heat resistant 15% cooler for added switchgear protection
- Easy to install • Single phase & 3 phase available

CBI offer a range of Enclosures, Load Centres and Switchboards for Mining, Commercial and Residental.

CBI electric Australia

Innovative, Robust, Reliable and Efficient Protection

» 1800 770 870 » www.cbi-electric.com.au

HEINEMANN ELECTRIC PTY LTD TRADING AS CBI-ELECTRIC AUSTRALIA

HEINELEC® CIRCUIT PROTECTION

SLEGERS GET CONNECTED

STANDARDS IN YOUR POCKET

NECA HAS DEVELOPED AN APP THAT PROVIDES ITS MEMBERS WITH CURRENT, WIDE-RANGING INFORMATION AT THE TOUCH OF A BUTTON – AND BETTER YET, IT'S FREE TO MEMBERS. KATE JORDAN HAS THE STORY.

Australian Standards are often expensive, cumbersome and heavy, and can easily become outdated. Further, standards are just one part of the mass of information that electricians need to be able to access, such as Service and Installation Rules, the National Construction Code and forms from energy distributors.

In this age of information, it has been difficult for electricians to find the information they need – until now.

The National Electrical and Communications Association (NECA) has just released the Technical Knowledge Base (TKB) app that aims to solve the above problems. It's essentially an online database that's accessible from smart phones, tablets and desktop computers that will provide NECA members with access to up-to-date standards and information relevant to their state as part of their membership fees.

The TKB originated in Western Australia when the local NECA branch setup a searchable database on its website. With good feedback from members there, the association decided to expand the initiative nation-wide.

NECA Victoria senior member services officer Rod Lovett is fervent in his praise of the app.

"The biggest advantage of it, from a contractor's perspective, is that the information is always current.

It's every standard that most contractors use and if there are any amendments, it updates automatically," he says.

"The other big advantage is that it's fully searchable. If I put in 'emergency and exit lighting', it will come up with all the relevant standards and regulations that apply to that."

The app is designed so that each state can upload the information that is most relevant to its members.

"Some of the information will be common, but we will run information that is specific to Victoria.

As an example, the Victorian members will have access to:

- Victorian Service and Installation Rules.
- Electricity Safety (Installations) Regulations 2009 V5.
- Energy Safe Victoria Alerts and FAQ.
- Relevant sections of the National Construction Code.
- Electrical Product Recalls.

The sheer mass of information that will be available could be overwhelming, but the app is designed to be easily navigated and is fully searchable.

With the TKB app, NECA will also have the ability to anonymously track which queries are most common and then provide targeted education on those matters.

"For example, there's a requirement now as part of the standard testing in Victoria to do fault loop," Rod says.

"We know that a lot of contractors and electricians don't fully understand it. So, if we found that we were starting to get lots of people searching for 'fault loop', we could then run some free information sessions on how to calculate fault work."

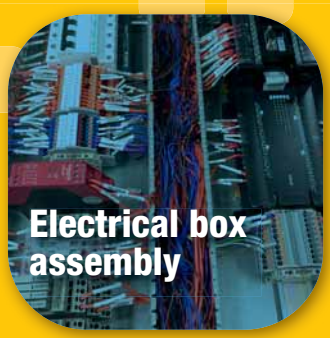
Access to TKB is simply through the NECA website. TKB will form an integral part of the technical support services that NECA currently offers and is fully supported through its Technical Services Department. ■

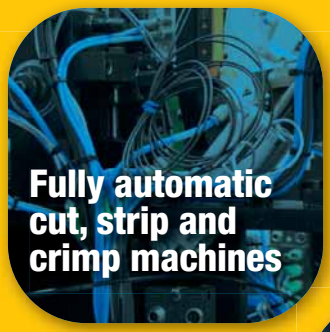
> **NECA**
> **www.neca.asn.au**

THE FOLLOWING AUSTRALIAN STANDARDS WILL BE INCLUDED IN TKB

- AS/NZS 2067
- AS/NZS 2293.1
- AS/NZS 2293.2
- AS/NZS 3000
- AS/NZS 3001
- AS/NZS 3003
- AS/NZS 3008.1.1
- AS/NZS 3010
- AS/NZS 3012
- AS/NZS 3013
- AS/NZS 3439.4
- AS/NZS 4509.1
- AS/NZS 4777.1
- AS/NZS 5033

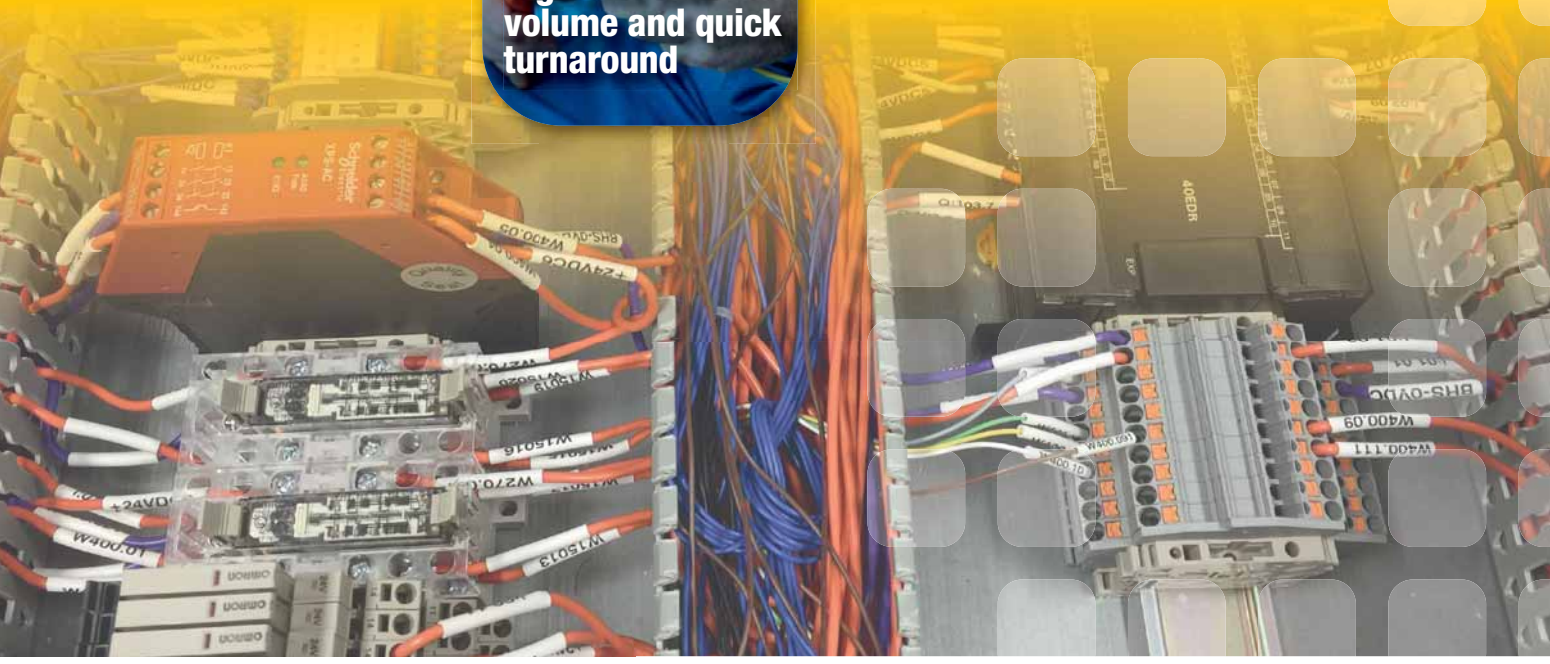
Cable Assembly & Box Build Assembly





Metal Work
Label and Wire Marker
CNC Engraving and Machining
Functional Test and Logistic Service

@Ampec we specialise in manufacturing of custom design cable assemblies as well as turnkey electronic and electric product assemblies.



+61 2 8741 5000
e sales@ampec.com.au
w www.ampec.com.au

ampec TECHNOLOGIES

PARDON THE INTERRUPTION

TECHNICAL ASPECTS OF UNINTERRUPTIBLE POWER SUPPLIES WILL BE OF INTEREST TO ELECTRICAL CONTRACTORS. PHIL KREVELD PROVIDES AN OVERVIEW.

This article deals with the static uninterruptible power supply (UPS), the rotary storage type (RUPS) and the diesel rotary storage type (DRUPS).

The accent is on large systems – 500kW and higher. Almost invariably, these are used in tier IV redundant power supplies.

Although redundancy is imperative for failsafe conditions, the many ways in which it is achieved are not discussed because much depends on individual sites.

The Uptime Institute – an independent advisory organisation focused on improving the performance, efficiency and reliability of critical infrastructure for the information economy – defines four levels:

- **Tier IV:** Fault intolerant site infrastructure.
- **Tier III:** Concurrently maintainable site infrastructure.
- **Tier II:** Redundant capacity components site infrastructure (redundant).
- **Tier I:** Basic site infrastructure (non-redundant).
- **Tier IV:** Guaranteeing 99.995% availability.
- **Tier III:** Guaranteeing 99.982% availability.
- **Tier II:** Guaranteeing 99.741% availability.
- **Tier I:** Guaranteeing 99.671% availability.

Tier IV has all components fully fault tolerant, including uplinks, storage, servers, plus heating, ventilation and air-conditioning.

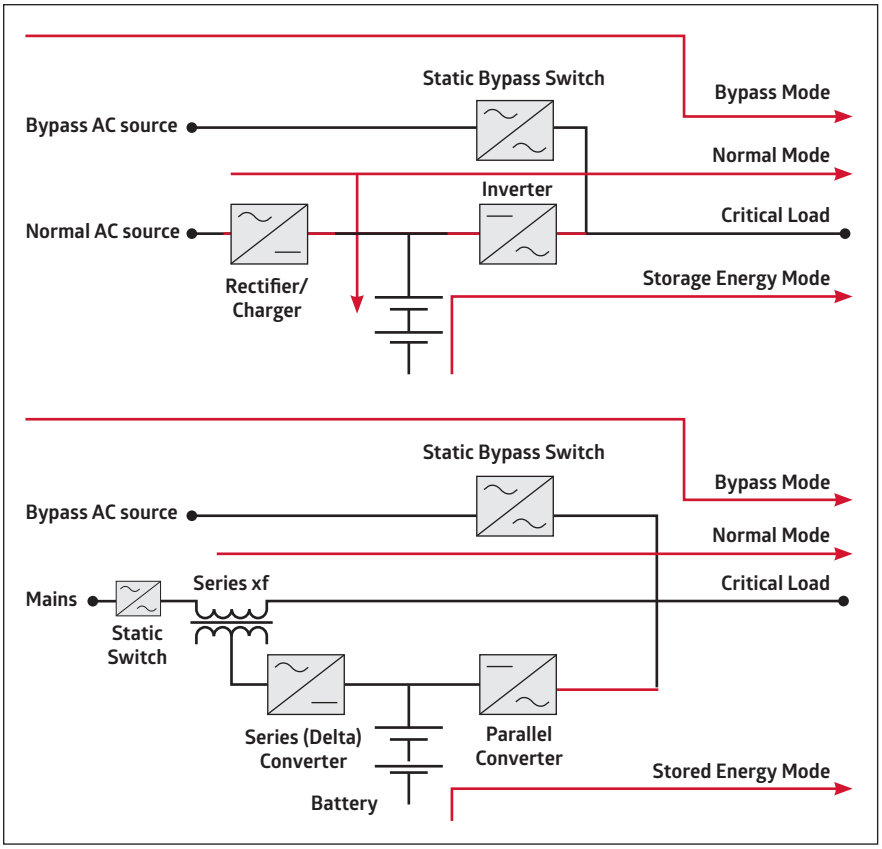


Figure 1: The double conversion (left), and delta conversion schemes.

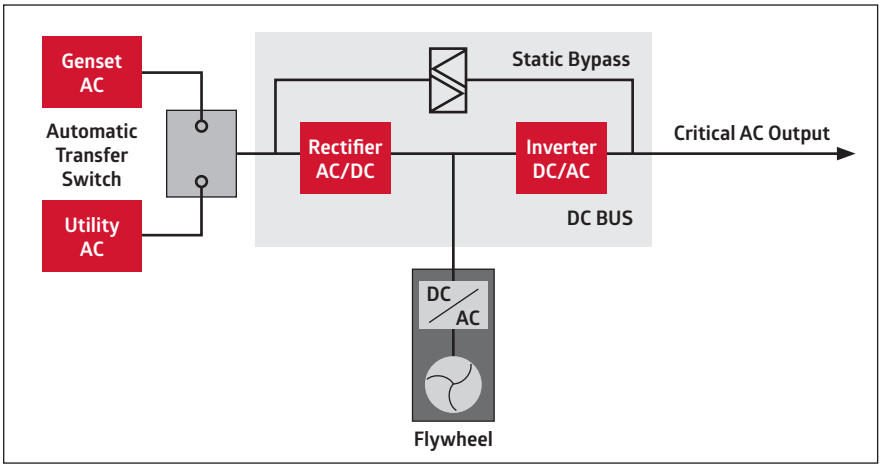


Figure 2: A flywheel-backed, double conversion UPS. (Source VYCON VDC.)

Although defined in IT terms, operating theatres, dialysis centres, etc, can be subject to the same requirements. Tier IV – in addition to

BY
PHIL
KREVELD

duplication, triplication, etc, aspects to achieve redundancy – also implies special engineering measures, some of which are highlighted here.

UPS SYSTEMS

The systems dealt with include:

- Battery-backed static inverters supported by diesel generators;
- flywheel-backed (RUPS – or rotary UPS) static inverters (the energy stored in the flywheel takes the place of batteries, and the flywheel is driven by a motor generator) with long (more than 5-30 seconds) interruption support from a diesel generator; and
- DRUPS without batteries.

We can't do justice to the 'economy' argument when choosing a particular system, as this depends on particular site requirements.

However, in the case of DRUPS, the idea is to eliminate batteries altogether. A battery is a limited-life storage medium, and in Tier IV there must be no risk regarding availability, including batteries. Long power interruptions, outstripping battery capacity, must be taken into account.

Valve-regulated lead acid (VRLA) batteries are commonly used, although there are nickel-cadmium batteries in use for some major energy storage systems. VRLAs are considered to be reliable, with relatively low maintenance.

Notwithstanding the marketing arguments from suppliers, battery-backed UPS systems are usually employed for ratings below 500kVA. The energy storage density of flywheels is lower than that of VRLAs, and by a factor of 10 compared with Li-ion batteries.

BATTERY-BACKED STATIC UPS

The two important topologies are the double conversion and delta schemes, as shown in Figure 1.

The double conversion topology has the advantage of isolating the load but is less efficient than the delta circuit.

The delta inverter provides incremental energy to the load (to make up for system losses). The primary of the delta transformer is, in effect, a variable impedance controlled by the delta inverter.

When the mains static switch operates to the off position, the load receives power from the parallel converter.

The series (or delta) converter makes up for any difference between the voltage on the output of the UPS and the voltage from the mains during normal operation. It also controls the input power factor to unity as it is it takes up mains current that is sinusoidal and in-phase with the mains voltage.

Furthermore the series-inverter controls the charging of the battery. The mains static switch protects against back-feed into the mains.

Double conversion systems can draw a considerably higher harmonic current than delta systems unless fitted with input filtering or harmonic traps. In both topologies the static bypass switch has to be synchronised with the inverter/parallel converter.

FLYWHEEL-BACKED STATIC INVERTERS

The earliest forms of UPS systems seem to have been rotary, although that might be historically debatable.

A rectifier circuit maintained a battery bank driving a DC motor/AC generator. The inertia of the motor/generator provided change-over energy. A supplemental flywheel accommodated changeover in a few seconds, allowing a ride-through with sufficient frequency as well as voltage stabilisation.

The energy stored in a flywheel is proportional to the square of the rotational speed, and to its moment of inertia. In an ideal flywheel, all of the mass is concentrated at its outer radius, giving it a moment of inertia proportional to the square of the radius. Thus the energy stored is proportional to:

$MR^2 N^2$

Where M is the mass, R the radius, and N the revolutions per second or minute.

The principle of the UPS is shown in Figure 2.

The AC motor/DC generator flywheel unit can be powered from the auto-transfer switch end or the inverter output.

The flywheel includes a hub that is formed from aerospace-grade steel, a high-speed permanent magnet motor generator, and contact-free magnetic bearings that levitate and sustain the rotor during operation.

Typically the DC generator will supply a 500V DC link. The manufacturer, Vycon, states that a 300kVA UPS would have up to seven seconds of uptime for the diesel generator to come on line. For additional capacity, flywheels can be paralleled.

DRUPS

These systems are generally devoid of battery static USP circuitry.

As in the system described above, the bridging energy during change over from mains to UPS is supplied by a flywheel. The flywheel inertia should be thought of as the combined inertia of a motor generator and coupling. The basic idea is shown in Figure 3.

The synchronous motor/generator is connected to the second motor/generator coupling flywheel combination via a bi-directional power converter.

Under normal mains conditions, the synchronous machine operates as an over-excited synchronous condenser, correcting power factor and drawing only energy for windage and bearing losses for the entire 'rotating system'.

The buffer inductor (tapped inductor) has a low mutual inductance impedance but a high impedance providing isolation for the synchronous motor/generator, which regulates the critical load voltage. >

A little more detail is shown in Figure 4, including the diesel generator necessary for longer mains failure periods.

The power converter in Figure 4 looks a lot like the double conversion system discussed above. However, the DC link connecting the two motor generators has no batteries.

ROTARY AND STATIC

When UPS systems go beyond 1MW, the DRUPS technology is more likely to be chosen.

Some practical considerations have been mentioned, namely that DRUPS as a system – without limited-life batteries – is a more 'hardened' system.

A clear advantage of battery storage is its efficiency compared with flywheel storage. The trickle charging during normal operation is about 10% of the energy required to maintain flywheel rotational speed.

In cost per kilowatt, high-power flywheels and lead acid batteries are of the same order. Lead acid batteries have a much higher energy storage density than flywheels.

On the other hand, if chosen for areas subject to poor power quality, batteries can be subject to excessive cycling and their service life will be reduced.

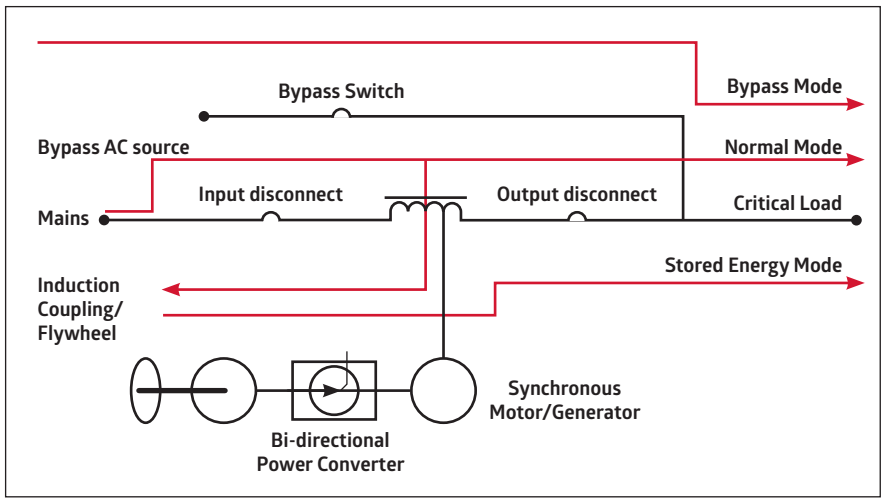


Figure 3: Basic topology of a DRUPS.

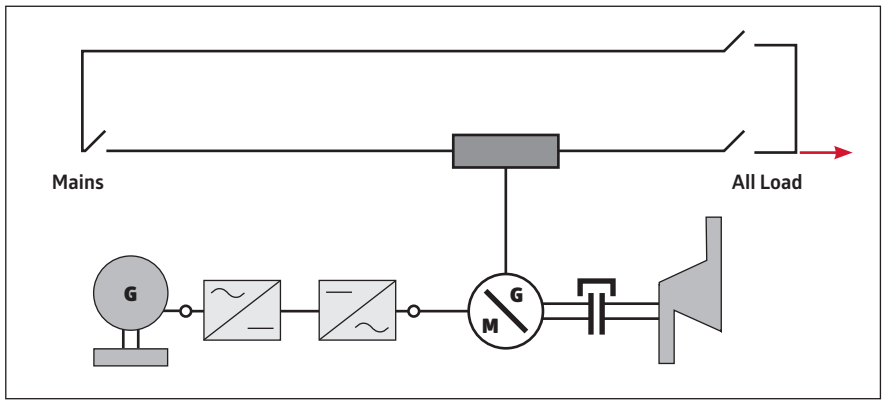


Figure 4: DRUPS, power converter, and diesel with coupling to synchronous motor generator.

DRUPS systems (being AC without sine wave shaping using pulse width modulation) do not reflect harmonics into the mains.

POWER FACTOR

We are focusing on displacement power factor, whereas total power factor also takes account of harmonic distortion.

Displacement power factor is a substantial cost addition to many power bills. It is therefore of importance to UPS systems, since we are talking here of 1MW systems and greater.

In the case of DRUPS technology, the use of synchronous motors provides power factor adjustment, from lagging (running as a motor) to leading (running as a synchronous condenser), so that maintaining a power factor of unity is no problem.

DRUPS systems, being AC throughout, can be affected by the input capacitance of IT power supplies, thus exposing standby generators to leading power factor.

In static UPS systems, AC to DC converters can have much lower power factor.

Thyristor converters in normal full load operation have lagging power factors, the reason being that commutation to the off-state can only happen at zero current. Any inductive part of the DC link (usually an inductor-capacitor circuit) will extend the current on each half cycle.

If insulated gate bipolar transistors (IGBT) are employed in the AC to DC conversion, the displacement power factor is essentially unity because IGBTs can be gated on and off.

This is a more costly conversion, as freewheel (snubber) diodes must be used across the switching transistors (these conduct the current due to the collapsing magnetic field of inductors).

Lagging power factors are not problematic for standby generators

unless lower than 0.7 when the automatic voltage regulator (AVR) runs out of excitation current control range.

Leading power factor is a problem, in that lower and lower excitation current is necessary to control voltage as more power is drawn. The AVR therefore runs out of range much more quickly and voltage can rise to dangerous levels.

HARMONICS

The export of current harmonics is mainly a problem for static UPS systems.

In an unfiltered state the commonly used six-pulse converter generates more than 30% of total harmonic current distortion (THID). This can be reduced to about 7% by a second transformer and parallel connected six-pulse converter, making a 12-pulse converter.

The latter makes sense for higher rating UPS systems. For a six-pulse system the principal harmonics are the fifth and seventh; for a 12-pulse converter, the eleventh and thirteenth.

Passive filters for mitigating harmonics employ capacitors as parallel elements and inductors as series elements.

Under light IT load, the input to the UPS converter appears mainly capacitive, and that can be a problem for the standby generator. This is sometimes taken care of by switching out capacitors under light load conditions. The use of active harmonic filters removes the problem but adds substantially to the overall cost.

OPERATION WITH STANDBY GENERATORS

Frequency stability is of importance – there are no golden rules, but it is an issue if the generator full load capacity is closely matched to the static UPS.

With a prolonged outage, say, in excess of 20 seconds, the generator will start up and supply the AC to DC converter. Frequency and voltage stability at the site should be such that the DC link battery bank is not being needlessly exercised.

The static UPS double conversion topology (Figure 1) is better suited to stable synchronisation than the delta conversion topology. This is because the former is entirely isolated from the mains (yet is mains synchronised under normal operation).

> Selection of static or rotary UPS should take account of power quality of incoming supply.

When a power outage occurs, the inverter supplying the critical load is self-synchronised, maintaining this state until power restoration when synchronisation is derived from the static transfer switch.

In the delta scheme, frequency stability is important. The inverter has to be in synch with the generator, because in essence it is regulating the voltage to the mission-critical load.

Frequency stability is the main issue for DRUPS systems. The employment of synchronous motor-generator-flywheel combinations provides a stable basis.

DIESEL ENGINES

Diesel generators, particularly when not fully loaded for extensive periods, are more prone to 'wet stacking'.

Most standby generator systems up to 5MW use the reciprocating internal combustion engine as the power source to drive the generator.

Diesel is a convenient fuel source, and the compression ignition systems of diesel engines have a much higher thermal efficiency.

When a diesel engine is operated on light loads, it will not attain its correct operating temperature. When operated for extended periods, unburnt fuel is exhausted and noticed as wetness in the exhaust system, hence the term wet stacking.

The obvious solution is to run the generator set with an electrical load that reaches the designed operational temperature of the diesel, or approximately 75% of full load.

Prolonged operation at low load will eventually mean an expensive engine overhaul.

The use of resistor load banks to be switched in when light load conditions pertain is recommended. This can be an automatic switching-in, or as part of a regular maintenance procedure.

BATTERY AND SYSTEM MONITORING

The monitoring of batteries is essential for UPS systems.

On-line monitoring requires string current monitoring, and also monitoring of individual cell voltages – that being necessary to prevent a cell of lower capacity being driven into reverse condition.

For preventive maintenance, an off-line 'state of health' test is recommended.

Capacity tests (discharge tests) should be done at the installation (acceptance test) within the first two years of service, and at intervals no greater than 25% of the expected service life.

For on-line battery monitoring, a radio-based method is preferable, as it obviates extensive cable harnesses.

USB and RS-232 (serial port) connectivity may be suitable for small installations. However, data centre UPS systems should include internet protocol connectivity to allow remote management across an Ethernet local area network – the same mechanism that supports remote server, storage and other systems management in the data centre. ■

FEELING THE HEAT

THE FIRST PART OF THIS SERIES DESCRIBED HOW HEAT STEMS FROM CURRENT IN A RESISTIVE ELEMENT, AND HOW FAULTS CAN CAUSE FIRES. GEORGE GEORGEVITS NOW OUTLINES SOME CASES.

Over the years, I have investigated a diverse range of electrical fires.

The list includes house fires caused by defective wiring, incorrectly installed lighting and lightning strike. It also includes vehicle fires.

WIRING AND FITTINGS DEFECTS

Fixed mains wiring in domestic and most commercial applications commonly uses some form of PVC insulated cable. The most common type is thermoplastic sheath flat cable (cream colour).

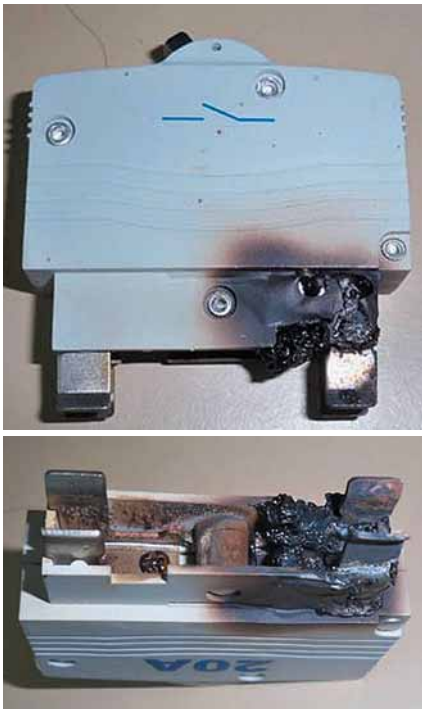
The PVC insulation will burn when heated and emit toxic fumes (including chlorine gas); however, PVC is not an accelerant – once the source of heat is removed, it will not sustain a fire.

An electrical fire can be caused by arcing between two conductors or by the heat from ohmic losses in a high-resistance joint.

Indoor mains wiring originates from some form of switchboard, and each conductor is connected to a protective device (fuse or circuit breaker) by means of a screw terminal.

If this screw terminal is not tightened sufficiently, it will constitute a high-resistance joint. Under a high current load, such a joint will heat up and can be a source of ignition.

Protection devices that plug into a switchboard can also fail and burn if the socket they plug into does not make a good contact.



A plug-in circuit breaker that has caught fire due to a high-resistance joint.

The wiring for power points and lighting is usually daisy chained. Thus power points and light fittings can act as connection points for two or more cables. Each joint, if not installed correctly, can be a source of ignition under certain conditions.

I have encountered many cases of a tunnel terminal, used for terminating the cable at the rear of the power point, has not been correctly tightened.

Under heavy load (eg: a clothes dryer) the high resistance caused by the loose joint has caused the cable to heat up and catch fire. This can spread to timber in the wall and cause serious fire and smoke damage to the house.

Similarly, power points and power boards can suffer internal mechanical damage through abuse. One or more of the socket contacts can become splayed and may no longer make a low-resistance contact when a power plug is inserted.

If the load happens to be a blow heater or hair dryer, the plastic constituting the plug and the socket can melt and eventually cause nearby combustible materials to ignite.

Ceiling-mounted halogen downlights operate at very high temperature. For ventilation and safety, the Wiring Rules specify clearances from adjacent timber. If ceiling insulation covers such a fitting, it will prevent ventilation and may constitute a fire hazard.

This type of lighting has been known to cause roof fires if not installed correctly, if ventilation has subsequently been obstructed, or if associated power supply components have failed (eg: step-down power transformer or ballast).

Halogen downlights are being replaced by far more efficient and cooler-running LED designs.

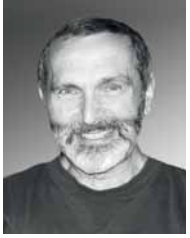
VEHICLE FIRES

Electrical wiring in vehicles differs from mains wiring in several ways.

It operates from DC and employs a low-voltage source (usually 12V or 24V). By necessity, the source (the battery) has to have a very low impedance in order to operate the starter motor.

To deliver enough power to the headlights or ignition system, the operating currents are generally much higher than those in domestic mains circuits. Because of this, vehicle wiring systems do not tolerate faulty connections or unfused short circuits.

Some time ago I examined a European sports car that had caught fire while being driven. Fortunately, the vehicle was close to the workshop where it



BY
GEORGE
GEORGEVITS

was usually serviced. The driver made it to the workshop and the battery was quickly disconnected.

(NB: With any form of electrical fire, the first action is to disconnect the supply.)

Inspection of the fire-damaged area in the engine bay revealed that the fire was associated with wiring supplying one of the electric radiator fans (this car had two).

Electric radiator fans are invariably high-speed, high-power devices. This is necessary for sufficient radiator cooling in hot weather.

Closer inspection of the fan revealed that one of the push-on spade connectors was only half mated. The high-resistance joint caused by this defect generated enough heat to melt the wire's plastic insulation and subsequently cause ignition.

The incident occurred while the vehicle was idling in traffic on a hot day. The fire started when the fan thermostat cut in and quickly spread to nearby plastic parts in the engine bay. The driver was lucky to make it back to the workshop.

In another case, I was called upon to inspect a fire-damaged semi-trailer.

The driver had been travelling at high speed when he noticed the smell of burnt plastic in the cab. He pulled over as quickly as he could, but the cab had filled with acrid smoke. He left the vehicle to burn, fearing for his safety. Had he disconnected the battery, the damage would have been much reduced.

When I inspected the prime mover, it was obvious that the fire had started in the engine bay.

Inspection of the wiring remnants revealed a short length of heavy gauge wire that was connected directly (ie: unfused) to the positive supply rail on the engine bay firewall. The other end of this wire was just a melted blob of copper.

Fire damage near a particular wall stud.

The wire seemed to have been added after the truck was built, probably to supply some form of aftermarket accessory.

Unfused wiring like this is a bad idea. A short circuit to the chassis can create a very large fault current that will quickly melt and burn away the wire insulation. It will keep on supplying heat until the wire eventually melts and the circuit is broken, just like a fuse.

In this case, I calculated that the wire could readily carry more than 500A before melting.

In all likelihood, the fire started when this wire rubbed against part of the vehicle's hot chassis until the plastic insulation was worn away, thereby creating a dead short to the chassis.

The 270Ah battery could easily supply many hundreds of amps. The wire would have glowed white hot before melting. All nearby plastic parts would also have caught fire.

LIGHTNING STRIKE

One inspection involved a new, unoccupied house that had caught fire.

The damage appeared concentrated around a run of fixed mains cabling containing six or so cables inside a plasterboard wall.

Part of my brief was to advise whether the fire was electrical, whether the wiring complied with the Wiring Rules, and whether it might have been damaged by another trade after installation.

The burn pattern indicated the fire was associated with electrical cables passing through a hole in a stud. The wiring could not have been damaged after installation, as any such fault would have tripped the relevant circuit breaker.

The damage appeared most severe near one of the studs, and was much worse for a ~100mm length along a particular cable. Most peculiar!

A neighbour said the fire had started during a violent thunderstorm, soon after a very loud thunderclap.

An online lightning strike database revealed that there had been a very close lightning strike at the time of the fire. That afternoon there were more than 1,000 within 50km of the site.

In my view, lighting had struck the roof, followed the sarking and stud down the wall and arced across to the mains cable, thereby burning away the insulation on that one cable. The breaker for that circuit (and only that circuit) had tripped. ■

GIVE 'EM A BREAK

THE CIRCUIT BREAKER HAS SAVED A LOT OF LIVES. DAVID HERRES OUTLINES THE ROLE AND CHARACTERISTICS OF A SIMPLE BUT EFFECTIVE DEVICE.

This residual current device interrupts both conductors.

Circuit breakers play a vital role in all electrical systems – residential, commercial and industrial.

Breakers are rated in amps, the amount of which is plainly printed on the end of the handle.

The purpose is to automatically open a circuit in the event of over-current, by which is meant electrical current in excess of the rated ampacity of the conductors.

If the ampacity is exceeded, the temperature of the wire will rise. This is usually due to an increase in supply voltage, short circuit caused by a line-to-line or line-to-ground fault, or an increase in the connected load.

Prolonged or repeated temperature rise will damage the wire insulation. In a severe case, the copper can get red hot inside the wall, igniting nearby combustible material and causing a widespread fire.

Breakers perform the additional function of acting as a manual switch. After a fault has been corrected, the tripped breaker can easily be reset.

Fuses are also effective over-current devices. A moulded-case switch looks just like a breaker and snaps into a load centre in the same way, but it has no over-current interrupting capability.

Codes require that if you brace the handle of a breaker in the on position the device will still trip without moving the handle in the event of overload.

Circuit breakers have been around for a long time and they are extremely reliable. They were used in early telegraph networks long before the first power distribution system was built.

If a breaker becomes faulty, it is preferable for it to trip when there is no overload rather than fail to trip when needed. In fact, that is how they are designed. Breakers do not stick or lock in the on position. The price we pay for that kind of performance is that they occasionally nuisance trip.

To prevent damage to a computer's hard drive, an inexpensive uninterruptible power supply (UPS) will provide continuity of power when a circuit cuts out.

Life support equipment, either in a health-care facility or in the home, generally has elaborate automatic back-up power. Increasingly, this set-up is seen in family homes.

When an over-current device powers down a branch circuit, the first move is to determine whether it is performing its protective function or just nuisance tripping. For the most part, circuit breakers are reliable and rarely fail. It is a simple matter to swing the wires over to a good breaker.

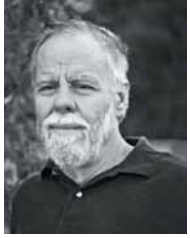
An individual circuit outage generally falls into one of three categories, although there are grey areas.

The breaker may fail to reset, thereby signifying a dead short, or it may hold for a short interval before tripping again. Otherwise, it may hold for quite a long time, sometimes hours, before cutting out.

The latter is because breakers in common use are inverse time devices, with the ability to tolerate a small amount of over-current for a long time and a greater amount of current for a short time.

An accurate picture can be gained from current measurement using a clamp-on ammeter (trade name Amprobe). If the breaker holds long enough, you can check the current at each outlet until the fault is located.

If there are loads plugged in, one of



BY
DAVID
HERRES

them is probably faulting. Electrical equipment, especially motors, tend to draw more current as they age, due to internal insulation gradually breaking down. This can also happen if a transformer is connected.

A hair dryer or laptop computer, when the internal battery is being charged, may be the culprit. Unplugging connected loads one at a time, with a clamp-on ammeter at the entrance panel, will quickly locate the fault. The Amprobe 'hold' function is useful in this procedure.

Nuisance tripping can also be a problem with residual current devices (RCDs). In the United States and Canada these are known as ground-fault circuit interrupters (GFCIs). The purpose and inner workings of both are similar, but the circuit deployment varies due to different phasing arrangements.

NEC and CEC, as well as the Australian and New Zealand Wiring Rules, require such devices in sensitive locations – wherever the proximity of electrical power and water may lead to a shock.

Since their introduction in the 1960s, and subsequent widespread use, RCDs have greatly reduced the number of non-utility electrocutions, especially in homes.

The equipment-grounding conductor usually completes the circuit to the entrance panel, then the over-current device trips. However, in some instances that conductor breaks or has not been properly hooked up. The result can be an electric shock – sometimes fatal.

The RCD takes the form of a breaker in the entrance panel or load centre, a receptacle at the wall outlet, or a moulded-case device built into a power cord and located adjacent to the plug.

The hot wire and neutral return conductor of a 240V circuit both pass through the device. Normally, the current in the supply and return conductors is equal (conforming to Kirchhoff's Current Law that electrical current is everywhere the same in a non-branching circuit).

In a two-fault situation (involving connectivity of the hot wire and loss of connectivity of the equipment-grounding conductor), when someone touches the energised metal, some of the current goes to earth.

The RCD monitors both current paths, performing a continuous differential measurement. If the difference exceeds a specified limit, typically 6mA, the device interrupts the circuit. The amount and duration of the brief electric shock is not enough to constitute a hazard.

Many of these devices combine the function of an over-current device, and they can also be used as a switch by pressing the 'test' button.

Since their introduction in the 1960s, RCDs have greatly reduced the number of non-utility electrocutions, especially in homes.

The newer RCDs have an LED that indicates a tripped condition, so it is possible to know at a glance where the problem lies. Moreover, if the RCD is not getting power, it will not reset, providing immediate information on the status of the upstream portion of the branch circuit.

Unfortunately, RCDs are prone to nuisance tripping, which is often caused by a defective load. The first step is to unplug all downstream loads, one at a time.

(Remember: nothing that happens upstream of the RCD, including conductor imbalance, can cause tripping. The device monitors only downstream wiring, devices and loads.)

Some loads are incompatible with RCDs, and refrigeration equipment is one example.

In a hermetically sealed compressor, motor windings are submerged in the grounded refrigerant, and any imperfection in the light coating of insulation will allow current leakage to ground.

Moreover, an undetected nuisance-tripping incident can lead to the loss of freezer contents.

A dedicated non-RCD circuit should be run for a refrigerator, even in a kitchen.

RCDs should not be used in circuits for fire alarms, life support and other essential services.

If the cause of nuisance tripping is not apparent, and substitution has ruled out the device, take a good look at the wiring. Cable rubbing on grounded metal pipe or an errant nail can create a problem, or there may be moisture in the wall.

Does the nuisance tripping occur after heavy rain? Perhaps an outdoor receptacle has been bugged off a kitchen or bathroom receptacle to obtain the required RCD protection.

If cable connectors have been over-tightened in older concrete block or masonry constructions with metal wall boxes, there may be enough current leakage to cause RCD tripping. If so, it may be possible to loosen the connectors and slide in a slit piece of cable jacket.

If wiring runs are suspected, the diagnostic procedure is to progressively isolate segments of the branch circuit by temporarily unhooking the hot wires, one at a time, until the fault has been located.

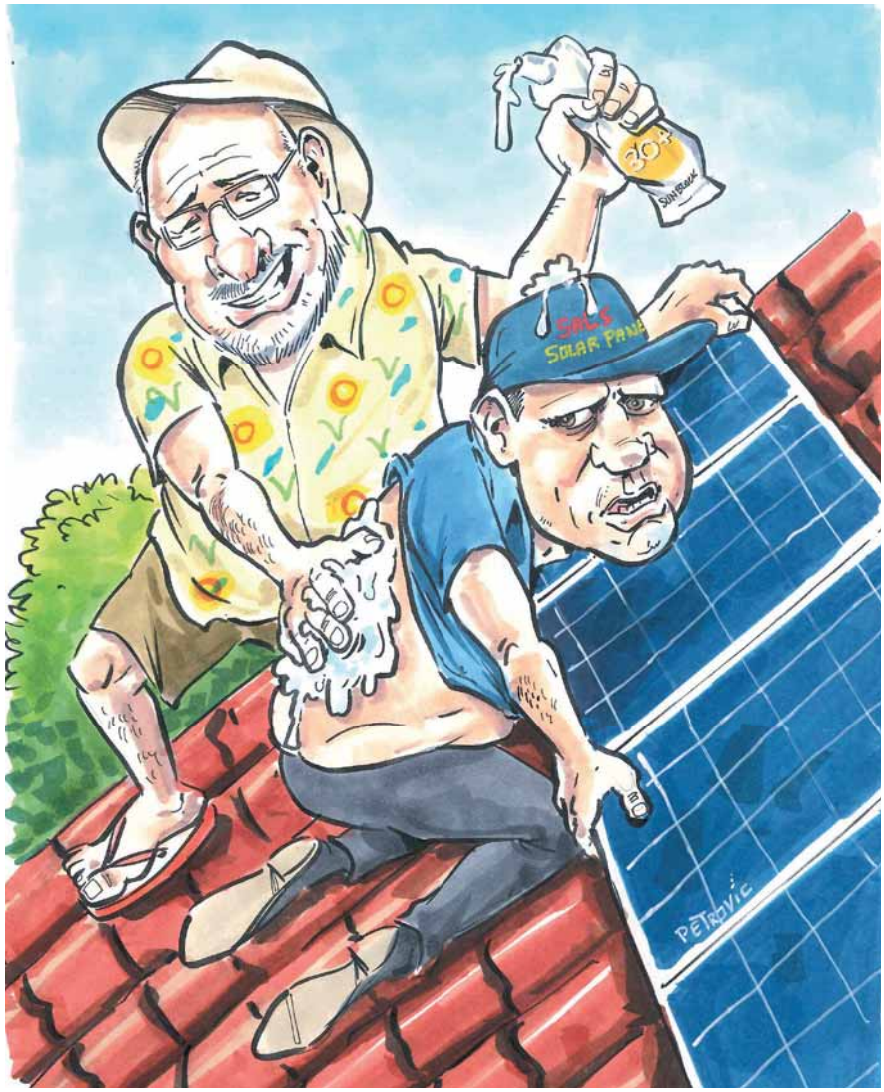
However, in residential construction most of the wiring is behind finished walls, so some hard work may be in order. ■

SKIN IN THE GAME

THINK ABOUT SOLAR INSTALLATIONS THE SAME WAY YOU THINK ABOUT SUNSCREEN, WRITES GARY BUSBRIDGE. SIMPLY BUY QUALITY PRODUCTS.

It's that time of year – out comes the sun, off comes the shirt, suntan central.

But there are hazards associated with getting that suntan, and we all know that we should 'slip, slop and slap' as a matter of course. That is, slip on a shirt, slop on the 30+ sunscreen and slap on a hat. You could take it further with: seek shade or shelter and slide on some sunnies.



'Slip, slop, slap, seek and slide' is very good advice for all tradies. But this article is not just aimed at helping you to be sun-smart.

The solar energy revolution has been under way for quite a few years. By the end of 2014, government support had led to the installation of about 1.5 million small-scale solar power systems across the country.

According to the Clean Energy Council, these systems produced about 2% of the country's total electricity, and the figures can only have increased through 2015.

Although this has been a boon for clean energy production, it has been far from smooth from an installation perspective.

First, there were the more than dubious installations using various government rebates to provide ultra-low-cost systems to the home owner. This was devastating for the reputable electrical contractor who wanted to provide a quality installation with quality components.

Basically, the bad guys cut out any reputable contractor because of price. Fortunately, things have calmed down and there are many who now provide that system at an effective price, using quality products.

There were lots of horror stories of poor workmanship and lack of service back-up. If something went wrong, home owners ended up with no support whatsoever – they were probably left with just a phone number. Most of the cowboys have now left the market.

The AS/NZS 5033 *Photovoltaic Installations* Standard has been published for quite a while, and in recent times the AS/NZS 4777 Standards for *Inverters and Inverter Installations (Part 1 and Part 2)* have been published.

BY
GARY
BUSBRIDGE

From a Standards perspective things are all tickety-boo… or are they?

Among the problems that have arisen, by far the worst is the number of fires caused by the DC solar isolator switches, whether on the roof or on the wall near the inverter.

> There were lots of horror stories of poor workmanship and lack of service back-up. If something went wrong, home owners ended up with no support whatsoever – they were probably left with just a phone number.

The regulator in Queensland has done extensive work in the field to check installations and staff were horrified by the number of dubious quality DC solar isolators in the systems.

Some brands that caused fires have been recalled, and you may have seen the notices. These brands were of poor quality with ineffective switching contacts, which would not have survived the performance requirements of a DC isolator Standard in any shape or form.

Given the evidence gathered by the Queensland regulator, it's hardly surprising that there's a bit of work to do in tidying up the loose ends.

A recently updated international Standard for DC isolators is being adopted in Australia as AS/NZS 60947-3. It's highly likely that the DC solar isolator will be called up in legislation as a 'Level 3 or declared article'.

Before being sold in Australia, these items will have to show compliance to the Standard and be marked with the Regulatory Compliance Mark (an approved product).

It is most important to remember that the current AS/NZS 60947-3 Standard for DC isolators is robust and provides the necessary performance and verification detail for these types of switches if applied appropriately.

However, it needs further environmental considerations specifically related to Australian and New Zealand requirements.

Some of the detail now being considered should help with your selection, so the following should be considered as a requirement before buying solar isolators.

(It will be a future requirement, but this sort of information and performance probably applies already to reputable manufacturers' products.)

First, look for the marking, and by this I mean the label. It should preferably be on the front of the cover so that it can be easily seen after installation.

The essential information is the trade name, the catalogue number, the IP rating (eg: IP56), DC-PV2 classification, the rated current of the switch in the enclosure, the AS/NZS 60947-3 Standard number and the mounting orientation.

For your information the DC-PV2 is described as: connecting and disconnecting PV circuits where significant over-currents may prevail and where current flow can be in both directions; for example, where several strings are connected in parallel and to the same inverter, or one or more strings with a battery.

Second, the product should carry the manufacturer's instructions for the installer. The information should contain details of installation requirements for the IP56 outdoor units, and an indoor unit where it is not exposed to weather.

There should also be some derating factors for the rated current based on the ambient temperatures where the unit will be installed. This may affect the ratings of the solar installations.

The cross-sectional size and the number of cables accepted into terminals along with specific torque ratings on the terminals are also expected to be on the instructions.

Third, there are some physical performance issues to look for. The operating method of the switch should be independent, meaning that the user has no control of the switching action within, even though the user operates the switch.

The switches shall also be suitable for isolation purposes and able to be locked in the 'off' position.

Fourth, and this is an important aspect of the installation, you must deal with the effects of moisture ingress in the enclosure.

Think about how the conduit is fitted to the enclosure, as heating and cooling during the day and night does cause some condensation in the enclosure.

To this end, have all conduit entries to the bottom face of the enclosure so that any condensation build-up will drain into the conduit. This has been standard practice for many a year among sparkies installing in harsh environments.

If you want to be sure, drainage glands can be fitted to the enclosure that will allow drainage but won't compromise the IP56 rating.

The trick is to buy reputable products for your installations – just like using a reputable sunscreen to protect your skin. ■

> **Clipsal by Schneider Electric**
> **www.clipsal.com**

A TARIFF-IC OPPORTUNITY

AS POWER BILLS BECOME INCREASINGLY CONFUSING, ELECTRICIANS SHOULD USE THE OPPORTUNITY TO EDUCATE THEIR CUSTOMERS ON HOW TO SAVE MONEY. PAUL SKELTON EXPLAINS.

Do you remember when reading a power bill was simple? When there were two tariffs – peak and off-peak – and you could pay the bill knowing that it was probably correct?

Times certainly have changed. Under the guise of 'making things fair', utilities have added so much complexity to the process that these days your power bill may as well be written in Farsi. Surprisingly, though, the increased convolution of power bills could be a good thing for electrical contractors, particularly those with SME customers.

Glenn Platt leads the Grids and Energy Efficiency program within CSIRO's Energy Flagship, which focuses on solving the energy challenges of consumers, business and grids. He says the issue of complex tariffs presents an interesting business opportunity to contractors – that of education as well as upselling new technologies.

"Utilities are trying to make things a lot more complicated," Glenn says.

"The increased complexity of tariffs solves a number of problems for people who run the electricity network. The theory is that you can use higher prices to get people to spread their usage out, which means there will be less peak demand.

"Another problem utilities are facing is around the use of solar and the fact that people who have lots of solar often don't use a lot of electricity from the grid, but still require access at night or on overcast days. As a result, these customers don't really pay much for the grid, which makes grid-reliant users believe they are subsidising them.

"As a result, utilities are using a 'demand tariff', where you get pinged based on the maximum load you draw from the grid."

Glenn explains that the theory behind the introduction of multiple tariffs is to steer people's behaviour.

"From a customer's perspective, things are getting a lot more complicated. They now have to understand all of these new tariffs and change their behaviour accordingly, which in some cases just isn't possible," he says.

"A few electrical students I know struggle to tell the difference between power and energy, so how will home owners fare?"

This is where educated contractors come into play.

"People are starting to call out for help. Home owners and small business operators are looking for clarity in regards to tariffs and how to save money. This means there's an opportunity for contractors to be providing advice to their customers.

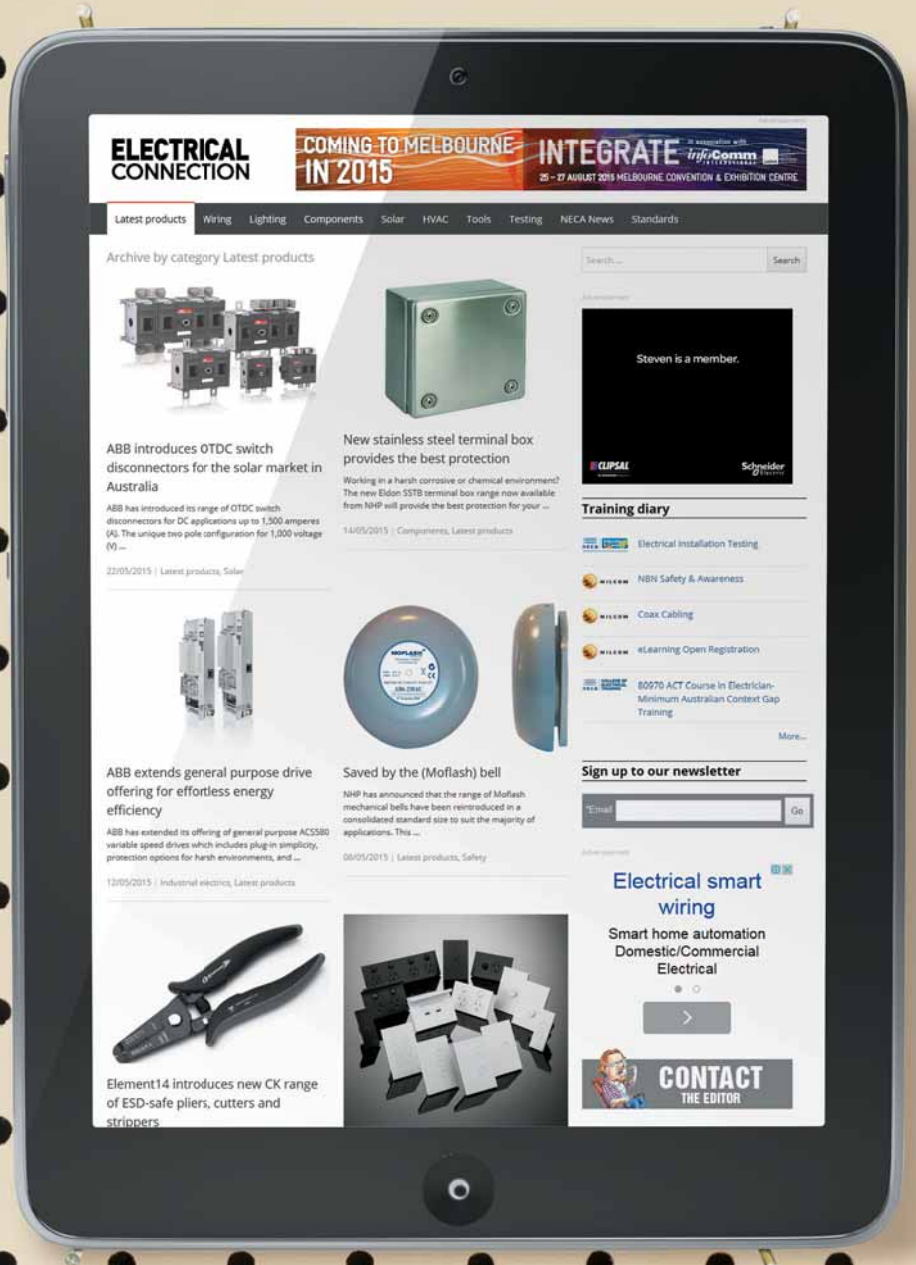
"At the other end of the spectrum, there's an opportunity for contractors to be installing new technologies, like batteries, which are really well suited to helping customers save money given the new tariff structure. Alternatively, you could install load management technology or timers on some circuits. The truth is, there are a range of options available to contractors.

"This is a complex issue and people will pay more should they not change behaviour, which many people don't know how to do."

Glenn suggests contractors look at the Federal Government's Energy Made Easy website, which offers guidance on all the tariffs in Australia. It will help to get a better understanding of how to assist your customers. ■

> **Energy Made Easy**
> **www.energymadeeasy.gov.au**

ELECTRICAL CONNECTION



Your online toolbox

ELECTRICALCONNECTION.COM.AU

QUALITY MATTERS

POWER FACTOR CORRECTION CAN LEAD TO ADDITIONAL BUSINESS FOR ELECTRICAL CONTRACTORS. PHIL KREVELD COVERS THE CONSIDERATIONS.

Maximum demand in Australia has been growing much more strongly than aggregate terawatt-hours, particularly in the northern states.

Yet even in the south, kVA demand has become an important consideration in distribution companies' capital expenditure. As a result, consumers in areas previously not subject to kVA tariffs are facing substantial increases in their energy bills.

Electrical contractors willing to take an interest in this field can make an economic case for installing power factor correction gear, and thereby gain increased business.

This article deals with technical aspects and some matters relating to installation and service.

POWER FACTOR

A power factor of 0.9 lagging – not too shabby, you might think – implies a phase angle difference between voltage and current of almost 26°.

In kVA terms there's an 11% increment compared with kilowatts, and the possibility of a sharp increase in the power bill. To correct the power factor to 1.00 requires almost half the kilowatt value in kVArs.

In short, that's where the cost-benefit calculations come in: weighing up the cost of correction against potential savings in electricity.

Correcting the power factor to 0.95 requires about one-seventh of the kilowatts in kVArs, reducing kVA to 5% of kilowatts thus minimising the chance of a bigger power bill.

The power factor in discussion is the displacement power factor, equal to the cosine of the phase angle difference between voltage and the fundamental 50Hz current – ie: cos φ where φ is the phase angle.

It's not the total power factor, because that takes into account current harmonics as well. There is some doubt on the sensitivity of metering in respect of harmonics in a particular installation. However, it's a safe assumption that the kVA (when based on Kilowatts divided by the displacement power factor) gives the demand on which the tariffs would be based.

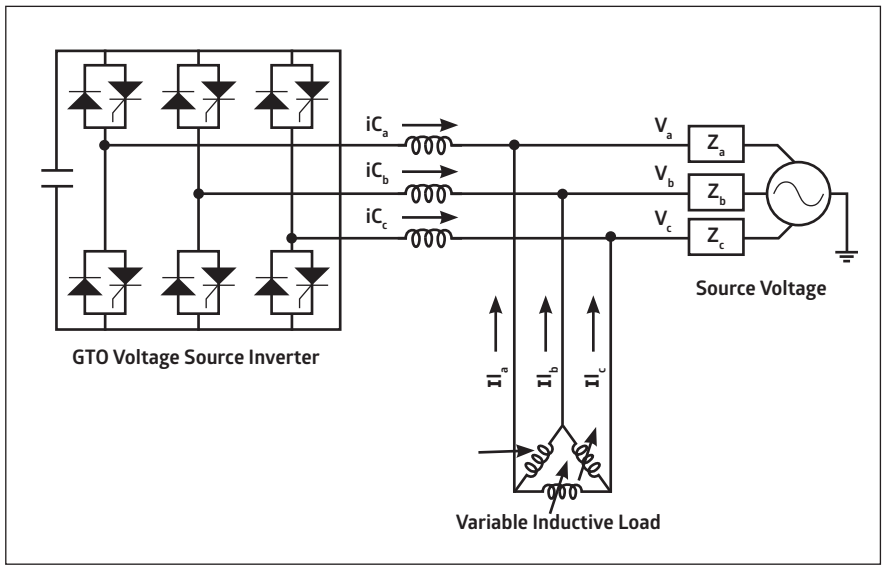


Figure 1: Schematic for a STATCOM.

CORRECTION EQUIPMENT

With the exception of electronic loads such as IT power supplies, most loads draw lagging current.

Correcting kVArs is almost invariably handled by capacitors, their leading current offsetting the load current lagging reactive component.

Commercially available equipment mostly employs capacitor-based correction. However static var compensation equipment is also available. The latter type uses solid-state switching to generate anti-phase current.

A note of caution: the different technologies have advantages and disadvantages. *Electrical Connection* does not offer editorial advice. We highlight matters so that readers can investigate technical features and, where necessary, seek independent advice.

Based on the technical literature, it seems that some static var compensation equipment (in particular STATCOM, see below), offer important advantages. These include stepless adjustment of reactive compensation, and leading as well as lagging power factor correction.

HARMONICS

Office buildings, malls, supermarkets, etc, have high harmonics generating loads.

There's a common assumption that the displacement power factor is close to unity, but this is not always borne out by measurements.

BY
PHIL
KREVELD

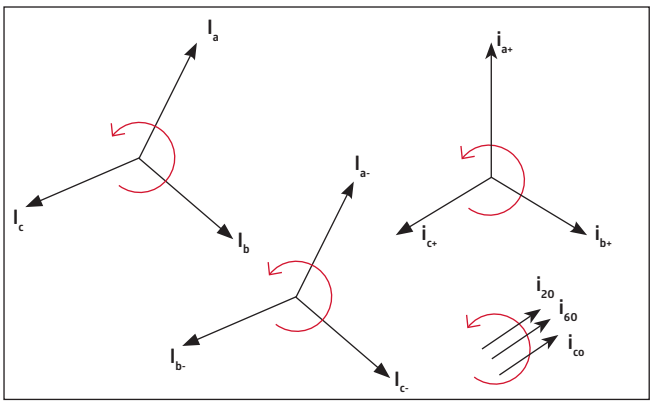


Figure 2: In general, unbalanced currents can be resolved into a-b-c (positive sequence), a-c-b (negative sequence) and a0-b0-c0 zero sequence components.

Thyristor-based converters in variable-speed drives for fans, chillers, compressors, etc, have lower power factors than insulated gate bipolar transistor (IGBT) and gate turn-off (GTO) thyristor switched converters. The latter two have a power factor very close to 1.00.

Phase-fired thyristor equipment – used in heating, gluing, heat treatment, etc – has a poor displacement power factor. Phase firing at 30° (1.7 milliseconds from the zero-crossover) produces a displacement power factor of 0.78. The harmonics content for the current is close to 50%.

Harmonics further reduce the total power factor but have no bearing on displacement power factor.

HARMONIC FILTERING

It's often assumed that harmonic filtering improves power factor, but this is true only for total power factor.

Many active harmonic filters provide limited displacement power factor correction. However, their total kVAr capacity invariably has to be apportioned between harmonics mitigation and displacement power factor correction, thus limiting one or the other capacity range.

In some installations, capacitor-based correction equipment is combined with active filtering. In such cases, care must be taken to place the capacitor bank at the incomer, and not on the bus feeding the harmonics-generating load.

THE STATCOM

The equipment type referred to here is properly called a static synchronous compensator.

It is often referred to as a STATCOM, and a simplified schematic is shown in Figure 1.

The circuit looks a lot like those employed in active harmonic filters, but in this case the control scheme is different in important ways. >

Although details of the compensation will vary between commercially available equipment, in each case the fundamental current is extracted by some means – fast Fourier transform (FFT), notch filter, etc.

Pulse width modulation, adjustable per phase, basically allows adjustment of power factor per phase and also the balancing of phases.

For many installations, phase balancing is a very important feature requiring a dynamic response, in that phase loading fluctuates in many if not most installations.

There is little or no detail in suppliers' technical literature on how phase balancing is achieved. One method is possible by way of control protocols converting unbalanced currents into symmetrical components. See Figure 2 for a brief description of symmetrical components.

The negative sequence controller injects capacitive or inductive negative sequence currents of opposite phase to that of the load negative sequence currents.

As a result, the network sees symmetrical load current and phase voltages without exchanging power with the network. Note: the zero component flows only in a four-wire distribution system or otherwise in delta windings of transformers.

It is advisable to examine phase balancing features closely and seek practical verification if that feature is crucial for an installation.

OTHER COMPENSATION

The use of thyristors and GTOs as switching elements for capacitors – and sometimes parallel connected inductors – is well established in MV and HV transmission.

The STATCOM had its start in MV distribution, and more recently it has come into use in LV networks. The term static var compensator is generally reserved for equipment switching passive components.

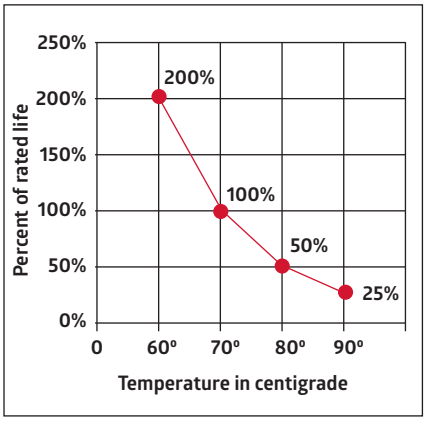


Figure 3: Capacitor lifetime versus temperature.

CAPACITOR-BASED CORRECTION

Metallised polypropylene (MPP) capacitors have greatly improved capacitor bank reliability compared with earlier types using polychlorinated biphenyl (PCB) dielectric material.

MPP capacitors are durable and generally offer a self-healing feature. When they short out, the conductor area surrounding the shorted area vaporises, thus removing the shorted circuit. The capacitor continues operating, with slightly lower capacitance.

The self-healing feature is convenient, but if capacitors continue operating beyond their design constraints they start to have multiple shorts and can lose capacitance more rapidly.

Capacitor banks are generally connected in delta circuits, using power factor as measured on one phase as the basis for power factor correction.

Specialised contactors are sometimes employed with early-make contacts in series and a current-limiting resistor to help 'form' the capacitor, followed by the later main contact closure.

Some contactors employ the use of small, air-core inductors to limit inrush current. However, this technology increases the response time of power factor correction equipment. Zero voltage cross-over thyristor (triac) control diminishes inrush current and improves response time.

PREVENTIVE MAINTENANCE

Temperature degradation, in terms of component value and reduced lifetime, is a serious problem.

It should be dealt with by regular preventive maintenance testing, including capacitance measurement.

Twice yearly check-ups, including verification of capacitance values, are recommended. But this is rarely done in practice, even though it is desirable for continued effective operation of the equipment.

Problems occur with frequently exercised capacitor banks, particularly in regard to inrush current. This can be several orders of magnitude larger than under steady-state conditions, thereby causing contacts to weld.

SELECTING CORRECTION EQUIPMENT

Significant harmonics, load unbalance and power factor variations must be taken into account.

It is a very good idea to carry out a thorough power quality survey before specifying power factor correction equipment.

Specifications for new installations may describe in detail the equipment to be quoted on, but they lack information on power quality at the site. This adds to potential future problems such as voltage regulation, resonance and imbalance.

For existing installations a power quality survey should be conducted over a reasonably long period. This will allow as many possible variations in electrical parameters as possible to be captured and contrasted against incoming power line conditions. Problems in power quality at that stage cannot easily be compensated.

Although not a direct power factor issue, phase balancing is very important. Many types of load – in particular induction motors – respond badly to phase imbalance. ■

Why put it all on the line because of a non-certified lug?

The Australian and New Zealand Standard and specifications for lugs, links and connectors is unique compared to the rest of the world. These standards were developed to protect lives and buildings, because an inferior lug can result in an arc flash explosion or other dangerous joint failures.

Don't get caught out by false statements claiming products are compliant – demand a valid test certificate and look for a clear, distinctive brand name on the product.

For your protection, only use CABAC branded lugs, links or connectors and rest easy knowing CABAC lugs, links or connectors are designed, manufactured and certified to Australian and New Zealand Standards. Certification testing is conducted in an independently accredited NATA Test Laboratory.

Play it safe, with CABAC branded certified lugs, links and connectors.
Visit www.cabac.com.au/certifiedlugs for more information.

CERTIFIED · INSIST ON CABAC ·

Certified System Quality ISO 9001 SAI GLOBAL

NATA WORLD RECOGNISED ACCREDITATION

Certified?
Always look for the CABAC icon and testing certificate

CABAC
One Call → One Day → One Delivery

TASTY DISHES

SATELLITE DISH WORK CAN BE A PROFITABLE SIDELINE FOR ELECTRICIANS, AS THE TOOLS AND EXPERTISE ARE ALREADY IN PLACE. DAVID HERRES OFFERS AN OVERVIEW.

Construction workers of all types are severely affected when the economic climate is uncertain and demand for new building blows hot and cold.

Electricians seem to survive downturns fairly well. One coping mechanism is to reach out into closely related fields such as refrigeration and data networking. Electricians have tools and knowhow that are applicable wherever electrons or photons are being moved about.

Communications circuitry is one area that has a lot in common with power and light. Design, installation and repair concepts are simple, but task-specific demands have a way of becoming complex and detailed. Of course, electricians are used to that.

Many homes in the developed world have TV and an internet connection using cable or a satellite dish.

Audio, video and data transmission operate at much higher frequency than the 50Hz or 60Hz we are accustomed to in power and lighting. For home owners it's a mysterious world of bandwidth, harmonics and duty cycles.

For an electrician it's not a very big step beyond Ohm's law and familiar notions of capacitance and inductance. There is abundant information available in textbooks and on the internet.

Otherwise you could find some malfunctioning equipment and dive right in. You may not have an oscilloscope or spectrum analyser just yet, but bring along your multimeter.

If a TV is completely dead – dark screen, no sound, no illuminated LEDs on the front panel – it probably means the internal power supply is defective. (Occasionally the problem is as simple as a defective power cord or tripped breaker.)

If the set shows signs of life but the video and/or audio quality is poor or the video has difficulty staying in synch, there will be a range of possible faults.

The way to proceed is to examine the transmission line, including modem, cable box and antenna. (A satellite dish is technically a type of antenna.)

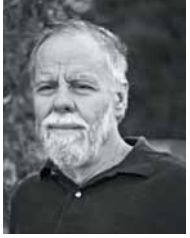
A good tool in this endeavour is a field strength meter. It can measure the transmitted signal in space or at various points along a transmission line. This can also be done using a small portable TV with an RF port on the back panel that accepts a coaxial cable connector.

Troubleshooting consists of moving along the transmission line and watching for an abrupt change in signal strength, indicating the fault location.

For campus-style buildings under single ownership, the coax is usually mounted on power poles some distance below the grounded conductor associated with the high-voltage circuit. You will need a cherry-picker.

To make this type of transmission cable work, inline amplifiers are located at less than 100m intervals to make up for signal attenuation, and these amplifiers need power to bias the semiconductors.

The power is carried along with the RF signal in the coax. It may be AC or



BY
DAVID
HERRES

DC and is typically about 60V. The power can be introduced at either end of the transmission line or anywhere along the way. All that is needed is a small cord and a plug-connected AC-powered transformer connected to the coax.

If this power is out, the good news is that AC voltage can be used for troubleshooting the line using a standard multimeter.

Many users, especially residential, receive television programming via a satellite dish. Large hotels and similar facilities, often with multiple buildings some distance apart, are also good candidates for this technology.

The troubleshooting techniques mentioned for coaxial cable are relevant because the signal has to be conveyed to the receiver in the building. However, installation, maintenance and overall troubleshooting are somewhat more complex.

Satellite dishes are generally used in remote locations. They function well, with video and audio quality equal to, or better than, those of cable – notwithstanding occasional weather-related outages.

The defining feature of a satellite system is the parabolic metal antenna. A parabola is one of Euclid's conic sections, and reflectors conforming to that particular curve are widely used. Light bulb reflectors and remote listening devices are other examples.

The dish gathers the signal contained in electromagnetic energy coming from the satellite and focuses it at the input end of the feedhorn, which is mounted at the dish's focal point.

This segment of the signal path provides lots of passive amplification, the amount determined by the diameter of the dish. (With higher power transmission in recent years, it has become possible to reduce the size of the dish.)

The dish must be precisely aimed so as to pick up the signal from the satellite, which occupies a fixed position in the sky directly over the equator. The satellite must be at a specific altitude – 35,786km – to avoid crashing into the earth or flying off into space. Small on-board rockets maintain the position.

There are thousands of satellites in geostationary orbit, and additional satellites are launched as needed.

Satellites contain transponders, typically numbering 24. Each of these is a semi-autonomous transmitter/receiver connected to a power supply and antenna. Programming >

is beamed up from transmitters on earth and the transponders rebroadcast 100-plus channels, multiplexed and at a different frequency so as to avoid blanking out the incoming signal.

Separate transponders serve different areas on earth with slightly overlapping footprints, providing complete coverage of the assigned geographic region.

Installation of a satellite dish is straightforward except for the aiming process, which is highly exacting. It's like hitting a rubbish bin lid at a distance of five miles. If the dish is not pointed correctly, performance will be compromised.

You can use the on-screen signal strength meter or a portable instrument made for the purpose.

It's not feasible to point the dish in various directions and watch the meter for a response. You probably wouldn't find a signal, or you would lock onto a signal from the wrong satellite.

The correct procedure is to look up online the setting for your location. Aim the dish in that direction then tweak it in to lock onto the strongest response.

If the dish is pier-mounted, the metal post should extend well below grade (depending on local soil, wind and frost conditions) and set in concrete. If it's roof- or wall-mounted, it is important to lag-screw the mount securely into sound timber framing. If it is spongy or loose, long-term alignment will not happen.

Apart from pointing the dish, installation is not difficult but you need to understand the circuitry. The signal from the satellite is high-frequency electromagnetic radiation that carries audio, video, synch and metadata for the programming.

Because the frequency is high, parallel capacitive and series inductive losses are great, and transmission via ordinary cable is precluded.

For that reason, the signal at the dish's focal point must travel through a waveguide to the location of the down converter. A waveguide is a bolted and gasketed pipe of rectangular cross-section with a polished reflective inner surface that channels the signal about 1m to where it enters the low-noise block.

Inside the feedhorn is a polariser. Its purpose is to double the number of available channels by sending two separate signals on each frequency. These signals are either vertically or horizontally polarised, and they occupy the same frequency. The desired signal is chosen in the feedhorn.

In early satellite dishes a servo motor rotated a polariser to select the channel, but now the mechanism is electronic.

Because the low noise block contains semiconductors, power supply voltages are needed. A DC supply voltage originates in the building, and travels over the coaxial transmission line to the site of the dish. Two voltage levels (typically 13V and 17V) select the type of polarisation (horizontal or vertical).

In circular polarisation, clockwise or counter-clockwise rotation is selected, doubling the number of channels available.

The signal, reduced to a frequency compatible with coaxial cable and correctly polarized, travels to the receiver in the building where four operations are performed.

First, the desired channel is selected. Some signals are encoded to prevent unauthorised access. A smartcard, inserted into a slot in the receiver, performs the decoding function. Proprietary microchips enable menu interactivity with suitable on-screen graphics.

The signal frequency is reduced to RF compatible with the television set and fed into it through a short coaxial cable. When there is stereo capability, colour-coded cables with RCA jacks are used.

Satellite dish systems are also used for internet access where cable is not available. This is a more expensive and elaborate system compared with TV, and more expertise is required for installation and troubleshooting.

For one thing, the dish has to be aimed more accurately, because any attenuation will show up in the quality of the internet connection. Also, unlike TV, an internet installation involves transmission up to the satellite so that there can be interactivity.

Two coaxial cables connect the modem in the building to the low noise block that is part of the feedhorn/dish assembly. This is usually a twin cable with a grounding wire included.

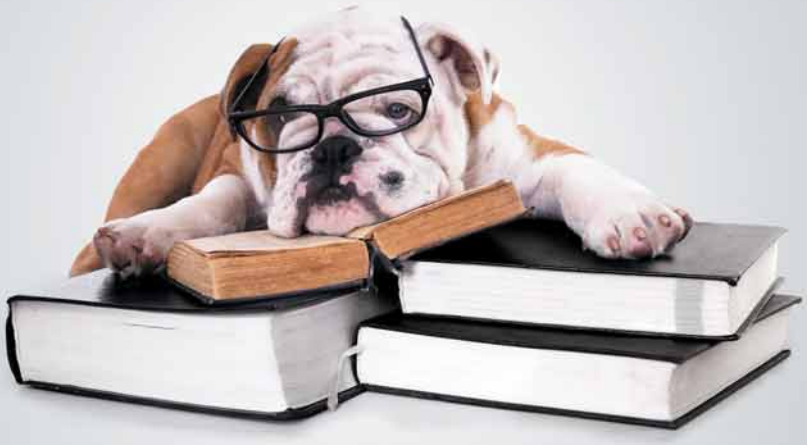
When working on an internet dish, you must beware of radiation burns, which can occur if the system goes into transmission mode while you are at the focal point.

Then there's the sometimes difficult matter of configuring the owner's computers and mobile devices, which involves installing cabling or enabling wireless with the network name and password in each device.

TV and internet satellite dish providers offer extensive online training with examinations and certification. Lots of technical data is included, plus practical information on installation with particular emphasis on mounting and aiming the dish. ■

Communications circuitry is one area that has a lot in common with power and light.

ELECTRICAL
CONNECTION



Old dogs.

New tricks.

WWW.TRADESDIARY.COM.AU

Over 1,000 courses online now.

SPOTLIGHT ON COMPLIANCE

ON 1 MARCH 2016, THE THREE EXISTING COMPLIANCE MARKS CONTRACTORS WILL BE FAMILIAR WITH - C-TICK, A-TICK AND RCM - ARE BEING CONSOLIDATED INTO A SINGLE COMPLIANCE MARK - THE RCM. STEVE ARTHUR, TRADE CHANNEL MANAGER, PHILIPS LIGHTING AUSTRALIA EXPLAINS.

Prior to 2010 the Australian Communications and Media Authority (ACMA) proposed changes to labelling arrangements for electrical product supplied in Australia and the implementation of a consolidated Regulatory Compliance Mark (RCM).

At the time the lighting industry, including Philips Lighting, broadly welcomed the opportunity for a nationally consistent approach for product safety and performance standards, and an improved regulatory framework for equipment suppliers and consumers.

The industry recognised that there were many benefits across the board to the application of one form of compliance mark for electrical safety and electro-magnetic compatibility (EMC). On 1 March 2016, the three existing compliance marks contractors will be familiar with - C-Tick, A-Tick and RCM - are being consolidated into a single compliance mark - the RCM.

WHAT DOES THE RCM MEAN?

The single RCM on an electrical product is the manufacturer's or supplier's declaration that the product being specified or installed complies with the applicable ACMA technical standards.

From 1 March 2016 even though suppliers must use the RCM as the compliance label, it is likely there will still be devices that are labelled with the C-Tick or the A-Tick and these can continue to be supplied until labelled stock has been exhausted.

On 1 March, the Regulatory Compliance Mark (RCM) will become the only compliance mark for electrical safety and electro-magnetic compatibility.

CHECKING FOR ELECTRO-MAGNETIC COMPLIANCE

Contractors are often required to specify products sight unseen or may be handed a product to install by a project manager or home owner.

If in doubt about the compliance of a product, contractors can visit the national database that has been designated for all supplier registration, which can be found on the Electrical Regulatory Authorities Council (ERAC) website (www.erac.gov.au). This is a database is jointly used by the ACMA, ERAC and Radio Spectrum Management (New Zealand).

A supplier intending to supply devices that are required to be labelled under an ACMA Labelling Notice must register on the database as a 'responsible supplier'.

CHECKING FOR PRODUCT SAFETY

All electrical equipment in Australia and New Zealand must comply with the fundamental safety requirements and any relevant standards under applicable state, territory and national electrical safety legislation.

If there is any doubt about product safety, contractors can look up products on the Electrical Equipment Safety System (EESS), a national database administered through ERAC, that

BY
STEVE
ARTHUR

records the registration details of responsible suppliers of electrical equipment in Australia and New Zealand.

A new EESS is being introduced by some Australian State and Territory electrical equipment safety regulators. Under the EESS the previous risk levels for electrical equipment (ie. Prescribed/ Declared and Non-Prescribed/Non-Declared) are being replaced with a three tier risk level system. Under this new system, the risk levels a contractor needs to be familiar with are:

- Level 3 (formally prescribed/ declared equipment) - product must be approved and certified as compliant to use prior to sale, evidenced by a Certificate of Approval/Conformity; be marked with the RCM; have a registered Responsible Supplier (whose name and details are linked to the equipment) and be registered on the ERAC database.
- Level 2 (new level introduced by EESS) - there is currently no equipment classified as 'Level 2', however state regulators have indicated that luminaires may be moved from Level 1 to Level 2 in future.
- Level 1 (formally non-prescribed equipment) - equipment requires evidence that the items meet the relevant standard at the time the item was either manufactured or imported. This evidence is to be kept by the 'responsible supplier' for a period of 5 years starting on the day the item is last manufactured or imported by the responsible supplier.

CHECK WITH THE SUPPLIER

There have been examples of where the RCM has been used by opportunistic importers on non-compliant product. So if there is any doubt, contractors can contact the supplier and/or manufacturer directly.

If an LED luminaire is compliant for example, the supplier should be able to produce, upon request, the appropriate documentation to 'prove' that the product being supplied is compliant. This includes a test report or technical construction file showing the device complies with an applicable technical standard as well as a declaration of conformity and description of the device.

It is important to note contractors still need to be mindful that even when purchasing well-known and reputable brands, the product must be approved for sale and use in Australia. Philips Lighting and other reputable manufacturers go through a lengthy approvals process to ensure product compliance in Australia. Although products may look similar on the surface, if they are not approved for use in Australia there are possibly differences in specifications and materials that could pose safety risks.

WHAT'S THE RISK FOR THE CONTRACTOR?

It is crucial for contractors to remember what is at risk when purchasing and installing products that do not comply - customer safety, livelihood and reputation are just the tip of the iceberg.

In Australia, the liability for products that are found to be non-compliant to Australian standards usually falls on the manufacturer or importer of the product. However, if it can be proven that the electrical contractor knew that the product was non-compliant, some of the liability will also fall to the contractor.

If it is the electrical contractor that purchases product from overseas, then the contractor is considered to be the importer of the product and therefore liable for damages that arise from its non-compliance.

It is important to note here that liability for incorrect installation of complaint products also falls to the contractor, not the manufacturer or importer.

With so much at stake, any upfront savings on a product purchase is therefore negligible in comparison to the potential financial and personal costs associated with installing a product that does not meet Australian standards.

CONTRACTOR COMPLIANCE AND SAFETY CHECKLIST

Electrical and lighting product compliance and safety in Australia tends to be 'assumed' rather than qualified. To avoid non-compliant product:

- Purchase products from a local reputable wholesaler (offline or online)
- Choose well-known brands with a reputation for quality
- Search the ACMA and EESS database to check for product compliance and safety
- For individual product compliance details, contact the manufacturer or local distributor directly
- Watch out for obvious signs including no certification marks, no supporting compliance documentation forthcoming from the equipment supplier or unclear installation instructions.

Contractors can get actively involved with electrical industry initiatives such as Does it Comply?, an initiative aimed at stamping out the use products that do not comply with Australian Standards. Visit www.doesitcomply.com.au, to complete the online training module.

For information on product compliance, or to report a suspected non-compliant or counterfeit product visit the ERAC website - www.erac.gov.au

For updates on Australian Standards visit www.standards.org.au ■

Steve Arthur has been involved in the electronic component and lighting industry for more than 15 years in Australia and internationally. Steve has previously led the OEM business for Philips Lighting in Australia and is now bringing his expertise and passion for lighting and energy efficient LED lighting solutions to the Trade Channel.

SOUNDS LIKE A PLAN

FOCUSING ON THE BASIC SKILLS NEEDED IN AN ELECTRICAL CONTRACTING BUSINESS, BRIAN SEYMOUR TELLS HOW TO MANAGE THE PLANNING AND ACHIEVE A PROFIT.

Busy electrical contractors doing their estimates and administration on the run seldom think logically about the profitable outcome.

Here is a definition of profit according to Investopedia:

A financial benefit that is realised when the amount of revenue gained from a business activity exceeds the expenses, costs and taxes needed to sustain the activity. Any profit that is gained goes to the business owners, who may or may not decide to spend it on the business.

Therefore profit is more than the figures on the balance sheet, it is the lifeblood that keeps the organisation in business and protects the owners from bankruptcy.

Contracting is a gambling business – the bid is made and the risk is taken that the job will follow the anticipated schedule.

So many risk factors come into play even in the most basic installations: weather; availability of labour, tools and equipment; accidents; strikes; availability and delivery of materials; and access to work areas all affect the bottom line.

And a greater profit usually equates to greater risk.

These are just the everyday hazards that can affect your job. Other areas that have a significant bearing on profitability are outlined below.

TIME

Time is a vital element in maximising profit, and it's the hardest to assess.

Any tradesperson worth their salt should be able to list the materials required for a specified job. However, when it comes to labour, the estimator must take into account the aforementioned variable risks, which all affect labour time.

Most projects that go belly-up financially do so because of labour overrun triggered by many of these factors.

FINANCING

Do you have enough money to finance the project?

Many contractors believe that this is not a problem, because of progress payments, and their exposure is minimum. But even working with a customer who pays on time, there is a delay between lodgement of the progress claim and the payment.

Most construction contracts have a payment clause stating that the monthly claim must be lodged by a certain date and it will be paid 21 days from receipt of claim. So, from the beginning of the month until payment, seven weeks will elapse during which you must fund the project.

If you have to go into bank overdraft or borrow money for this funding it will eat into your profit. Even with small service jobs, if you allow your customer credit by sending an invoice after leaving the job, you will be funding this account until you receive payment.

I always advise new contractors to take a leaf out of the appliance servicing industry and demand payment at the end of the job – in cash or EFT – because every unpaid day has an effect on your expected profit.

Also, be sure to pay your suppliers on time. Poor payers get poor service and this will have an effect on your jobs if you cannot get materials when required to meet deadlines.

BY
BRIAN
SEYMOUR

OVERHEADS

This is basically the money required to keep your business operating whether you have any paying work or not.

Electrical contractors' overheads generally run between 15% and 25% of total sales, but this can vary dramatically depending on the type of work undertaken. To establish the most realistic percentage for your business it is wise to consult an accountant.

The overheads for an electrical contractor include administration and office expenses, vehicles, telephone and internet, depreciation, bad debts and collection expenses, industry subscriptions, licences, advertising and promotion.

However, there can also be job-specific overheads, which are incurred on particular job sites. These may include travel beyond the usual radius, hire of specialised equipment, site storage, accommodation, site transport, site lifting, site allowances, and utilities fees and charges. All need to be included in the final selling price to maintain profit.

WORKFORCE EXPERTISE

Does your team have the expertise to complete the job?

As mentioned, the jobs with more risk – and those that include new technology – are greater profit makers. If you do not have the expertise, how much will it cost to hire or sub-contract this work?

If any new technology is going to mean regular business, will a training program be worth the investment in time and money?

DEGREE OF DIFFICULTY

In sports such as surfing and gymnastics, higher marks are given according to the degree of difficulty, and the same applies in business.

Tasks involving a degree of danger would reduce the number of rival tenderers. However, you would need high levels of expertise to consider submitting a tender for high-voltage installations, putting floodlights on a high-rise building, working 500m underground, or installing expensive and sensitive equipment in a multimillion-dollar laboratory.

SOME ESSENTIAL TIPS:

- **Tip#1** Pay your suppliers on time – late deliveries can eat into profits
- **Tip#2** Consider the risk factor – does it outweigh the opportunity?
- **Tip#3** Monitor cash flow – long payment periods have a detrimental effect on profit
- **Tip#4** Do not willingly deceive yourself by underestimating your overheads
- **Tip#5** If you don't have the expertise, consider the most economical way of acquiring it
- **Tip#6** Identify your profitable customers and concentrate marketing strategies to them
- **Tip#7** Use a tender checklist to ensure all costs are accounted for
- **Tip#8** Remember: no customer, no job – keep the relationship strong
- **Tip#9** Profit is the lifeblood of the business

COMPANY EFFICIENCY

Is your customer base growing each year, and are you generating repeat business or continually marketing to new possibilities?

You will need to identify customers that generate the most profit and concentrate your marketing strategies on them.

Their jobs are usually those for which your team has the most expertise and can carry out the work with maximum efficiency.

UNDERQUOTING

Estimating is fraught with potential disaster when tender deadlines are extremely short or when multiple tenders are due on the same day.

Adding to these difficulties are 11th-hour variations and additions to the project, very late supplier quotes and a wide-ranging break-up of prices and schedule of rates, causing the final selling price to be calculated too quickly and resulting in omissions

Another regular mistake in underquoted tenders is the omission of prime cost, provisional and contingency sums; EBA; GST; site allowance; travel; site accommodation; or failure to include sub-contract prices.

These mistakes can cause prospective customers to lose faith in your company.

A good, well thought out selling price assessment sheet will flag up these specified sums and service costs, acting as a double check to ensure you don't omit them from the final selling price.

CUSTOMER RELATIONS.

The customer is the person who pays your wages, therefore 'no customer, no job'.

A profitable company maintains good customer interaction and provides an outcome with a quality consistent with the customer's requirements.

The old adage 'the customer is always right' is only partly true. The customer may know what the desired outcome should be, but in many cases will have no idea how to arrive at it.

This is where the electrical contractor becomes an advisor, to work with the customer to provide the highest-quality installation for the price.

Profitable tenders are often won due to the electrical contractor offering alternatives that produce a more aesthetic outcome or a more efficient installation.

In any market segment there are electrical contractors who are more profitable than the rest. They secure the best jobs, they have an amicable customer base and they maintain a dedicated team.

These companies plan their operations and follow through with the plans. They have established benchmarks of excellence that they continually practise, and it is reflected in their bottom line. ■

SIEMENS PUSHES THE BUTTON ON NEW RANGE OF SIRIUS ACT SIGNALLING DEVICES

SIRIUS ACT IS A COMPLETELY NEW SYSTEM OF COMMANDING AND SIGNALLING DEVICES DEVELOPED BY SIEMENS. A MODULAR SYSTEM, IT FEATURES A ROBUST DESIGN WITH IP69K DEGREE OF PROTECTION, HIGH-LEVEL AESTHETICS AND SIMPLE OPERATION.

Users have a choice of a wide range of pushbuttons and emergency stop buttons, selector and key switches and acoustic and optical indicators. The diverse range in metal and plastic versions for front panel mounting can also be combined flexibly with different rear-mounting contact and LED modules.

An online configurator simplifies selection and ordering. The components are connected to the controller via AS-Interface, IO-Link or standard cabling. Thanks to twist prevention and the innovative snap-on concept, the new commanding and signalling devices can be installed quickly and easily without errors even if holes are not keyed.

The new commanding and signalling devices were developed with a particular focus on ease of installation. The snap-on concept used in their design makes it possible to assemble the front element and rear holder quickly without special tools. Disassembly is equally rapid thanks to a release lever. A screwed connection with reliable twist prevention means that keyed holes are not essential for reliable device installation.

Sirius Act is a modular product line that enables users to choose from four design ranges in plastic and metal versions to meet their specific application requirements.

The front of the holders features different actuators and indicators, while at the rear they provide slots for contact and LED modules.

There is sufficient space to accommodate up to three modules side by side and two contact modules one behind the other in each case. The modules are available with screw terminals, spring-type terminals or solder pin connections

Thanks to its IP69K degree of protection, Sirius Act is unaffected by dust, oils, caustic solutions and extreme environmental influences to the extent that it can safely be cleaned with a high-pressure jet at high-temperatures.

Their long mechanical service life and certification for potentially explosive atmospheres makes the new commanding and signalling devices suitable for every application.

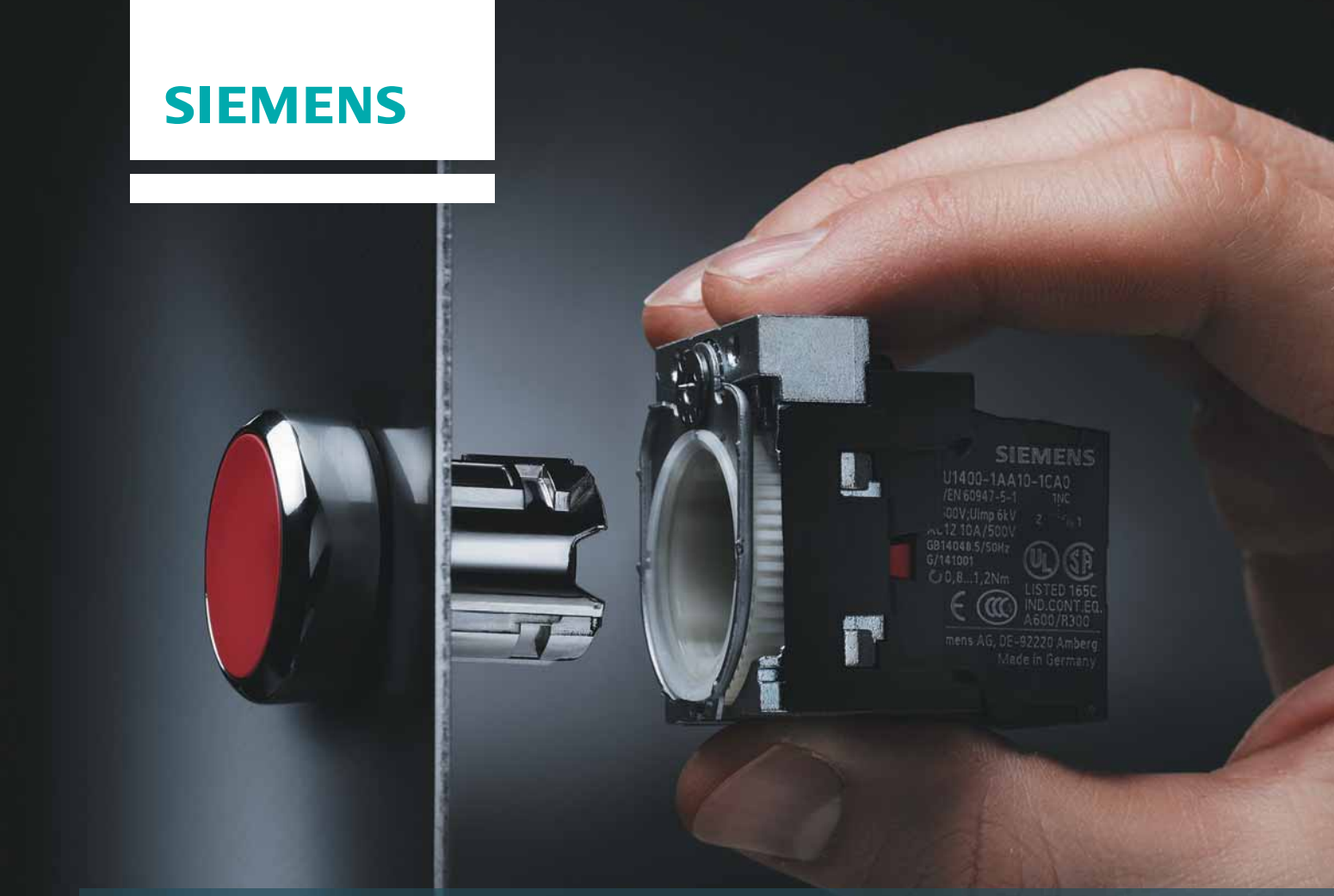
Siemens provides an online configurator for fast and convenient component combination and ordering. Single devices, housings and inscriptions can be combined individually to the customer's requirements in the configurator by means of drag and drop.

An automatically generated CIN number enables customers to reorder their configuration at any time without having to provide any further details. The online configurator provides download options for documentation, exploded views and connection diagrams too.

Sirius Act is now available in Australia through approved partners Ramelec and Power Parameters, and J.A. Russell in New Zealand. For further information about Sirius Act visit www.siemens.com/sirius-act ■

> **Siemens**
> **www.siemens.com/sirius-act**

SIEMENS



SIRIUS ACT – Performance in Action

Fast assembly thanks to new fixing concept

Installation has never been easier. With 100% twist prevention integrated into the holders, SIRIUS ACT can be installed in groove-free milled holes, saving you significant installation time.

The innovative snap-on concept makes the task of installing a unit so effortless that it can be done with one hand.

In addition, visible installation markers and indicators on components further reduce the risk of incorrect installation.

SIRIUS ACT push buttons and signaling devices – convincing in design, performance, ruggedness and handling. Enabling you to get things going.

Sirius Act is now available in Australia through approved partners Ramelec and Power Parameters, and J.A. Russell in New Zealand.

siemens.com/sirius-act

HANDS ON IN THE HILLS

Australian Solar Council vice president and SolarQuip founder Glen Morris runs regular four-day solar hybrid and off-grid training courses.

A PRACTICAL HYBRID/OFF-GRID TRAINING COURSE BEING DELIVERED OVER FOUR DAYS IN THE HILLS OUTSIDE OF MELBOURNE IS ATTRACTING STUDENTS FROM NEAR AND FAR. JACOB HARRIS HEADS OVER TO CHECK IT OUT.

At the end of a winding dirt road that ascends the densely-forested Mt Toolebewong, 70km north-east of Melbourne, is the Moora Moora Community Coop. The 245 hectare, cooperatively-owned property – comprised of approximately 30 homes – has existed off-grid for over 40 years and is the venue for SolarQuip's four-day solar hybrid and off-grid training course.

The course teaches students how to size, configure, program and design both on-grid hybrid systems and off-grid stand-alone power systems. I've come up for the day to check out Moora Moora, get a feel for how the course is delivered and to meet some of the staff and students.

The course is run by Australian Solar Council vice president and SolarQuip founder Glen Morris. I find Glen making his way across a field that separates the classroom where the theory elements of the course are taught and the student's lodge.

Glen, himself a long-time resident of Moora Moora, is happy to show me around and tell me about the course which, he stresses, is available to anyone who's interested and as such has no prerequisites. That being said, Glenn does suggest that a basic understanding of solar systems and simple mathematical equations will come in handy.

"I deliberately run the course without any specific prerequisites. It's not an accreditation unit or a unit of competency from an RTO, it's just professional development. I have run lots of courses for electricians in the past but this time I want to deliver training for people who need extra knowledge in the area but who might not necessarily be involved in the installation," says Glen.

This sentiment is reflected in the varied backgrounds of the students who attend the course. Among the students this time around there's an electrician who wants to learn more about hybrid systems and batteries, a mechanical engineer looking to improve his practical knowledge and an IT professional thinking about moving into the renewables sector. Of course, they're all here for different reasons and all have different levels of skills and knowledge.

We walk around to one of the practical training areas where there is a host of semi-permanently installed systems for the students to practice on. The brands represented here include:

- SMA Australia (Sunny Island 8.0H, SB3000TL-21, SB5000TL-21, Webbox, Sunny Sensor, and Meteorstation)
- Schneider Electric XW+ 8.5kW inverter/charger, 600V80A MPPT, RL 3kW solar inverter, combox and system control panel
- Selectronic SP Pro
- Outback Radian (7KW), Flexmax 80 and Mate3
- Studer Innotec XTM4000, VarioTrack, RCC, and other monitoring equipment
- AERL CoolMax charge controllers
- Plasmatronic Dingo charge controllers
- Fronius Galvo string inverter
- Canadian Solar PV modules and Camel Energy Storage System (full hybrid unit)
- SolaX hybrid inverter with Pylontec Lithium storage system
- ET/SolarBridge micro inverters (both on-grid and off-grid configurations) plus Power Manager
- AirBreeze DC wind turbine
- StreamEngine 2kW micro hydro turbine

"We've got several training areas that are essentially work zones for

the students. Everything's a bit messy because they're constantly building it and tearing it down – it's never finished. I've got loads of systems that are given to me by various companies, so I just get the students to play with them and learn about them. This is what I've designed this course to be: it's for people who want to learn about the theory and the practical.

"We've got extra low voltage systems for those who are not licensed and we've got low voltage systems for those who are. We have also just received the Redback Smart Hybrid System, which is a rather exciting new inverter. They consider it the Powerwall beta because it's actually an inverter and not just a battery, this is the first one in the world and we're testing it for them," says Glen.

It's a collaborative atmosphere as all the students work together enthusiastically and learn from each other. In this way any disadvantages brought about by disparities in prior knowledge are mitigated. Indeed, all the students appear to be taking a great deal from the experience as they work in small groups to test the IV curve on new and old solar cells and configure an independent power system (IPS).

In addition to the variety of hybrid systems students can train on, Moora Moora homes feature diverse off-grid solutions covering the spectrum of single appliance powered equipment (pumping), single home SPS systems, multiple dwellings supplied from a single SPS system and a micro grid system with multiple homes and buildings supplied by multiple SPS systems linked via a LV network.

It is a unique, relaxed learning environment that promises to provide students with all the skills needed to design both on-grid and off-grid hybrid systems to customer requirements.

"Because the market has changed so much with batteries, the training that's available through the standard units of competency is not applicable any more. I've been on the EL committee, who writes them. and we haven't updated them for 15 years. They only look at battery systems for remote off-grid applications, not for people who are on-grid storing their solar energy trying to reduce the cost of their electricity," says Glen. ■

> **SolarQuip**
> **www.solarquip.com.au**

ALL POWER TO 'EM

POWER OVER ETHERNET IS IDEAL FOR COMMUNICATIONS DEVICES. IAN MILLNER OUTLINES A FUTURE TECHNOLOGY THAT IS AVAILABLE TODAY.

The old days are well and truly on the way out and a new era is dawning fast and furious.

You could be walking into a mine field if you don't get some of the basics right. As always, a disruptive technology is a threat to many and an opportunity to those that are well informed and ready to harness the potential.

In this article we will look at how communications devices will be powered in the future, the technology, how it works and what you need to do to make sure the infrastructure is in place to support it.

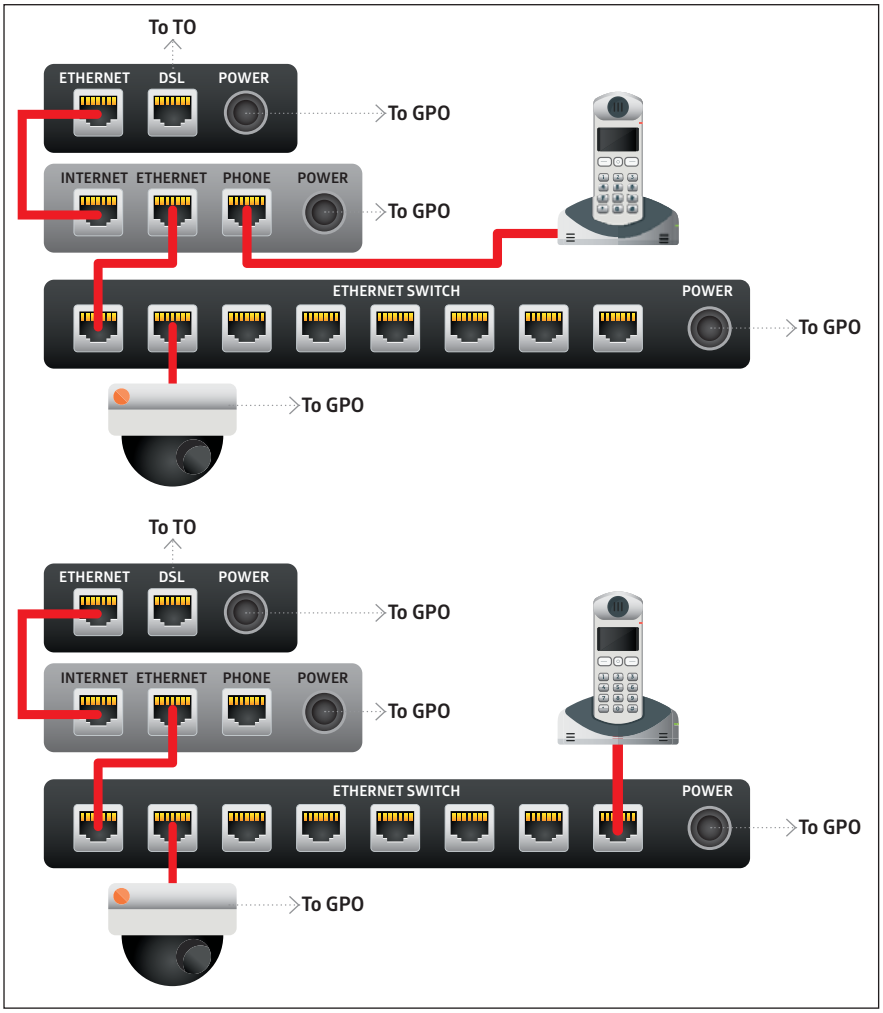
Today's communications devices are generally powered via a 240V AC socket through a power adaptor. Such devices include the:

- Cordless phone
- Modem
- Security system
- Computer
- Television
- CCTV camera
- Wireless access point.

You need access to a socket and connection to the communications network, which can be achieved using twisted-pair Category 5/6 cable or wireless.

For the plain old telephone system, power comes from the exchange. Medical alert and alarm systems usually come with battery back-up so that communications can be maintained for some time in an emergency.

As we know the world is changing, and communications systems in your house (including basic telephone services) will need to be powered locally. This will include your broadband modem, network termination device (NTD), home gateway and any devices that are mission critical or essential to life.



Figures 1 and 2.

To provide a power back-up in a residential environment you can simply buy lots of uninterruptible power supply (UPS) units and place them around the house. They can support various items, be they network devices or user devices that need to be running if the mains supply fails.

Naturally this presents some challenges, having multiple UPS units to start with, and potentially adding a battery back-up for the broadband NTD, plus batteries for the alarm system and medical alert system. It soon becomes a management nightmare.

The solution lies in structured cabling. Yes, you read it correctly, structured cabling – good old star-wired twisted-pair cable.

Enter tomorrow's technology that is available today – Power over Ethernet

BY
IAN
MILLNER

(PoE). This is power delivered over Category 5 cabling or, even better, Category 6.

The Standards continue to evolve, and they are getting to a point where they can deliver up to 70W of power on Cat 5 or better cable.

The first Standard was IEEE 802.3af, which supported 15.4W. Then came IEEE 802.3at, which supported up to 30W.

The benefit of the technology is that you can start to power devices such as IP phones; IP cameras; a range of devices for security, fire detection and environmental monitoring; aged and assisted living; and home health.

Structured cabling brings it all back to a central location where you locate the patch panel and all the essential communications equipment – the broadband NTD and/or modem, the gateway, the security system and monitoring systems.

This means you can install one UPS to support everything at one central point.

Figure 1 shows an installation without PoE, and you can see that every device needs to be connected to a 240V AC socket.

Figure 2 shows an installation with a PoE switch. Now power to the phone, CCTV camera and home gateway can come from that switch.

How does PoE work? It's simple. The Ethernet port in the gateway/switch injects a DC voltage into two or more pairs of the Ethernet port.

This means that if you need to provide back-up to the DSL modem and the CCTV camera only, you could install a UPS next to the telecommunications equipment then connect the DSL modem and the PoE switch to the UPS.

All other devices can now be connected to the PoE switch, which provides networking access and power. You can then program the PoE switch to power only certain ports during a mains power failure.

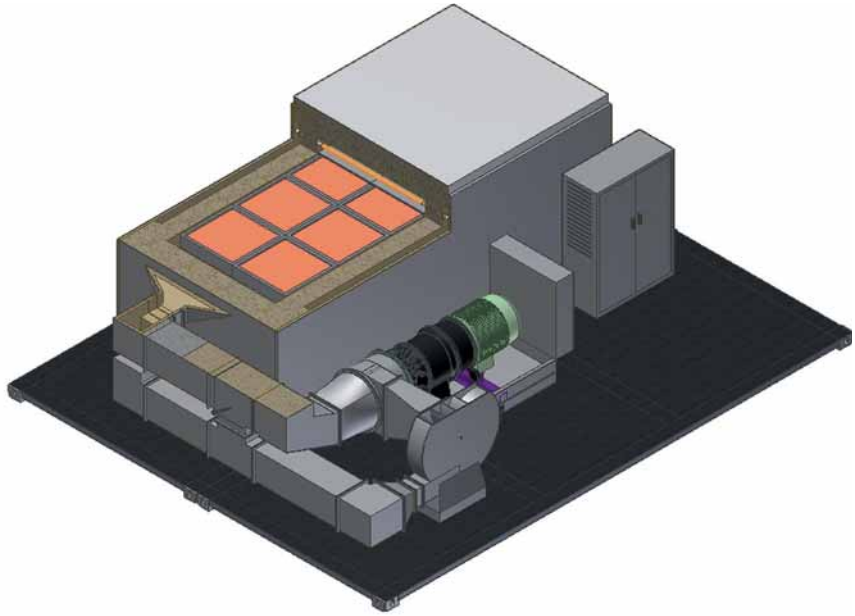
So far we are only seeing the beginning, but one thing you can be sure of is that PoE is here to stay and will cause disruption in areas you may not have considered.

You can do one of two things – ignore it or embrace it.

A final word: several manufacturers use PoE technology for lighting systems, so think very carefully about the choices you make. ■

A SHOW OF SANDS

SAND IS EMERGING AS A KEY INGREDIENT IN THE RACE TO DEVELOP A VIABLE ELECTRICITY STORAGE SYSTEM FOR RENEWABLE ENERGIES.



The TESS device stores electricity as thermal energy by heating and melting containers full of silicon derived from sand.

Latent Heat Storage (LHS) has developed a low cost thermal energy storage system based on the latent heat properties of silicon derived from sand.

The device – known as TESS – is being developed in South Australia with the help of an $A400,000 government grant to take it from prototype to commercial reality.

The TESS device stores electricity as thermal energy by heating and melting containers full of silicon. The high latent heat capacity and melting temperature of silicon makes it ideal for the storage of large amounts of energy.

LHS chief executive Jonathan Whalley says storage was the next big challenge for energy generation worldwide.

"Renewable energy sources generally spill energy due to supply and demand mismatches, so we've designed the TESS device to capture this 'spilt' energy for later use or release to the grid," he says.

"Our system also means that energy consumers will be able to purchase stored electricity off-peak at low tariffs, which ultimately means cheaper energy."

A key benefit of the TESS device is its capability to handle an increasing workload from 500kW applications through to an industrial scale of up to several hundred megawatt hours – enough to power about 7,000 homes for a day.

The patented device is small enough to fit inside a 20-foot shipping container but is readily scalable as demand requires.

TESS is suitable for grid and off-grid applications and has been designed to overcome the intermittent nature of renewable energies such as wind and solar by providing a stable energy output suitable for base load power.

It can be integrated anywhere within an electricity network and is suitable for commercial and industrial businesses where heat and electricity are required such as hotels, schools and hospitals.

"After three years of research and development, our key objective now is to complete building a commercial prototype of the TESS device and start showcasing its potential to global markets," Jonathan says.

A commercial prototype will be ready in early 2016 to be used as a selling tool to potential clients and Jonathan says devices would initially be built to meet the needs of individual sites rather than mass produced.

The Australian Government grant, through its Entrepreneur's Program, has been matched by LHS shareholders to generate $800,000 of total project funding.

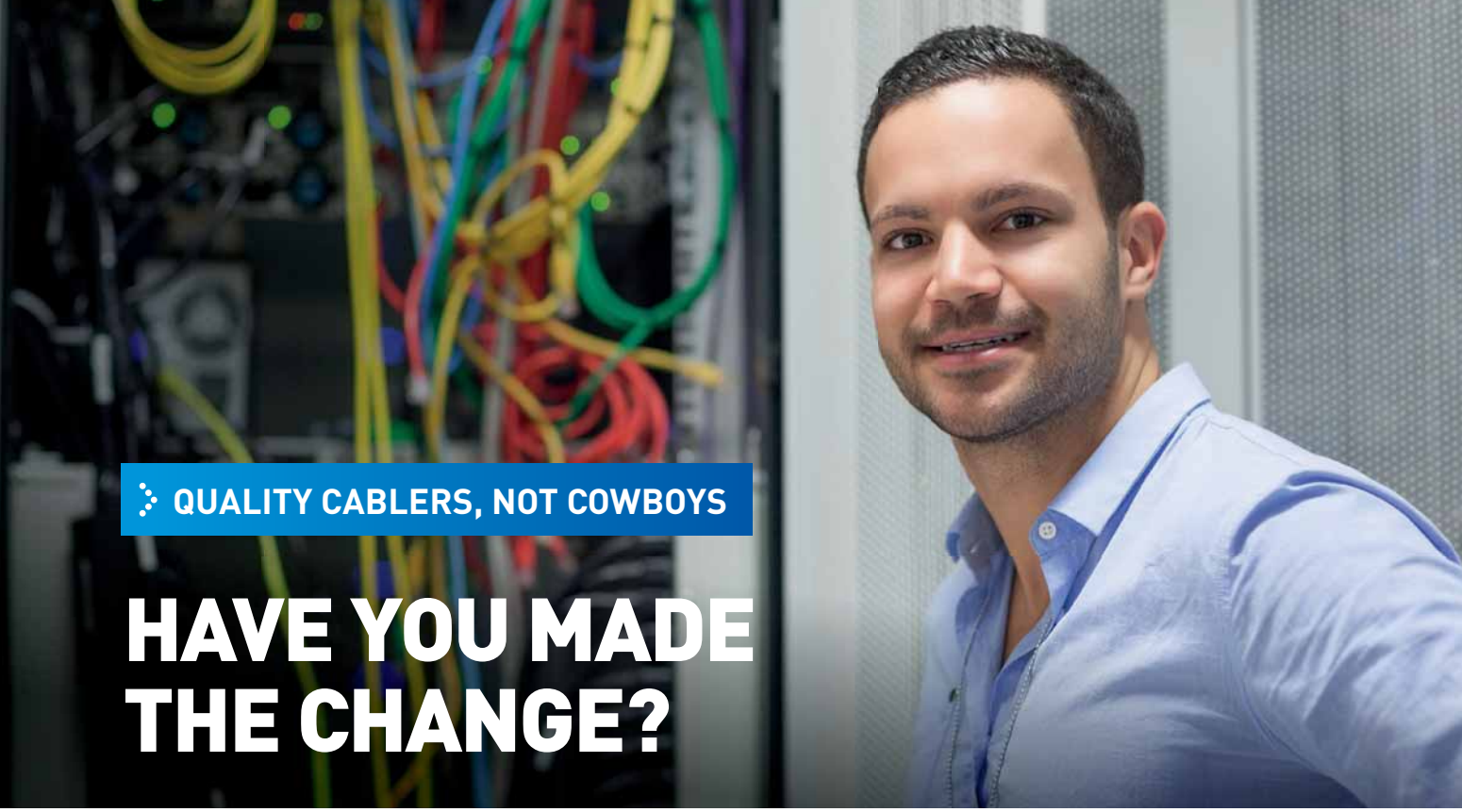
The device has been developed in partnership with Adelaide-based engineering consultancy ammjohn, and final year engineering students at the University of Adelaide.

Jonathan says the commercial introduction of energy storage systems would encourage more renewable energy generation such as wind farms and solar arrays.

"Energy prices are increasing around the world while storage technology costs are reducing, so we're approaching the tipping point where energy storage systems are finally becoming commercially viable," he says.

"We are developing an energy storage system to meet market demand … we anticipate that this will result in exponential growth of the energy storage market worldwide." ■

Andrew Spence



QUALITY CABLERS, NOT COWBOYS

HAVE YOU MADE THE CHANGE?

The 2014 ACMA competency requirements for broadband were designed so that all cablers comply with the highest industry standards. TITAB, which is Australia's largest cabling registry, can update you on changes and also advise on any training you may need to comply.

You must be registered

If you install or maintain telecommunications/ data cabling on customer premises, you must be registered – severe penalties apply for illegal work. Working without a registration may also affect your insurance.

Registration could also open up other broadband opportunities for you, as the NBN takes shape.

Tell your mates to register with TITAB now!

You'll get:

- experienced advice that makes registering easy
- direct access to qualified training providers
- specialist cabling (endorsement) recognition
- newsletter and email updates
- national website listing as a cabler
- access to the services of the Registered Cablers website (www.registeredcablers.com.au)
- access to key telecommunications bodies through our industry affiliations.

Get connected with the largest registry

For only $88.00 (3 years) or $38.50 (1year) it's heaps cheaper than legal action or a $20,400 fine.

TO REGISTER OR FIND OUT MORE

Call 03 9631 0800

email **info@titab.com.au** or visit **www.titab.com.au**

The largest not-for-profit, ACMA-accredited cabler registry

TITAB AUSTRALIA

CITT 37341

national electrical and communications association

A word from the CEO

As 2016 is an election year, this will be another busy year at NECA. We are currently reviewing our policies – which you can find on our website (www.neca.asn.au), and we are gearing up to a new round of discussions with all parties, to be sure our key industry issues are front-of-mind with all relevant federal members and senators.

We closed 2015 as usual with our National Excellence Awards - covered in this update, and again congratulate all our winners. We were also pleased to see that the Federal Government's *Higher Education Amendment (VET FEE-HELP Reform) Bill 2015* passed through the Senate in December with the support of the Opposition and minor parties. The new rules, which came into effect on 1 January 2016 provide greater protections for students and seek to increase the standards of the VET sector by stamping out unscrupulous marketing and enrolment practices.

We also concluded the E-Oz ElAMPS pilot project. This pilot project was a huge success and enabled NECA to engage with apprentice employers and other key stakeholders to examine the strengths and weaknesses of the present apprenticeship system in order

to develop future policy. Following these consultations, our *Employer Engagement* policy has now been formulated and will soon be ready for industry-wide distribution. The policy makes a number of recommendations in relation to competency-based progression, the training, support and supervision of apprentices, blended learning models and the development of an industry-led national apprenticeship recruitment register.

With our Does it Comply? partner, we have developed a series of short video clips that highlight the dangers of purchasing non-compliant products and the potential liability that can follow. These are short clips and very easy to relate to. I hope you will take a moment to refresh your knowledge on this continuing issue. These clips are also on our website.

The planning for our industry conference in South Africa continues to go well. We have now secured all of our main speakers and will be promoting the full program as this issue of *Electrical Connection* arrives on your desk. We have exclusive use of the venue we chose for this event in Stellenbosch – one of South Africa's most spectacular wine regions, and the numbers are looking great. But there are still places available.

We are also excited to be welcoming six winners from the marketing campaign run by our four principal sponsors: Clipsal by Schneider Electric, Gerard Lighting, L&H and NHP. Most of our winners are not NECA members, so I would like to stress that this is an industry conference not just a NECA members' conference. So we would really like to see a broad range of electrical contracting businesses at the conference. For further information – including the final program and principal speakers, check our website.

Finally, I'd just like to wish you a very successful 2016.

Best regards,
Suresh Manickam

Changing times ahead, part two

In the last issue of *Electrical Connection,* Glenn Platt – who is one of the keynote speakers at our conference in South Africa in April 2016, talked about how our world is changing. This is part two of his article.

Today, solar isn't just cheaper for the end consumer than conventional grid electricity, solar systems are also being used to maintain the reliability of the broader electricity grid. Imagine what this will do to the uptake of this technology across Australia.

Even if our Edison could get his head around the localised generation, storage and reactive power control on the power system of the immediate future, things won't stay this way for long.

Already in Australia trials are under way of microgrids and 'transactional' systems, in which local houses and other buildings essentially trade energy. This provides complete independence from the grid and often improves power quality and reliability.

In doing so, these systems demonstrate that we don't really need base-load power. What's needed is generation carefully matched to supply at any instant.

To achieve this, microgrids are managed by automated controllers that can accurately predict future load and generation, then actively manage loads and energy storage to keep things in balance with the available generation. They do this while maintaining power quality to the end user.

Driven by economics, with the bonus of practical benefits, the uptake of distributed solar and battery storage in Australia is akin to the disruption that digital photography caused to film, or the mobile phone caused to telephony.

Although the approaching changes will be widespread and profound, they aren't anything to be afraid of. On the contrary, they represent a great opportunity for electrical and communications contractors.

Glenn Platt heads up CSIRO's Energy flagship and will be the keynote speaker at the NECA conference in South Africa, next April.

The new technologies – solar, batteries, energy management systems, and so on – operate on the core electrical and communications principles we are used to. There are additional skills to learn, but it's not an entire change in direction.

These are labour-intensive sectors that can help the economy. The solar industry in the United States employs more people than the coal industry. It even employs more people than Apple, Google, Twitter and Facebook combined.

Large investment banks such as Morgan Stanley and UBS (not exactly crazy greenies or renewable energy zealots) are publishing papers on how they expect solar and batteries to be a huge industry over the next few years.

For example, Morgan Stanley predicts that about 2.4 million Australian homes will install solar and battery systems, with a payback time to the household of less than 10 years. Ultimately, this means more work, more challenges, and more opportunities for our industry.

Somehow I think Edison would have been a bit disappointed if he had come back and recognised so much of our electricity system so many years on from his initial inventions. However, if he knew about the huge changes just around the corner, I think he'd be excited for us all.

Edison once said: "Everything comes to him who hustles while he waits ..."

Exciting times are ahead – hustle on, I say.

To read this article in full, please go to "News & views" on the NECA website www.neca.asn.au

national electrical and communications association

2015 NECA National Excellence Awards

The nation's best electrical and communications projects have been recognised at the annual electrical and communications industry's Excellence Awards, hosted by the National Electrical and Communications Association (NECA).

State winners from across Australia attended this year's event at the Hilton Brisbane.

Three Victorian projects and two from each of New South Wales, Western Australia, Tasmania and Queensland received the top national awards in front of 350 industry representatives including contractors, educators and government representatives. New South Wales and Australian Capital Territory also received commendations on projects that were narrowly beaten by the overall category winners.

"These projects are the best and most innovative we have seen over the past 12 months," said Suresh Manickam, NECA CEO. "They clearly enrich our industry and reinforce the strong reputation of our sector."

NECA congratulates all of our 2015 winners and wishes to acknowledge the ongoing support of the electrical and communications contracting sector for making the Awards such a resounding success," he concluded.

Winners

Category		Company	State	Project Name
1	Domestic Residence	Argus Technologies Solutions	VIC	Private Residence Berwick
2	Contracting Business	Elecorp Group	VIC	Mitcham Private Hospital – Mental Health Unit Victoria Court
3	Energy Efficiency and Environment	Floyd Industries	VIC	Supply and Installation of Cogeneration Plant for the Wangaratta Aquatic Centre
4	Lighting Project	Kerfoot Electrics	NSW	Dooleys Lidcombe Catholic Club
5	Industrial – Small Project	Klimate Solutions	TAS	IMAS Taroona Research Facility, Mechanical Electrical and Control Upgrade
6	Industrial – Medium Project	RBD Electrical & Instrumentation	TAS	Ta Ann Smithton Plywood Motive Installation
7	Industrial – Large Project	Downer EC&M	WA	Shiploader Replacement Project
8	Voice/Data	Programmed Electrical Technologies	QLD	Lady Cilento Children's Hospital
9	Commercial - Small Project	Barnwell Cambridge	NSW	Chief Entertainment
10	Commercial - Medium Project	Fredon Pty Ltd	QLD	Aldi Distribution Centre – Brendale
11	Commercial - Large Project	Downer EC&M	WA	Perth City Link Rail Project - Electrical and Communications

Commendations

Category		Company	State	Project Name
4	Lighting	Stowe Australia	ACT	Australian War Memorial External Lighting Upgrade
5	Industrial – Small Project	RIC Electrics	NSW	Cootamundra Oil Seeds
7	Industrial – Large Project	Stowe Australia	NSW	Patrick Port Botany Redevelopment Project
10	Commercial - Medium Project	Martin Donnelly	ACT	Canberra Data Centres Fyshwick - Phase 1 and 2

NECA awards Trade Teacher of the Year to WA for the second year running

Garry Christiansen – who lectures at the Great Southern Institute of Technology, is this year's winner of the coveted Electrotechnology Industry Trade Teacher Award.

Garry is a committed, passionate professional with a wide range of experience gained from his career as an electrical engineer. He has developed innovative approaches to apprentice and employer support – including the development of an apprenticeship handbook used by his college, host employers and their apprentices.

He is very client-focused and works with a broad cross-section of regional host employers. And he has achieved excellent results with his Capstone assessments process.

Garry is also a passionate advocate of Training Package reform for the industry and regularly contributes to the national debate from a grass-roots delivery standpoint.

"We were very impressed by this year's candidates," said Wes McKnight, NECA's former President and leader of the judging panel. "Garry was the clear winner. But we were also so impressed by Brett Jotta – also from WA, that we have awarded him a Commendation. Brett teaches at the College of Electrical Training and we were very taken by his vision for the future and desire to see young people making a commitment to a Trade at a younger age," he added.

As part of his prize Garry will attend the NECA National Excellence Awards in Brisbane at the end of November, and thereby joins the industry as we celebrate the best of the best in our industry.

These annual awards are testament to the quality of professionals teaching in our industry today and we take this opportunity of thanking all the committed teachers, lecturers and mentors supporting our apprentices, and post-qualification students, in their studies.

On behalf of our industry, we applaud Garry and Brett, for their great contribution.

Dave McInness, Garry Christiansen (trade teacher) and Neville Palmer (chair of ElectroComms).

2015 National Apprentice Awards

This evening, some of Australia's brightest electrical apprentices were recognised by National Electrical and Communications Association (NECA) at its National Apprentice Awards event at the Hilton Hotel in Brisbane.

The Awards are held annually to acknowledge the achievements of each state's winners.

Guest speaker Brad Morrin – a former Canterbury Bulldog's NRL player and apprenticeship ambassador, delivered an entertaining speech for all in attendance.

Apprentices from across the country gathered in Brisbane to hear the winners of three award categories: Industrial, Commercial/Domestic and Communications.

This year's category winners are:

Industrial

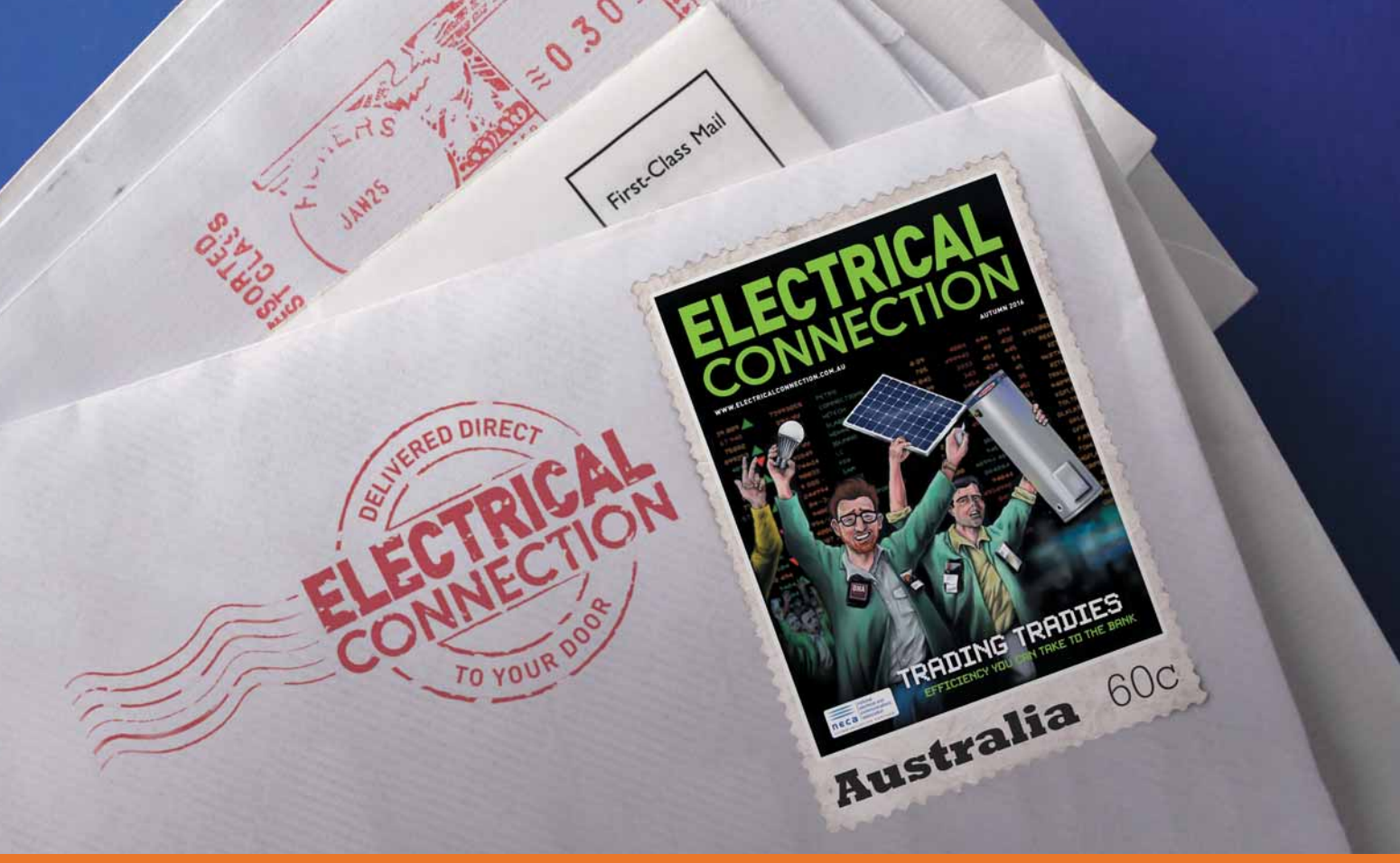
Placing	Name	State	Employer/ host
1st	Jeremy Scheurwater	QLD	i-LEC Solutions
2nd	Daniel Cocker	WA	SCEE (Southern Cross Electrical Engineering)
3rd	James Huf	VIC	NECA Education & Careers

Commercial/Domestic

Placing	Name	State	Employer/host
1st	Bradley Milligan	SA	Bordertown Pumps & Refrigeration
2nd	Cameron Kerr	ACT	Stowe Australia

Communications

Placing	Name	State	Employer/host
1st	Jimi George	SA	PEER VEET Hosted by Expert Data Cabling
2nd	Nicholas Burnes	NSW	NECA Group Training Hosted by Stowe Australia



Don't miss a single issue

○ 2 Year (8 issues) $79.00
○ 1 Year (4 issues) $45.00

○ 2 Year (12 issues) $99.00
○ 1 Year (6 issues) $59.95

○ 2 Year (8 issues) $79.00
○ 1 Year (4 issues) $45.00

○ 2 Year (8 issues) $79.00
○ 1 Year (4 issues) $45.00

PRICES INCLUDE DELIVERY WITHIN AUSTRALIA ONLY*

Name: ..... Company: .....

Postal address: ..... City: ..... State: ..... Postcode: .....

Phone: ..... Mobile: .....

Fax: ..... Email: .....

Total payment: $ ..... ○ CHEQUE ○ MASTERCARD ○ VISA ○ AMEX ○ DINERS

____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ Expiry: ____ / ____

Cardholder's name: ..... Signature: .....

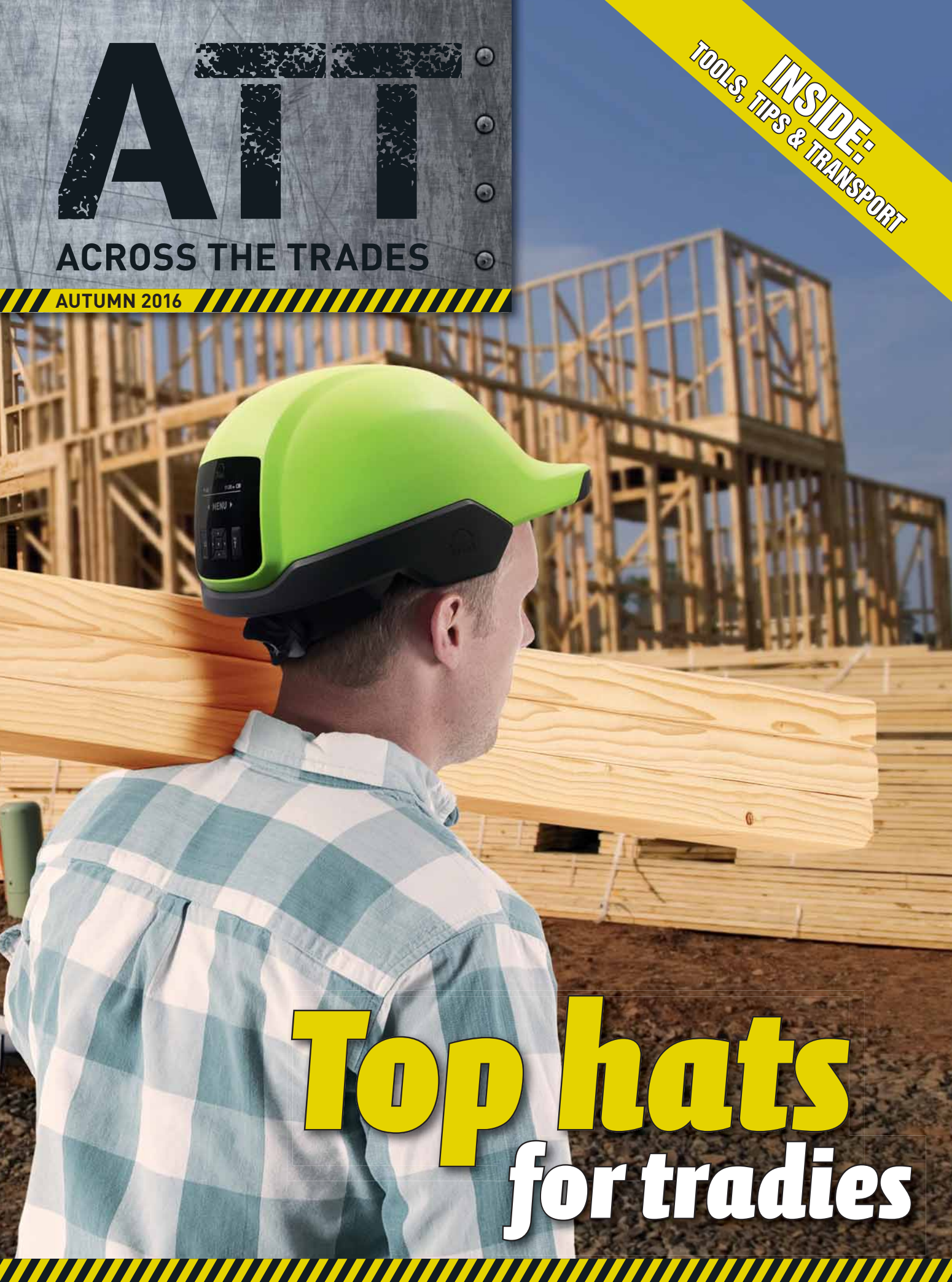
MAIL TO: CONNECTION MAGAZINES, UNIT 2/18-22 LEXIA PLACE, MULGRAVE VIC 3170

FREECALL 1800 623 214 • FAX 03 9542 9090 • WWW.TRADESTUFF.COM.AU

*FOR INTERNATIONAL DELIVERY FEES, PLEASE CALL 1800 623 214

ATT
ACROSS THE TRADES
AUTUMN 2016

INSIDE:
TOOLS, TIPS & TRANSPORT



Top hats for tradies

THE MAD HATTERS OF CONSTRUCTION

As the wearable technology sector takes off, a handful of innovators are turning their attention to designing the hardhat of tomorrow. **Paul Skelton** reports.

eHat can communicate through the wearer's smart phone to an expert who is sitting at their PC at a remote location.

By now, you've probably heard about the new 'wearables' craze. In fact, many of you probably wear a FitBit or know someone with an Apple Watch – some of you may have even seen Google's stupid and pointless Google Glass. But, what you may not know is that wearable technology could play a vital role in the future of health and safety on a construction site.

In the US alone, the wearable market is anticipated to be worth some $30 billion by 2018. This has stoked competition in all sectors of the market, but perhaps the most interesting is industrial.

Industrial wearables (IWs) can be broken into several categories – safety devices (e.g. wristbands with inbuilt GPS trackers), health trackers (e.g. heart rate and blood pressure monitors), communications devices and security solutions.

For construction site workers, especially those in remote areas, the current interest in IW technology appears to be surrounding 'smart hats'.

According to eHatsystems, which is getting ready to release its very own 'smart hardhat', the global smart hat market is estimated to be worth $3 billion by 2020.

The eHat System comprises a smart hat with several unique features. It's a safety hat with a light, a high definition camera, microphone and headset and some intelligent software that allows it to communicate wirelessly to an approved smart phone, back to your subject matter specialist (who could be at home or in the office thousands of kilometres away), who can see almost simultaneously what the wearer sees through their PC or tablet.

"We believe that with the help of

IWs, skilled workers will be kept better informed and safer," eHatsystems founder Terry Lancaster explains.

"eHat may be the first working example of a communication IW. It is aimed at workers who are located at worksites with limited access to supervisors and experts.

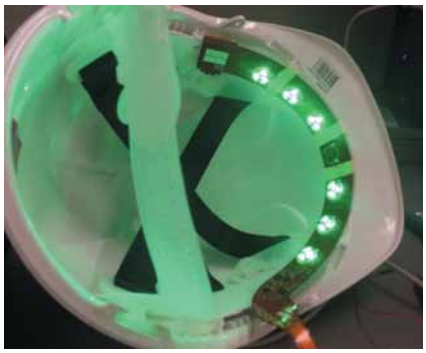
"This means eHat can communicate through the wearer's smart phone to an expert who is sitting at their PC at a remote location. From the eHat camera, the expert can see live streaming of video and hear the eHat's audio. The expert is also able to send audio back to the eHat's headphones."

Ultimately this means that when a person in the field requires assistance or has a task to be assessed, they put on the eHat and make a call to the appropriate expert who is registered with the eHat system. This way the expert can see the problem immediately as well as communicate with the wearer of the eHat so that the issue can be resolved quickly or in the case of training, a trainer can assess if the task is being performed correctly.

The eHat itself is specifically made to meet hardhat standards. It can also be rated to withstand water exposure and be able to stand high temperatures. The great beauty of eHat is the wearer has their hands free to work on the task and therefore have full mobility. This is a significant step forward in the efficiency of communications when compared with standard smart phone applications.

"It's important to note that eHat is more than just a hardhat with some electronic gear on it. It also opens up the opportunity for a new service," Terry says.

"eHat will also enable the efficient crossing of the knowledge line. It will enable, via its support network of experts, the most efficient transfer of knowledge from the people who need answers to those who can provide them."



Laing O'Rourke's smart hardhat includes an array of sensors in the sweatband as well as a GPS tracker.

When a company signs up for the eHat service they will nominate the expert contacts that are most relevant to their workers; however, down the track the company will launch its 'assist hub', which enables the worker to contact the eHat Support Centre. Through this service an expert will be found that is the best match to handle the equipment fault or task required by the person wearing the eHat.

"Through the assist hub, even small companies with limited staff can use the resources of eHat to assist them with situations that they are unfamiliar with. This will have a profound effect on how tasks are completed in the future. Workers will need to feel they are not left to their own devices with eHat. Real live help will always be one call away."

> The global smart hat market is estimated to be worth $3 billion by 2020.

IF THE HAT FITS

eHat isn't the only company currently exploring smart hat technology and, where eHat is yet to launch, international engineering enterprise Laing O'Rourke has been conducting field trials of its own hardhat solution.

Developed by the company's Engineering Excellence Group, the smart hardhat includes an array of sensors in the sweatband, a GPS tracker, an accelerometer and a data collection unit. It has been designed to monitor the temperature and heart rate of the wearer working in harsh environments, plus the external temperature and humidity.

"While the most reliable way to measure a worker's vital signs would be to use a chest strap or undergarment that is in proximity to your heart, guys on site simply won't wear them. A weekend warrior out riding or running may be happy to do that for a couple of hours of exercise, but making it a requirement for a full day's construction work isn't feasible," Laing O'Rourke device engineering leader Rod Shepherd says.

"For that reason, our system has been designed to retrofit any hardhat, ensuring the technology can be used by anyone on site wearing their current protective gear."

In addition to the sensors there is also a vibrating and sound alert system to provide warning to the wearer, based on all the data that is collected and transmitted via a lower-power Zigbee radio to a central gateway for storage. The central gateway is equipped with a 3G M2M industrial router allowing for remote access to all data collected and can also be used to generate alerts by SMS and email.

"We're still in the pilot stage, but we're gaining a lot of insight into how to turn this into a very robust solution that can be used in more applications," Rod says.

"Initially the system will be used on projects that include high-risk activities or extreme conditions with a view to rolling out more broadly across the business in the future.

"Laing O'Rourke is committed to the continual pursuit of safety innovation to ensure our people go home safely everyday. This smart hardhat is just one way we're working to achieve that."

With projects like these in the works, there is hardly any doubt that IWs will soon be a staple of any construction worker's toolkit. If not, I'll gladly eat my hat.

eHat Systems
www.ehatsystems.com
Laing O'Rourke
www.laingorourke.com

TOOLS

IR SCANNER

Bosch Power Tools
www.bosch-pt.com.au

Capturing, documenting and sending detailed temperature measurements have never been easier thanks to the **Bosch GIS 1000 C** professional infrared scanner. Never again risk losing your measurement data through manual transfers, as the GIS 1000 C allows users to store all data and photos taken internally and conveniently document results.

Quickly identify problem areas with the highest precision thanks to the Infrared Scanner's high accuracy of ±1.0°C with a wide temperature range of -40°C to +1,000°C. In addition, accurate ambient temperature and relative humidity levels of ±2% can be recorded due to the precise exposed sensor.

TRUCK ACCESSORIES

ARB
www.arb.com.au

Since the release of the MY16 MQ Triton, ARB has been building an extensive accessory range to complement the vehicle. Designed with practicality in mind, ARB's range of gear includes front, rear, side and under body protection as well as the classic canopy, air lockers and more.

Using 60.3mm outer frame and cross bar tubing, as well as an extensive use of press forming in the construction, the **Summit bull bar** for the Triton uses a split pan design for maximum strength and airflow as well as under wing protection panels to protect the vulnerable lower parts of the Triton. The bar is able to accommodate a range of low mount electric winches, up to 4,500kg, and includes twin hi-lift jack points to assist with difficult recovery situations. Provision for ARB Intensity LED and IPF driving lights are integrated into the top pan of the bar, while a redesigned fog light surround and ARB LED indicator/clearance light assembly is included as standard.

PORTABLE PABX

Broadband Solutions
www.broadbandsolutions.com.au

Broadband Solutions has announced the launch of **Smartphone BBS**, an easy-to-use mobile interface for its cloud-based telecommunications platform, SmartPABX.

The app simplifies the process of eliminating traditional phone handsets from the office environment and ultimately reduces overheads for established businesses and start-ups. Staff simply download the application on their own mobile device and enter their username and password to access their personal extension.

The app is powered by the flexible SmartPABX cloud platform which gives businesses access to all the capabilities of a full-featured enterprise quality phone system for a fraction of the price including, call-waiting, music-on-hold, call queues and CRM integration. Thousands of dollars can be saved on hardware costs with no onsite PABX or handsets required.

STORAGE SOLUTION

Festool
www.festool.com.au

Through the SYS-Combi 2 and SYS-Combi 3 (pictured) Systainers, Festool has combined its traditional Systainer with a drawer for consumables and small parts. These products are the perfect combination of Systainer and Sortainer, providing even better organisation – even on the move. The drawer can be divided flexibly for accessories, consumables, small parts and other objects. This ensures excellent organisation, saves time and cuts down on unnecessary movements, trips and effort.

SUMMER WORKWEAR

KingGee
www.kinggee.com.au
KingGee Workwear is set to keep you cooler with the launch of its new **WorkCool 2** range.

Complete with the latest HyperFreeze and Outlast technologies, the KingGee WorkCool 2 range is designed to support personal safety and wellbeing by easing heat-related impacts during scorching days on the tools.

Injected with Outlast technology, the WorkCool Boot keeps hard working tradies cool on their feet throughout the day, without forgoing cutting edge design.

The lightweight construction comprises a wide profile composite toe cap, cosmo lining treated with Agion Anti-Microbial fibres and a ripstop nylon mesh upper – to provide strong, and breathable support.

CORDLESS TOOLS

Panasonic Australia
www.panasonic.com.au
Panasonic has announced three new cordless power tools using the company's latest brushless motor to deliver optimum performance and durability – the **EY74A2 13mm drill** and driver, the **EY79A2 hammer drill** and driver and the **EY75A7 impact driver**.

The enhanced internal engineering and technology is complemented with a fresh new body design. The cordless tools have a 'carbon fibre look' textured finish, and a comfort grip for improved ergonomics. All models are part of Panasonic's 'Tough Tool IP' range of IP56 rated dust and water resistant power tools, designed to perform at their best whatever the conditions.

CASUAL WORKWEAR

Hard Yakka
www.hardyakka.com.au
Inspired by early 20th century workwear and its Brunswick roots, the new **3056** summer range from Hard Yakka combines the toughness of yesteryear with the form and functionality required from today's hard-working tradies, through a range of jeans, shorts, shirts, Ts and footwear.

EXCAVATOR-DOZER

Kobelco
www.kobelco.com
Kobelco has laid new ground in the Australian market with the launch of a 16-tonne digger/dozer hybrid; the **ED160 Blade Runner**.

The ED160 Blade Runner combines the digging power of the popular Kobelco SK135SR-3 excavator and a six-way power and tilt dozer blade. The blade is similar in size and volume to the blade on a 90 HP dozer.

The ED160 Blade Runner can be used anywhere an excavator or bulldozer would be deployed, for example cutting forest roads and associated drainage work, or stripping vegetation prior to digging trenches and laying pipes. The ED160 Blade Runner offers powerful digging together with fine grading capabilities to provide a one-machine solution on job sites.

SPREADING THE GLOVE

With WHS playing such an important role on jobsites around the country, it is important to get your head around understanding chemical resistant properties.

Protecting workers' hands from chemical hazards can be a complex challenge due to the variety of chemicals and gloves with different protective properties.

ProChoice Safety Gear product development manager Brad Rodgers says that hand protection from chemicals requires a detailed risk assessment of the chemical concentration and exposure time along with knowing the age of the gloves, their history, testing them before use and ensuring they are tested to Australian/European Standards (see below), as well as being a good fit.

"Chemical concentration will have a huge influence on the breakthrough time [how long it takes for the chemical to breach the glove] while exposure time must also be carefully managed," Brad says, adding that other factors influencing glove choice include the temperature of the chemical or material being worked on, along with the frequency of the glove's use.

He suggests that specific advice should not be relied upon unless it comes from the manufacturer of the chemical in question.

"Knowing exactly what is in the chemical and the concentration levels plays a big part in the protection required," he said.

"Material safety data sheets are available from the outlet that sold the chemical or you can usually download them from the manufacturer's website."

MATERIAL AND FIT

Brad states that matching the material of gloves – whether nitrile, PVC, latex or neoprene (see overleaf) – with the above factors is an essential part of the PPE identification process, with thicker gloves not necessarily offering better protection.

"Different glove materials react in different ways to chemicals, so thickness won't play a big part; however, if it's a combination of risks – for example chemical and abrasion, then glove thickness could play an important role."

That said, he cautions, if materials handling is also involved a thicker glove can reduce the feeling and grip, potentially increasing risk.

Brad emphasises the need for a detailed risk assessment and states that fit and comfort of a safety glove is critical.

"It not only increases the likelihood of the glove being worn, but also provides better dexterity and feel. In the case of chemicals, it can reduce the likelihood of the glove slipping or the hand pulling out of the glove and exposing the user to hazards," he says.

volkswagen-commercial.com.au

Includes 92kW TSI with DSG and a corporate escapee.

New Caddy. A lot goes into a Volkswagen van.

People who start their own small businesses put a lot into their van. Not just their supplies, but also their hard work, time and the career they left behind to follow their passion. At Volkswagen, we've loaded our new Caddy with innovative features like a 92kW turbo charged petrol engine, DSG transmission, BlueMotion Technology, touch screen audio, with City Emergency Braking* and Adaptive Cruise Control* as optional extras. We put in so much, because you put in so much.

*Safety technologies are not a substitute for the driver's responsibility of the vehicle.

Commercial Vehicles

Brad adds that matching the length of the gloves to the application is also essential.

"Some chemical resistant gloves can be wrist length but most are above the wrist and some extend right up to the shoulder," he says, adding that submerging the hand into a chemical requires a longer glove to afford the appropriate protection.

GLOVE STORAGE AND TESTING

Depending on how they are stored, the chemical resistance of gloves may degrade over time, according to Brad who adds that latex, being a natural material, is most susceptible to breakdown.

He says gloves should always be stored in a cool dry location and out of direct sunlight to maximise the lifespan and suggested that before use, gloves – whether new or used – should be tested before working with or on the hazard in question to determine if there has been any degradation and to understand the gloves limits and breakthrough time.

"Ensure the gloves are watertight first and foremost. Don't expect every pair will be." he says.

"While manufacturing process are very good, once the glove has been shipped and handled by multiple people you can't be sure that it wasn't damaged. Even if there is no visible damage, it may contain a pin hole."

COMMON HAZARDOUS SUBSTANCES IN THE WORKPLACE INCLUDE:

- Acids
- Caustic substances
- Disinfectants
- Glues
- Heavy metals, including mercury, lead, cadmium and aluminium
- Paint
- Pesticides
- Petroleum products
- Solvents

> Hand protection from chemicals requires a detailed risk assessment.

CHEMICAL RESISTANT GLOVE MATERIALS:

- **NITRILE**
  Nitrile rubber offers excellent physical-hazard resistance to punctures, cuts, snags and abrasion. Nitrile rubber has considerable resistance to oils, fuels and certain organic solvents.
  Applications: Chemical handling, auto assembly, petrochemicals, food processing.
  Suitable For: Oils, greases, petroleum products and some acids and caustics.
- **LATEX**
  Natural rubber (latex) has a very high elasticity compared to other glove materials, good cut, puncture and tear resistance, and outstanding grip and temperature resistance.
  It withstands water, alcohols and some ketones, but has poor chemical resistance against most hydrocarbon and organic solvents. It can cause allergic reactions in some people.
  Applications: Janitorial, food processing, general maintenance.
  Suitable For: Ketones and mild acids.
- **PVC**
  Polyvinyl Chloride (PVC) is an ideal alternative for those with latex allergies, PVC chemical-resistant gloves offer good abrasion resistance, but may be susceptible to punctures, cuts, and snags.
  PVC is effective against water and most aqueous solutions, detergents, and diluted bases and acids, but has limited chemical resistance to organic solvents. PVC is one of the more common coatings for coated work gloves.
  Applications: General maintenance, fisheries, construction, janitorial and gardening.
  Suitable For: Most acids, fats and petroleum hydrocarbons.

NEOPRENE

Neoprene is exceptionally flexible and has good abrasion and cut resistance, while resisting the effects of aging, sunlight, ozone, oxidation and weather.

Applications: Automotive, degreasing, mechanical and janitorial

Suitable For: Some acids and caustics. ▲

STANDARDS FOR CHEMICAL GLOVES:

The standard that relates to chemical gloves is EN374-3- 2003- *Chemical Risk Standard*. The Australian equivalent (which is identical) is AS/NZS2161.10.3:2005 Part 10.3: *Protective gloves against chemicals and micro-organisms—Determination of resistance to permeation by chemicals*

ProChoice Safety Gear
www.prochoice.com.au

GENERAC®

Control Your Power. Control Your Life

MARKET LEADER IN HOME STANDBY GENERATORS

Stand up to unpredictable weather & unforeseen power outages with an automatic standby generator from the most trusted name in standby power, offering you comfort, security & convenience.

Generac Standby Power Generators are powered by **Natural** or **LP Gas** & are fully self contained.

Advanced Features set a Generac automatic generator apart from other solutions

8, 10 & 13kVA units available.

Quiet Operation
Generac Standby Power Generators are lined with sound reducing foam panels for even further reduction in noise levels.

Utility Grade Power
TruePower™ Technology provides clean, smooth power for the safe operation of sensitive electronics & appliances.

Smart, User Friendly Controls
The controller tracks generator functions so you don't have to.

Security & Convenience
If the power goes out, your generator switches on - automatically.

TRADE ENQUIRIES WELCOME

Great value-add oppportunity for new home builders, renovators & developers.

Please note: This is a Type B Gas Appliance. Installation of this appliance requires a submission to Energy Safe Victorian by an appropriately licenced Type B Gas Fitter. The installation must be accepted by Energy Safe Victoria prior to operation. For installations outside Victoria please refer to the relevant state Gas Technical Regulator. Transfer Switch sold separately. Additional fittings may be required upon installation. Images for illustrative purposes only.

ALLPOWER
The Service Experience

For more information phone **1800 333 428** or visit **www.allpower.com.au**

A BOLT FROM THE BLUE

Dewalt has introduce a new battery that features the latest in communications technologies.

Smart phone technology is being used increasingly by professional tradies to drive productivity and a more efficient way of working. To address this opportunity, Dewalt has expanded the XR lithium-ion system with Tool CONNECT, a power tool battery with Bluetooth connectivity that provides the modern construction professional with an easier and faster way to manage their power tool arsenal.

Any power tool fitted with a Dewalt XR 18V Tool CONNECT battery pack (either 2.0 or 5.0Ah), may be paired to a mobile device up to 30m away via the Tool CONNECT app. The customisable interface is designed to provide the user with one-touch access to a wealth of information, such as proximity of location, state of charge and temperature, as well as access to practical reference material.

Once paired via the Tool CONNECT app, batteries (and the associated power tool) can be easily located and identified. Rapid inventory checks can therefore be carried out at the start and end of a job to ensure that all batteries are fully charged, and are within the immediate vicinity. Forgotten or misplaced items can also be quickly identified without time consuming searches.

The 'Lend' function of the Tool CONNECT app allows owners to keep track of tools loaned to an individual or a team. The app will automatically deactivate the power tool battery and notify the owner following expiry of the agreed period of time. This can be a useful means of tracking for tools used by a team on large commercial construction sites, and also an effective way of managing vibration exposure time.

Any power tool fitted with a Dewalt XR 18V Tool CONNECT battery pack may be paired to a mobile device up to 30m away.

In the event of theft, or if the tool leaves a defined working perimeter, construction professionals can automatically disable the Tool CONNECT battery to prevent further use.

Tool CONNECT app users are able to tailor alerts to monitor the status and health of batteries. These include notification of a low state of charge and a remaining run time indicator. The user can also choose to disable a battery when out of range, and be warned of a high operating temperature to prevent damage.

"Time is precious at the end of a working day and high quality power tools can be expensive to replace," a spokesperson for Dewalt says.

"The XR Tool CONNECT system allows construction professionals to quickly check if they have all of their tools accounted for and also verify which, if any, of their batteries need to be charged overnight, ready for the next challenge."

The Dewalt Tool CONNECT app is available to download free of charge from the App Store for smart phones (iPhone 4, 5, 6 models and above) and tablets (iPad Mini and Air models, and above) featuring an iOS operating system, and from the Android App Store (on approved android devices). ▲

Tool CONNECT app users are able to tailor alerts to monitor the status and health of batteries, including notification of a low state of charge.

Dewalt
www.dewalt.com.au

According to figures from Labourforce, franchises are on the rise, with many tradies looking for the support of a larger brand while still working autonomously.

TRADESMAN AND HANDYMAN FRANCHISES GREW 3.2% ANNUALLY FROM 2009-2014.

Handyman franchises had a total estimated revenue of $882 million in 2014.

IN 2014-2015, TRADIE JOB ADVERTISEMENT RATES WERE UP 20.7%.

Demand for temporary and contract staff is up 6.9%

Demand for permanent staff is up 3.4%

25.6% OF ALL JOB ADVERTISEMENTS IN OCTOBER CAME FROM THE MINING, UTILITIES AND CONSTRUCTION SECTOR.

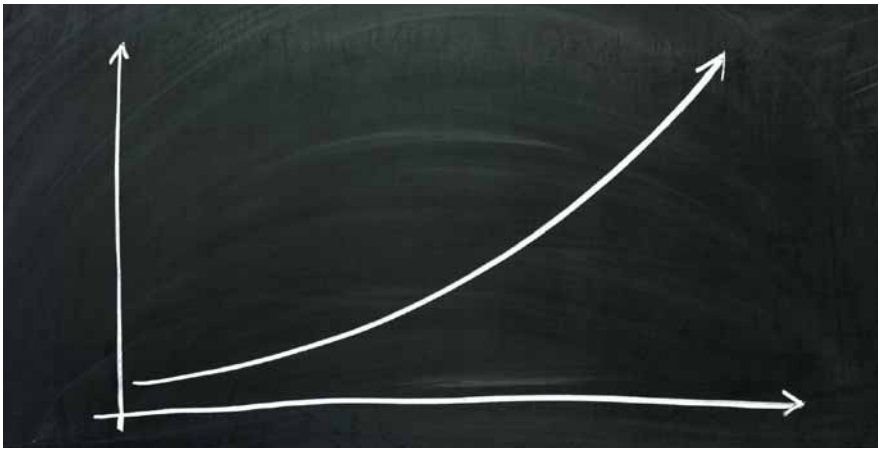
VICTORIA HAS SHOWN THE BIGGEST GROWTH IN EMPLOYMENT, WITH 6.2% INCREASE.

Conversely, NSW was the weakest performer.

**Sources Labourforce Impex Transport, Logistics & Supply Chain Job Index, and Tradesman and Handyman Franchises in Australia: Market Research Report.*

INCENTIVISE AND THRIVE

Through the introduction of a simple incentive scheme, your business can see a growth in productivity of up to 200%, writes **Tony Gattari**.



Once, a client of ours was so upset in the 200% productivity gain that he turned red in the face and shouted obscenities around the office

He wasn't upset with us or the gain, he was upset because he felt that his employees had been taking unfair advantage of him for many years and this was the proof.

In reality, it wasn't the employees that were the problem; it was the business model that they had to work to that was the problem. Our client had simply done what every other business in their industry had done – pay award wage or just above, similar working conditions and similar reporting standards.

Well, if you treat employees like every other business they have been employed in then they will treat you the same way as they have treated their last boss... or worse!

The challenge is that most business owners do not find a more productive way of rewarding their employees, other than paying industry standard. They also treat their employees in the same manner as all the other employers. Your ability to act the same way as all the others gives you dramatically the same result as all the other businesses, and let's face it, that's not being competitive.

THE 200% INCREASE

Originally, the employees of this company were paid a standard wage for the week and the result was standard – employees took sick leave as it became available, wouldn't work back when needed, loyalty was non-existent and the work being done was just satisfactory. The business was a manufacturing business, but the lessons can be used in any business if you put some thought into it (a little more on that subject later).

The stages of change were:

- The owner calculated how many items a person produced each week over a period of one month.
- Every person in the factory was put onto a base wage (they already had this) plus they were paid a piece rate over a certain level of production. Each person was told that this was a test and some adjustments to the rate were possible. Bonus points were taken away for items below quality.
- The items produced and wages paid were calculated each week and the owner discovered that some people (different items being produced) in the factory received substantially more so the rate was adjusted to be more even across the board.
- Monitoring went on for another two months and small adjustments were made to the rates for the different sub items being made.
- The business adopted the new system - crazy not to, given the results.

THE RESULTS

The results truly spoke for themselves:

- 200% increase in productivity.
- Comparative decrease in wages against items being produced.
- Decrease in absenteeism across the board.
- Willingness to work after hours and on Saturdays.
- Higher quality of goods produced.
- Increase in loyalty.
- The highest paid production workers in the industry.
- The most profitable business in the industry.
- A gain of clients due to improved delivery times and quality of goods.

ABILITY TO INCREASE INCOME

Employees need to be able to increase their income if they put in more effort. If you do not allow this to happen in your business then you have a communist regime where every person gets paid the same no matter how hard they work – so let's all work the same – as little as possible to get paid.

If you are fortunate you have employed people that are self inspired and feel rewarded by the effort they put in. Reward for effort is a powerful tool not to be ignored.

LIKELY STEPS

The process below is not an exhaustive list of steps to follow just a simple process to give you points of reference:

1. Define each departments desired productive output. For example, marketing has number of qualified leads; sales is fairly easy with number, value and profitability of sale; production is what the client/customer receives and/or the subcomponents that need to come together to make the end product; finance and

administration could be against percentage of invoices sent out within a set period, bonus for collections under 14 days, etc.

2. Pick the department that is going to give you the highest result for your effort; for example, if you manufacture pick production, if you are a re-seller then sales is your area and if cash flow is a challenge then it could be a combination of the sales and finance departments for collecting the money on time.
3. Develop a bonus system on paper first ensuring you have factored in your costs. Most bonus systems fall down because the employees over perform and the business can't afford to pay the bonus.
4. Model the bonus system on a spread sheet using the wages, bonus and costs as the key figures to check. If you are working on units and the current situation is 100 units produced each week then you need to test the bonus on what happens if they produce 300 units or 500 units. How does this affect your costs – do you have to employ more people to keep up with the work? Do you have to move premises, etc?
5. Build in quality if you are working on an increase of units.
6. Once you are happy with the bonus structure and have tested it on paper and on your computer then you will need to meet with your employees, discuss the bonus system, discuss how it will work and that it will be tested and some adjustments may be necessary.
7. Test it, cost it so you know you are making a profit.

DANGER POINT

Do not put in a bonus system and then take it out as employees will become unmotivated and your business will suffer. A bonus system needs to be well structured prior to it being implemented.

Make sure you cost the bonus system in terms of extra wages compared to profit and productivity and you have the cash flow to pay it. If you are paid on 30-45 day accounts by your clients/customers and you pay wages every week then a good bonus system could send you profit rich and cash poor. Pay a bonus only after you receive the cash, e.g. if you are paid by your clients every 45 days then the bonus would be paid quarterly. ▲

Tony Gattari is founder and chief energy officer of Achievers Group. He also acts as general manager of sales and marketing for Laser Plumbing and Electrical membership group.

LADDER SAFETY

SAFETY DEVICE

Ladderlimb
www.ladderlimb.net
Ladderlimb was recently launched on the market to enable all ladder users to perform more safely and efficiently when carrying out all ladder tasks.

Ladderlimb makes working up ladders safer by securely holding tool bags, buckets of water or paint cans securely in place leaving your hands free to work. It fits into the hollow rung of most modern aluminium ladders and the handle of your bucket, tool bag or paint tin is then clipped onto the sprung clasp at the end of the hand grip.

The tapered, rubberised 'limb' of the LadderLimb fits snugly into the ladder, holding whatever is attached to it securely in place. And, when you wish to work at another height, the LadderLimb can be easily and effortlessly withdrawn and placed into another rung.

Ladderlimb is available in Bunnings.

LADDER LEVELLER

Branach
www.branach.com.au
The patented **LeveLok LL-STB-1** leveller/stabiliser has only two controls and operating it is so easy, it can be done with the touch of a toe.

To set into position, hold the ladder with both hands and simply push the foot pedal down. The leg will extend in increments of 5mm up to 245mm. You'll hear the stainless steel ratchet's reassuring 'click' with each increment. When the leg has been extended to the point where it has firm footing, you're done. Additionally, the automatic backup safety lock is instantly activated, thereby preventing accidental slipping or tripping of the locking mechanism. This is another patented feature found only on Levelok Ladder Levelling Systems.

Tough as nails, the LeveLok LL-STB-1 leveller/stabiliser enables most fibreglass, aluminium or wood ladders to adapt to nearly any indoor or outdoor situation – from stairwells to uneven terrain.

LOCKING JAW

Lock Jaw Ladder Grip
www.lockjawladdergrip.com.au
Lock Jaw Ladder Grip is a new Australian product that assists in securing ladders to gutters. It is designed to increase the safety of persons who use ladders and assist in meeting increasingly strict legal requirements associated with ladder use.

Lock Jaw Ladder Grip contains an adjustable locking jaw allowing it to be secured to a range of different gutter types. In addition there are adjustment mechanisms that allow the device to be used on a wide variety of single and extension ladders.

Once a ladder has been climbed the Lock Jaw Ladder Grip can be clamped onto or removed from guttering in approximately five seconds.

SHOULDER PADS

Branach
www.branach.com.au
If you're tired of the shoulder pain you experience when carrying an industrial-strength, fibreglass ladder, the solution could be the Permanent-Mount shoulder pad, which makes hauling a ladder more like carrying a kitten on your shoulder (assuming you can find a 45kg kitten).

Made entirely of polyethylene foam, the **PASR-3** is not only extremely strong and durable, it also provides excellent vibration and shock absorbency. And being able to tote your ladder without the accompanying pain means you can more readily carry the ladder in the proper way.

The PASR-3 even helps prevent shoulder and back injuries. It accommodates any shoulder size and shape. Its bevelled edges minimise interference with clothing and objects, and help reduce wear and tear to a minimum. It's also waterproof.

RENAULT PRO+

Renault TRAFIC

The van you need. Guaranteed.

If you're in the plumbing, building or electrical trade, the Renault Trafic is the van you need, guaranteed. It combines great value for money with plenty of grunt and up to 6.0m^3 load space, 1.2T payload and load-through length of 4.1m. It's got the safety features you want including bulkhead, Stability Control and Reverse Sensors and Camera*. It also has the generous 12 month/30,000km service intervals you need to keep you on the road. Get the van you want and need, visit your Renault dealer today.

*Standard on Trafic Twin Turbo models only. †Three (3) year/200,000 km warranty offer and 3 years/200,00 km Roadside Assistance both apply to all new or demonstrator TRAFIC models. Warranty & Roadside Assistance valid for 3 years or 200,000km (whichever comes first) from new. Demonstrator vehicles receive balance of new vehicle warranty and Roadside Assistance. Roadside Assistance terms and conditions apply. Call our Customer Service Team on 1800 009 008 or view the Terms and Conditions statement at www.renault.com.au/drivingpeaceofmind for details. ^First 3 scheduled maintenance services capped at $349 per service on new and demonstrator TRAFIC models, based on standard scheduled servicing from new and on normal operating conditions. Scheduled maintenance services required every twelve (12) months or up to 30,000km (whichever occurs first). However, TRAFIC is subject to adaptive servicing requirements, as determined by the Oil Condition Sensor, and may require servicing prior to the standard twelve (12) months or 30,000km service interval. If vehicle is not presented within three (3) months of when the scheduled service is required, right to that capped-price service under the program is forfeited.

3 YEARS	3 YEARS	3 SERVICES
200,000 KM† WARRANTY	ROADSIDE† ASSIST	CAPPED^ PRICE

renault.com.au

This just won't cut it

You don't need 1001 tools to cut penetrations in heavy-gauge profiled metal roof sheet, duct, furring channel etc. when you can have the tool with 1001 deconstruction uses. You need a tool that won't shy away from the folds, seams and awkward situations that other tools pass up!

This will

What you need is a Metal Pecker; the revolutionary new tool that cuts penetrations in-situ. It eats-up multi-folds, chases profiles and makes cutting so much safer thanks to no sharp blades and extended handles that provide cutting leverage to keep your hands clear of jagged metal edges.

See the Metal Pecker in action at www.metalpecker.com

METAL PECKER
Cuts metal penetrations in a flash

ISUZU UTE D-MAX 4X2 VARIANTS, HOLDEN COLORADO LS-X

Isuzu Ute Australia has added two new 4x2 models to its D-Max that are designed to help attract more trade customers to the one-tonne ute range, which has now expanded to 25 variants.

Priced from $34,300 plus on-road costs, the Space Cab Ute is now available in SX trim with a 4x2 driveline, while a two-wheel-drive SX Crew Cab Chassis is also now available, priced from $36,100 plus on-roads.

Previously, the Space Cab and Crew Cab Chassis body styles were offered only with a 4x4 drivetrain.

Both are available only with a five-speed automatic transmission and combine with the familiar 3.0-litre four-cylinder '4JJ1-TC Hi-Power' turbo-diesel engine in service across the range, producing 130kW of power at 3,600rpm and 380Nm of torque from 1,800-2,800rpm.

Holden's related Colorado has also come in for some attention with a limited edition LS-X model based on the LS 4x4 Crew Cab Pick Up reaching showrooms late in 2015.

Priced from $46,490 plus on-road costs for the manual (or $48,690 for the auto) – $1,000 upstream from the donor LS 4x4 – the X-rated edition adds a host of accessories including 16" alloy wheels, front fog lamps, an alloy sports bar, Colorado-branded smoked bonnet protector, carpet flooring and LS-X decals.

Holden says customers save more than $1,000 by opting for the special edition rather than purchasing the extras individually.

The LS uses a 2.8-litre 'Duramax 2' diesel engine that develops 147kW at 3,600rpm and either 440Nm (six-speed manual) or 500Nm (six-speed auto), both at 2,000rpm ▲

Isuzu Ute Australia
www.isuzuute.com.au
Holden Australia
www.holden.com.au

HOLDEN VFII UTE

Giving us every reason to celebrate and also start the grieving process, Holden has turned out the quickest and most powerful Commodore-based ute ever with the VFII series upgrade that marks its final Australian-built model range before closing the shutters on local manufacturing in 2017.

Talk about a final fling, and saving the best 'til last, the headline act of the VFII series is a new, more powerful all-alloy 6.2L LS3 V8 that delivers 304kW of power at 6,000rpm (up 34kW over the previous 6.0L Gen 4), 570Nm of torque at 4,400rpm (up 40Nm) and a stirring soundtrack courtesy of a bi-modal exhaust and locally designed mechanical sound enhancer that pumps up the exhaust volume in the cabin and outside the vehicle by up to 10%.

Previously the domain of HSV's Maloo, the LS3 V8 in Holden's SS, SSV and the SSV Redline utes can reach 100km/h from standstill in less than five seconds with the standard six-speed manual, and the optional six-speed automatic is just a tenth of a second behind.

Fuel economy takes a hit, with the 6.2 V8 consuming about a litre more per 100km than the 6.0L V8 in the VF range, at 12.8L/100km for the SS manual and 12.9L/100km for the auto.

The pick of the bunch is clearly the SSV Redline, priced from $50,490 in manual guise – $6,000 upstream from the SSV and 10-grand up from the SS (auto adds $2,200) – which as well as a host of extra equipment and features brings revised suspension tuning to improve both ride comfort and handling, and a Brembo braking package with four-piston callipers that now extends to the rear wheels.

A new optional Performance Brake package, developed for heavy-duty police application and comprising a larger master cylinder, uprated brake pads and larger front rotors, is available for an extra $350, while Redline customers can also order 20" forged alloy wheels for $1,500.

All sports utes (including SV6) have a new front fascia with larger grille and fascia ducts that are designed to improve aerodynamic performance, while the V8s have bonnet vents that release hot air out of the engine bay and, perhaps just as importantly, add to the general tone of aggression at the front end.

There are no modifications to the 210kW/350Nm 3.6L V6 and the auto-only Evoke (priced from $33,490) continues largely unchanged. The SV6, which starts at $33,990 as a manual and $36,190 with auto, scores keyless entry, push-button start, new 18" alloy wheels and the new front fascia detailed above.

As well as the big donk and design tweak, the SS likewise adds keyless entry/start and new 18" rims, while SSV now has new 19" alloys and a colour head-up display. ▲

Holden
www.holden.com.au

LDV G10

Chinese brand LDV has launched its all-new G10 van in Australia, pitching the Toyota HiAce rival directly at tradies with a value-oriented package that starts at $25,990 drive-away for ABN holders.

A product of China's biggest motor company, SAIC Motor Corporation, the rear-wheel-drive G10 one-box van is a smaller sibling to the V80 and part of the specialist LDV light-commercial brand distributed by Ateco Automotive through a growing national dealer network – 37 outlets at last count, with more on the way.

Ateco describes the G10 as a game-changing vehicle for the brand that is the best-value one-tonne van on the Australian market.

Whereas the V80 was a carryover from the now-defunct Leyland DAF Vans, which was bought by SAIC in 2009, the G10 was designed and engineered in China from the ground up using some up-to-date technology including a perky turbocharged petrol engine and a ZF-supplied six-speed automatic transmission.

The engine and transmission in question – fitted to the higher-series model priced from $29,990 drive-away for ABN holders – is a 2.0L twin-cam turbo-petrol four-cylinder with direct injection and variable valve timing, offering maximum power of 165kW and peak torque of 330Nm. Official fuel consumption on the combined cycle is 11.7L per 100km.

At the entry level, a less advanced 105kW/201Nm 2.4L naturally aspirated four-cylinder petrol engine paired with a five-speed manual gearbox – a combination that returns 11.5L/100km – was recently added. It also has a leaf spring rear suspension compared with the five-link coil-spring set-up on the turbo-petrol auto.

Both use a MacPherson strut arrangement up front, have power-assisted hydraulic steering and disc brakes at each corner, the latter supported by an anti-lock system, electronic brake-force distribution and emergency brake assist.

Electronic stability control is also fitted standard, along with a 'roll movement intervention' system, rear camera with park assist feature, parking sensors with alarm, a tyre pressure monitoring system and an airbag for the driver and front passenger.

External features run to 16" alloy wheels (running on 215/70 tyres) including a full-size spare, power side mirrors with integrated turn signal, rear fog lamps, dual sliding doors and a lift tailgate – entry points that provide access to the cargo area which offers a maximum volume of 5.2m^3 and can accommodate two standard pallets.

The cargo area measures 2,365mm long, 1,590mm wide (wheel arch width: 1,278mm) and 1,270mm high. Maximum payload is 1,093kg, and gross vehicle mass 3,000kg, with braked towing capacity 1,500kg. Tare weight is 1,907kg.

Convenience items include remote central locking, cruise control, air-conditioning, power front windows and two-speaker radio/MP3/DVD with a 7" in-dash LCD touch screen and Bluetooth phone and audio.

The vehicle is backed by a 3-year/100,000km warranty and emergency roadside assistance. ▲

LDV Vans Australia
www.ldvautomotive.com.au

RAM 2500, 3500

The third biggest-selling pick-up in America, where around 40,000 examples are sold every month, the full-size Ram truck is now available in Australia through a new right-hand-drive (RHD) conversion operation set up by Ateco Automotive and the Walkinshaw Automotive Group.

Joining other local conversion and retail outfits such as Performax International, the newly formed American Special Vehicles has launched the Ram 2500 and 3500 series trucks through a 20-strong national dealer network and with the blessings of Fiat Chrysler Automobiles (FCA) in Detroit, which is providing support in areas such as vehicle supply, homologation and parts and service.

Backed by a 3-year/100,000km warranty and full volume import approval (meaning no restriction on numbers), the Ram pick-ups do not come cheap given the costs involved in importation from Mexico and substantial re-engineering at Walkinshaw's factory in Clayton, Melbourne, to convert them to RHD and measure up to RAM's own standards of safety, comfort and build quality.

Prices start at $139,500 for the Ram 2500 and $146,500 for the 3500, plus on-road costs. Both are offered in five-seat crew cab configuration in high-end Laramie specification, with the same powertrain: a Cummins-sourced 6.7L six-cylinder turbo-diesel engine that pumps out 276kW of power at 2,800rpm and a stonking 1,084Nm of torque at just 1,600rpm.

The engine is paired with a six-speed automatic transmission and BorgWarner part-time 4x4 driveline, with high and low range. The fuel tank holds 117L.

For tradies carrying big loads, the Ram offers up to 6,989kg braked towing capacity using a pintle or 4,500kg with a 70mm tow ball; a 50mm ball enables 3,500kg. Gross Combination Mass with the pintle is 11,479kg, 8,990kg with the 70mm ball or 7,990kg with a 50mm ball. Payload is 913kg for the 2500 and 1,713kg for the 3500.

The pick-up is built on a steel ladder frame chassis using eight separate cross members, while the front suspension is a three-link coil spring arrangement and the rear a solid axle set-up – a five-link coil-sprung configuration on the 2500, while the 3500 uses a heavier-duty Hotchkiss leaf spring format.

The large cargo box has a 1,939mm floor length, 1,687mm width (1,295mm between the wheel arches housing 18" alloys) and 511mm depth.

The overall body stretches 6,027mm from end to end, and is 2,009mm wide and 1,974mm high in Ram 2500 form or 2,027mm for the 3500, which also has extra ground clearance (218mm versus 188mm). Kerb weight is 3,577kg for the 2500 or 3,596kg for the 3500, with a GVM of 4,490/5,309kg respectively. The turning circle is 13.38m.

Safety equipment includes multi-stage front airbags, front and rear curtain airbags, electronic stability control, four-wheel disc brakes (360mm rotors up front and 350mm at the rear), ABS, a rear view camera, eye-level brake light with cargo camera and a tyre pressuring monitoring system. A security alarm is also fitted.

Comfort and convenience items run to leather upholstery, heated and ventilated front seats (with 10-way power adjustment for the driver, six-way for the front passenger), heated/leather multi-function steering wheel, dual-zone climate control, 8.4" touch screen display, 7.0" multi-view cluster, nine-speaker sound system (with subwoofer), satellite navigation, a media hub (SD, USB, aux), a 240V auxiliary power outlet, and plenty more. ▲

Ram Trucks
www.ramtrucks.com

HOLDEN SPECIAL VEHICLES GEN-F2 MALOO

Not to be outdone by Holden and the 304kW LS3 V8 it has transplanted into the swansong VFII ute, the Aussie lion brand's high-performance division HSV has produced a fitting farewell for the Maloo R8, dropping the incredible supercharged 6.2L LSA V8 into the Commodore-based two-door.

The new range is dubbed Gen-F2 and, like VFII, marks the final fling for the Australian-built ute as Holden prepares to close its manufacturing facilities towards the end of 2017.

Gone is the 340kW/570Nm LS3 of the regular Maloo and in its place is the force-fed Chevrolet-sourced LSA that in this case churns out 400kW of power at 6,150rpm and 671Nm of torque at 4,200rpm.

This is slightly down on the previous limited-edition GTS Maloo that offered the LSA engine in full-blown 430kW/740Nm form and was priced from $87,990, but the Gen-F GTS is no longer available, leaving this detuned but still hard-punching and more affordable LSA as the next best thing.

Priced from $76,990, the Gen-F2 Maloo R8 combines with a TR6060 (MG9-spec) six-speed manual transmission as standard, while a 6L90E six-speed heavy-duty automatic with 'Active Select' and paddle shifters adds $2,500.

The new series is also more than a mere engine upgrade, with exterior design revisions and modifications to the suspension set-up.

HSV says spring and damper rates have been stiffened to reduce bodyroll and improve corner-entry response, while the unique rear suspension module with 9.9" differential and upgraded drive and prop shafts delivers improved rear stiffness and rear braking efficiency.

New five-spoke 20" alloy wheels are a striking addition, while the front fascia has been tweaked and now incorporates a subtle air splitter. The bonnet vents seen on the Holden VFII V8 utes are found on the new Maloo (finished in satin black paint rather than gloss), with the mirror caps and fender vents using the same colour.

A new vibrant blue dubbed Slipstream has also joined the exterior bodywork palette.

The LS3 is expected to become available in Gen-F2 guise in the first half of 2016, although pricing and specifications were still to be confirmed prior to publication.

Holden
www.holden.com.au

CITROEN BERLINGO

Citroen Australia has introduced its upgraded Berlingo, bringing a segment-first standard reversing camera to the light-sized commercial vehicle class and other advanced features.

Standard safety features on the MY 2016 series now run to hill-start assist and electronic stability and traction control, while high-level infotainment technology arrives in the form of a locally developed 7.0" touch screen with Apple CarPlay and MirrorLink for Android connectivity systems, as well as Siri Eyes Free, Bluetooth and USB and auxiliary jacks.

Dual side sliding doors are also now standard across the series that continues to offer three variants spanning short and long bodies and turbocharged four-cylinder petrol and diesel powertrains.

The short body manual is priced from $21,990 plus on-road costs and is powered by a 1.6L turbo-petrol engine that offers 80kW of power at 5,800rpm and 147Nm of torque at 4,000rpm, driving through a five-speed manual gearbox and offering fuel economy of 8.2L per 100km on the official combined cycle.

The short body has a cargo volume of 3.3m^3 to the back of the front seats, or 3.7m^3 with the passenger seat folded. Total load length is 1,800mm to the seatbacks, or 3,000mm to the passenger's footwell.

Priced from $26,990, the long body is offered only with a 1.6L turbo-diesel good for 66kW at 4,000rpm at 215Nm at 1,500rpm, combining with a five-speed manual – capable of 5.7L/100km – or optional ($4,000) six-speed semi-automatic transmission with a fuel-saving automatic engine idle-stop system that lowers consumption further to 4.7L/100km.

Load capacity increases to 3.7m^3 to the rear seats (4.1m^3 with the passenger seat down), while load length is 2,050mm/3,250mm.

Both body styles rest on a 2,728mm wheelbase, have cargo width of 1,230mm between the wheel arches and an 1,100mm interior height. Rear barn doors opening to 180° are also fitted.

Payload is 850kg on the short body and 750kg on the long body variants, while braked towing capacity ranges from 800kg to 1,000kg, depending on the variant.

A third seat can be added for $500, or $1,000 with a front passenger airbag and storage box included. Otherwise, only the driver's seat has an airbag. Four-wheel disc brakes with ABS are included, as are front seatbelt pre-tensioners with force limiters for the outboard positions.

The upgrade brings an optional ($500) 'look pack' for long body variants, which includes LED daytime running lamps, fog lights with cornering function and cosmetic enhancements such as colour-coded bumpers, exterior mirrors, doorhandles and side strips, and new 15" 'Airflow' wheel covers.

Regular models gain a revised bumper while cargo areas benefit from a standard moulded floor protector. A metallic grey exterior colour is also added to the Berlingo palette.

Citroen Australia
www.citroen.com.au

TOYOTA LANDCRUISER 70 SERIES

Toyota Australia is preparing to introduce a significant upgrade to its LandCruiser 70 Series range, with a high level of safety equipment added to bring all variants – including the single and double cab utes – up to a top-rating five-star standard.

While the current model manages only three stars under the Australasian New Car Assessment Program's (ANCAP's) ratings system, the series upgrade due in the second half of 2016 will improve on this with the introduction of electronic stability control, brake assist and five airbags – two curtain-shield airbags and a driver's knee airbag adding to the current frontal airbags for the driver and front passenger.

Cruise control will also become standard across the 70 Series, which has long been valued by tradesfolk for its tough character and hard-working nature, particularly its mechanical reliability and serious towing, load carrying and off-road performance.

Toyota Australia says the company has worked closely with employers in the construction industry and other sectors, including mining and agriculture, in order to develop the improvements for the "unapologetically rugged vehicle that is renowned for its heavy-duty capabilities" – and to secure its future after 30 years on the market.

Further details are still to be released for the upgraded model, but expect it to continue to have a strong diesel engine as the backbone of the series.

The current 70 Series uses a 4.5L 32-valve '1VD-FTV' V8 turbo-diesel – with common-rail direct injection and an intercooler – that delivers 151kW of power at 3,400rpm and 430Nm of torque from 1,200-3,200rpm, the latter said to be the flattest torque curve among all of Toyota's engines. It drives through a five-speed manual gearbox and part-time four-wheel-drive system.

Braked towing capacity is 3,500kg and gross vehicle mass 3,300kg on the single and double cab utes, with kerb weight ranging from 2,065kg on the entry level single cab chassis Workmate to 2,215kg for the top-end double cab chassis GXL.

The current model has four-wheel disc brakes, electronic traction control and a few cabin mod-cons such as MP3-compatible stereo and Bluetooth mobile phone connectivity.

That said, air conditioning is still optional and the 70 Series remains a hard-edged vehicle at its core, with rigid axle suspension at both the front and rear, recirculating ball and nut steering system, manual 4WD hub engagement, front and rear diff locks, and so on. ▲

Toyota Australia
www.toyota.com.au

NECA EDUCATION & CAREERS
WWW.NECAEDUCATION.COM.AU

CONSTRUCTION WIRING

Construction wiring is a specialised area providing regulatory, industrial relations and cost challenges for contractors. Successfully managing these challenges requires comprehensive skills and knowledge of the relevant Australian and industry standards to ensure compliance and eliminate risks.

Start date	End date	Location
24/02/2016	26/02/2016	Carlton North
20/04/2016	22/04/2016	Carlton North

CONSTRUCTION WIRING REFRESHER

This two day refresher course willl update your knowledge and understanding of changes to standards and legislation impacting on installation practices. Acknowledged by Worksafe Victoria and endorsed by Energy Safe Victoria.

Start date	End date	Location
10/03/2016	11/03/2016	Carlton North

ELECTRICAL INSTALLATION TESTING

Electricians and RECs have a legal obligation to test and certify that their electrical work complies with relevant standards. It is essential thay you or your employess have the essential testing skills so that you can test and sign of on COES with confidence.

Start date	End date	Location
26/02/2016	26/02/2016	Carlton North
22/04/2016	22/04/2016	Carlton North

ESTIMATING ELECTROTECHNOLOGY PROJECTS - ADVANCED STAGE 2

Building on skills acquired in Stage 1, this course will provide you with accurate and profitable estimating skills as well as undertaking practical construction of an estimate from the receipt of the render documents, through the practical take off and pricing to final submission of the tender.

Start date	End date	Location
23/02/2016	1/03/2016	Carlton North
5/04/2016	12/04/2016	Carlton North

ESTIMATING ELECTROTECHNOLOGY PROJECTS - FUNDAMENTALS STAGE 1

Estimating is a key component in establishing a successful contracting business. Knowing what to charge is only part of the equation. Knowing how long a job will take and what is involved in developing a quotation for a job is critical. This course reviews the methods and procedures commonly used in estimating plus more.

Start date	End date	Location
8/03/2016	8/03/2016	Carlton North

GRID CONNECT

This course provides licensed electricans with the skills to design, install, set-up, test, fault find, repair and maintain grid conencted photovoltaic systems and the associated equipment

Start date	End date	Location
29/02/2016	4/03/2016	Carlton North
4/04/2016	8/04/2016	Carlton North

LICENSED ELECTRICAL INSPECTORS PRACTICAL (LEIP)

Increase your skills set an your service offerings by becoming an electrical inspector. NECA Education and Careers is the only RTO to offer tutorials to prepare you for the licensing assessment. This component prepares you for the practical component.

Start date	End date	Location
16/05/2016	18/05/2016	Carlton North

NECA EDUCATION & CAREERS
WWW.NECAEDUCATION.COM.AU

LICENSED ELECTRICAL INSPECTORS SAFE APPROACH (LEISA)

Increase your skills set an your service offerings by becoming an electrical inspector. NECA Education and Careers is the only RTO to offer tutorials to prepare you for the licensing assessment. This component prepares you for the safe approach component.

Start date	End date	Location
28/04/2016	29/04/2016	Carlton North

LICENSED ELECTRICAL INSPECTORS THEORY (LEIT)

Increase your skills set an your service offerings by becoming an electrical inspector. NECA Education and Careers is the only RTO to offer tutorials to prepare you for the licensing assessment. This component prepares you for the theory component.

Start date	End date	Location
7/03/2016	10/03/2016	Carlton North

LICENSED ELECTRICAN THEORY (LET)

Brush up on your knowledge before you go for your electrical licence. This component prepares you for the LET component plus you can book your assessment at the same time.

Start date	End date	Location
29/02/2016	3/03/2016	Carlton North
11/04/2016	14/04/2016	Carlton North
2/05/2016	5/05/2016	Carlton North

LICENSED ELECTRICIAN PRACTICE (LEP)

Brush up on your knowledge before you go for your electrical licence. This component prepares you for the LEP component plus you can book your assessment at the same time.

Start date	End date	Location
23/02/2016	25/02/2016	Carlton North
21/03/2016	23/03/2016	Carlton North
5/04/2016	7/04/2016	Carlton North
20/04/2016	22/04/2016	Carlton North
11/05/2016	13/05/2016	Carlton North

REGISTERED ELECTRICAL CONTRACTOR (BUSINESS)

If you want to start your own electrical contractor business then this course is for you. The course sets out the knowledge and skills required to ensure regulatory, technical, occupational and workplace relation requirements are met in conducting a contracting business.

Start date	End date	Location
5/03/2016	13/03/2016	Carlton North
18/04/2016	21/04/2016	Carlton North

SAFE WORK PRACTICE (SWP)

Brush up on your knowledge before you go for your electrical licence. This component prepares you for the SWP component plus you can book your assessment at the same time.

Start date	End date	Location
22/02/2016	22/02/2016	Carlton North
18/03/2016	18/03/2016	Carlton North
24/03/2016	24/03/2016	Carlton North
4/04/2016	4/04/2016	Carlton North
18/04/2016	18/04/2016	Carlton North
26/04/2016	26/04/2016	Carlton North
10/05/2016	10/05/2016	Carlton North

CLIPSAL BY SCHNEIDER ELECTRIC
HTTP://WWW.CLIPSAL.COM/TRAINING

C-BUS BASIC

The C-Bus Basic training course is an entry level training course designed for consultants, electrical contractors, system integrators and partners who wish to learn how to install and program C-Bus. The C-Bus Basic course will equip trainees with the skills to work with C-Bus products and become involved with the concept of commercial and residential automation. It is also the first step towards becoming an Approved Installer.

Start date	End date	Location
22/02/2016	24/02/2016	Adelaide
22/02/2016	24/02/2016	Sydney
8/03/2016	10/03/2016	Eagle Farm
14/03/2016	16/03/2016	Sydney
11/04/2016	13/04/2016	Rocklea
11/04/2016	13/04/2016	Townsville
18/04/2016	20/04/2016	Sydney
18/04/2016	20/04/2016	Carlton North
2/05/2016	4/05/2016	Perth
10/05/2016	12/05/2016	Eagle Farm

C-BUS DALI GATEWAY

The C-Bus DALI Gateway training course is designed for consultants, electrical contractors and system integrators who wish to learn the installation and commissioning of a DALI system with the integration of C-BUS DALI Gateway.

Start date	End date	Location
25/02/2016	25/02/2016	Adelaide
17/03/2016	17/03/2016	Melbourne
20/04/2016	20/04/2016	Sydney

C-BUS LEARNING PATHWAY A (C-BUS BASIC + TOUCH SCREEN)

The Learning Pathway A is a training course that will provide an entry level for consultants, electrical contractors, system integrators and partners who wish to learn how to design, install and program a C-Bus system including C-Bus Touch Screen.

Start date	End date	Location
14/03/2016	18/03/2016	Sydney
11/04/2016	15/04/2016	Rocklea
11/04/2016	15/04/2016	Townsville
18/04/2016	22/04/2016	Sydney
18/04/2016	22/04/2016	Carlton North
2/05/2016	6/05/2016	Perth

C-BUS LOGIC

The C-Bus Logic training course is designed for consultants, electrical contractors and system integrators who wish to learn how to program the C-Bus Logic Engine located in C-Bus Touch Screen or C-Bus Pascal Automation Controller (PAC).

Start date	End date	Location
10/03/2016	11/03/2016	Sydney
6/04/2016	7/04/2016	Brisbane
19/04/2016	20/04/2016	Adelaide
11/05/2016	12/05/2016	Melbourne

C-BUS TOUCH SCREEN

The C-Bus Touch Screen training course is designed for consultants, electrical contractors and system integrators who wish to learn how to program C-Bus Touch Screens.

Start date	End date	Location
18/02/2016	19/02/2016	Perth
7/03/2016	8/03/2016	Sydney
17/03/2016	18/03/2016	Sydney
14/04/2016	15/04/2016	Rocklea
14/04/2016	15/04/2016	Townsville
21/04/2016	22/04/2016	Sydney
21/04/2016	22/04/2016	Carlton North
5/05/2016	6/05/2016	Perth

CLIPSAL BY SCHNEIDER ELECTRIC
HTTP://WWW.CLIPSAL.COM/TRAINING

CONEXT XW+ AND SW/SW+ INVERTER/CHARGERS FOR OFF-GRID APPLICATIONS

The Conext XW Inverter/Chargers course is aimed at product managers, technical staff and existing installers of off-grid, battery backed energy storage systems, small scale and commercial solar systems. The Conext XW Inverter/Charger course will equip the attendee with the skills to design off-grid systems, program the inverter charger, fault find and maintain off-grid and battery backed energy storage systems used in conjunction with external generators and solar charge controllers.

Start date	End date	Location
25/02/2016	26/02/2016	Adelaide
17/03/2016	18/03/2016	Melbourne
5/04/2016	6/04/2016	Seven Hills
10/05/2016	11/05/2016	Brisbane

DALICONTROL SIMPLE WIZARD

The DALIcontrol Simple Wizard training course is designed for electrical contractors and system integrators who wish to learn the installation and commissioning of a DALI system using user friendly Simple Wizard software.

Start date	End date	Location
26/02/2016	26/02/2016	Adelaide
18/03/2016	18/03/2016	Melbourne
21/04/2016	21/04/2016	Sydney

ECOXPERT - PRACTICAL ENERGY AUDIT

This training course will ensure that an EcoXpert
- Understands the different types of Energy Audits.
- Can undertake an energy audit step by step.
- Can utilise data to identify opportunities to save energy.
- Is capable of generating an energy audit report.

Start date	End date	Location
31/03/2016	1/04/2016	Adelaide
19/04/2016	20/04/2016	Sydney
10/05/2016	11/05/2016	Brisbane

NETWORK CONNECTIVITY - ADVANCED FIBRE

The Advanced Fibre Optical Testing training course provides the necessary understanding of the requirements for infield testing for LAN and DATA central optical fibre cabling systems to meet standards and certification requirements. The course addresses the higher testing standard based requirements of high performance optical fibre systems in customer premises. The course is also suitable for carrier trained personnel as a mechanism to transision their optical fibre skills into LAN cabling systems.

Start date	End date	Location
18/03/2016	18/03/2016	Sydney
24/03/2016	24/03/2016	Brisbane
14/04/2016	14/04/2016	Melbourne
12/05/2016	12/05/2016	Perth
5/05/2016	5/05/2016	Hobart

NETWORK CONNECTIVITY - FIBRE TESTING UPDATE

This course addresses the changes in fibre optic standards and associated testing in the past two years.

Start date	End date	Location
17/03/2016	17/03/2016	Sydney
23/03/2016	23/03/2016	Brisbane
13/04/2016	13/04/2016	Melbourne
28/04/2016	28/04/2016	Adelaide
11/05/2016	11/05/2016	Perth
4/05/2016	4/05/2016	Hobart

CLIPSAL BY SCHNEIDER ELECTRIC
HTTP://WWW.CLIPSAL.COM/TRAINING

NETWORK CONNECTIVITY - TWISTED PAIR TESTING

Twisted pair training course provides the necessary understanding of the requirements for infield testing of high performance twisted pair telecommunication cabling to meet standards, customer and certification requirements. The course provides an easy to understand format at the field staff installing and testing twisted pair installations.

Start date	End date	Location
15/03/2016	15/03/2016	Sydney
21/03/2016	21/03/2016	Brisbane
11/04/2016	11/04/2016	Melbourne
26/04/2016	26/04/2016	Adelaide
9/05/2016	9/05/2016	Perth
2/05/2016	2/05/2016	Hobart

NETWORK CONNECTIVITY - TWISTED PAIR UPDATE

This course addresses the changes in twisted pair standards and associated testing in the past two years.

Start date	End date	Location
17/03/2016	17/03/2016	Sydney
23/03/2016	23/03/2016	Brisbane
13/04/2016	13/04/2016	Melbourne
28/04/2016	28/04/2016	Adelaide
11/05/2016	11/05/2016	Perth
4/05/2016	4/05/2016	Hobart

PUSH BY SCHNEIDER ELECTRIC
HTTP://WWW.CLIPSAL.COM/TRAINING

PUSH CONTROLS - CORE PRINCIPLES

The Push Control Core training course is an entry level training course designed for electrical contractors and apprentices who wish to learn how to install and program Push Controls products.

Start date	End date	Location
25/02/2016	26/02/2016	Sydney
29/02/2016	1/03/2016	Brisbane
5/04/2016	6/04/2016	Perth
11/04/2016	12/04/2016	Sydney
3/05/2016	4/05/2016	Melbourne
9/05/2016	10/05/2016	Sydney

NESS CORPORATION
HTTP://NESSCORPORATION.COM

M1 FUNDAMENTALS TRAINING

M1 Fundamentals is designed to equip the attendee with the fundamental skills needed to design, install, program & test Ness M1 Cross Platform Controllers. This course will benefit traditional alarm installers who wish to expand their skills into system integration as well as current integrators who need a more efficient system or simply want to provide their customers the features and benefits of M1 Cross Platform Controllers.

Start date	End date	Location
23/02/2016	23/02/2016	Nunawading
1/03/2016	1/03/2016	Nunawading
3/03/2016	3/03/2016	Seven Hills
10/03/2016	10/03/2016	Morningside
17/03/2016	17/03/2016	Malaga

COMPETENCY TRAINING
WWW.COMPETENCYTRAINING.COM.AU

ELECTRICAL SUPERVISOR

This electrical supervisors course has been designed for the mining industry to cover all aspects of duties and responsibilities of an electrical supervisor, and will include detailed explanation of the requirements of the Mines Safety and Inspection Act and Regulations and the requirements of the electrical safety management systems audit.

Start date	End date	Location
11/03/2016	11/03/2016	Perth

HAZARDOUS AREAS CLASSIFICATION AND DESIGN

This is an advanced course, intended for electrical workers, technicians, engineers and senior engineers involved only in area classification for electrical equipment in hazardous areas. It covers hazardous area classification procedures and techniques for both gas/vapour installations and for combustible dusts, including the proper methods for documenting the classification. Participants complete several classification tasks using real world input data during the training.

Start date	End date	Location
22/02/2016	26/02/2016	Adelaide
7/03/2016	11/03/2016	Brisbane
14/03/2016	18/03/2016	Perth

HIGH VOLTAGE SWITCHING OPERATIONS

This course is intended for electrical workers and engineers working with HV switchgear in industrial facilities and networks. Emphasis is placed on practical switching exercises, performed either at our facilities or on the customer's own HV equipment. Participants are also taught switching theory and the responsibilities of permit users and recipients.

Start date	End date	Location
22/02/2016	26/02/2016	Perth
29/02/2016	4/03/2016	Perth
29/02/2016	4/03/2016	Gladstone
7/03/2016	11/03/2016	Adelaide
14/03/2016	18/03/2016	Brisbane
14/03/2016	18/03/2016	Perth

HIGH VOLTAGE SWITCHING OPERATIONS - REFRESHER

This course is intended for electrical workers and engineers working with HV switchgear in industrial facilities and networks. This course highlights relevant changes in standards and legislation, and revisits the site's specific HVIA procedures, including switching officer responsibilities, access, test and work permit issuing and recipient duties. It is for personnel who are already authorised switching officers and is recommended every two years.

Start date	End date	Location
18/02/2016	19/02/2016	Melbourne
25/02/2016	26/02/2016	Brisbane
7/03/2016	8/03/2016	Gladstone
10/03/2016	11/03/2016	Brisbane
10/03/2016	11/03/2016	Perth
10/03/2016	11/03/2016	Adelaide
15/03/2016	16/03/2016	Melbourne
31/03/2016	1/04/2016	Perth

INSTALLATION AND MAINTENANCE OF ELECTRICAL EQUIPMENT IN HAZARDOUS AREAS

This course is intended for electrical workers, technicians and engineers involved with installing and maintaining electrical equipment in hazardous areas. It covers the principles of hazardous area classification, explosion-protection techniques, equipment installation requirements, inspections, and procedures for breakdowns and maintenance, with theory and practical components.

Start date	End date	Location
22/02/2016	26/02/2016	Sydney
22/02/2016	26/02/2016	Gladstone
29/02/2016	4/03/2016	Perth
29/02/2016	4/03/2016	Adelaide
7/03/2016	11/03/2016	Brisbane
14/03/2016	18/03/2016	Sydney

MATCHMASTER COMMUNICATIONS
WWW.MATCHMASTER.COM.AU

CERTIFICATE III IN DIGITAL RECEPTION TECHNOLOGY (TRAIN-CERT3DRT)

This program is designed to provide participants with the necessary competencies to install digital reception equipment for homes and businesses. It provides participants with fault finding skills on a range of digital reception equipment for subscription TV and free-to-air TV reception.

Start date	End date	Location
23/02/2016	26/02/2016	Brisbane
15/03/2016	18/03/2016	Sydney
19/04/2016	22/04/2016	Melbourne
17/05/2016	20/05/2016	Adelaide

DIGITAL TERRESTRIAL RECEPTION SYSTEMS (TRAIN-DTRI)

Embark on your learning path in television reception systems with our two day course. The program offers competencies of the Certificate II and III, including selection and installation of terrestrial antennas, managing and installing coaxial cable and designing simple domestic distribution systems. The module covers installation of digital television receiving equipment such as decoders and PVR s, and involves a combination of practical exercises to ensure you learn the skills required to progress through the Antenna Installers Endorsement Scheme assessment.

Start date	End date	Location
23/02/2016	24/02/2016	Brisbane
15/03/2016	16/03/2016	Sydney
19/04/2016	20/04/2016	Melbourne
17/05/2016	18/05/2016	Adelaide

SATELLITE DIGITAL RECEPTION SYSTEMS (TRAIN-SDRS)

Offering competencies of the Certificate II and III, this one day program will arm you with detailed knowledge of the design, installation and commissioning of new systems; ranging from domestic premises to 5 wire trunk SMATV systems. A combination of practical and theory exercises will ensure you grasp an understanding of radio frequencies, locating satellites, setting up mounts and measuring signals using the latest test equipment. Walking away with the knowledge of how to meet the Pay TV installation standards, you will be in the box seat to profit from market demand.

Start date	End date	Location
25/02/2016	25/02/2016	Brisbane
17/03/2016	17/03/2016	Sydney
21/04/2016	21/04/2016	Melbourne

COMPLEX DIGITAL (TRAIN-CDRS)

This one day course dives into complex digital systems, encompassing competencies of the Certificate II and III in television reception systems. You learn not only how to select antennas for large systems, but you will also gain an understanding of how to locate and rectify digital reception faults. To keep pace with the demands of consumers and business today, emphasis in the new digital era is on the convergence of the Internet, Pay TV, Terrestrial TV and inhouse video systems, especially for applications in hotels, apartments and commercial premises.

Start date	End date	Location
26/02/2016	26/02/2016	Brisbane
18/03/2016	18/03/2016	Sydney
22/04/2016	22/04/2016	Melbourne

COLLEGE OF ELECTRICAL TRAINING (RTO 2394)
WWW.CET.ASN.AU

UEE20111 CERTIFICATE II IN SPLIT AIR-CONDITIONING AND HEAT PUMP SYSTEMS

This nationally endorsed qualification provides participants with the training and knowledge to install, commission and de-commission single head split air conditioning and heat pump systems to a prescribed routine, where the maximum plant capacity for each system does not exceed 18kWr. It includes wall hung, floor, and ceiling suspended, cassette and ducted fan coil split and water heating heat pump systems.

Start date	End date	Location
20/02/2016	28/02/2016	Jandakot
29/02/2016	4/03/2016	Jandakot
16/04/2016	24/04/2016	Jandakot
23/05/2016	27/05/2016	Jandakot

UEENEEI150A UEENEEI151A PROGRAMMABLE LOGIC CONTROLLERS

The course provides training in development, installation and testing of programs for programmable logic controllers and industrial systems requiring advanced control functions.

Start date	End date	Location
15/03/2016	14/04/2016	Jandakot
3/05/2016	2/06/2016	Jandakot

UEE11 SUSTAINABLE—DESIGNER, INSTALLER OF GRID CONNECTED PHOTOVOLTAIC SYSTEMS SKILL SET

This skill set provides licensed electricians with the training to design, install, set up, test, fault find, repair and maintain grid connected photovoltaic systems and associated equipment.

Start date	End date	Location
14/03/2016	18/03/2016	Jandakot
9/05/2016	13/05/2005	Jandakot

COLLEGE OF ELECTRICAL TRAINING (RTO 2394)
WWW.CET.ASN.AU

UEENEEF104A INSTALL AND MODIFY PERFORMANCE DATA COMMUNICATION COPPER CABLING (CATEGORY 5/6/7 STRUCTURED AND COAXIAL CABLING)

This nationally endorsed course is an extension of the ACMA Open Cabler Registration Training Requirements Course, and provides open cablers with the training, skills and knowledge required to correctly install terminate category 5/6/7 structured and coaxial cabling.

Start date	End date	Location
18/03/2016	19/03/2016	Jandakot
6/05/2016	7/05/2016	Joondalup
6/05/2016	7/05/2016	Jandakot
17/06/2016	18/06/2016	Joondalup

UEENEEF102A INSTALL AND MAINTAIN CABLING FOR MULTIPLE ACCESS TO TELECOMMUNICATION SERVICES (OPEN CABLER REGISTRATION)

This nationally endorsed course provides applicants with the training, skills and knowledge required to meet the Australian Communications Media Authority (ACMA) Open Cabler Registration.

Start date	End date	Location
12/03/2016	17/03/2016	Jandakot
30/04/2016	5/05/2016	Joondalup
30/04/2016	5/05/2016	Jandakot

COLLEGE OF ELECTRICAL TRAINING (RTO 2394)
WWW.CET.ASN.AU

CHECKING AND TESTING AN ELECTRICAL INSTALLATION

This non-endorsed course provides licensed electricians and final year apprentice electrical mechanics and electrical fitters with the training, skills and knowledge to visually inspect and test a low voltage electrical installation in compliance with the requirements of AS/NZS 3000.

Start date	End date	Location
24/02/2016	24/02/2016	Jandakot
2/03/2016	2/03/2016	Joondalup
16/03/2016	16/03/2016	Jandakot
23/03/2016	23/03/2016	Joondalup
23/03/2016	23/03/2016	Jandakot
13/04/2016	13/04/2016	Jandakot
15/04/2016	15/04/2016	Joondalup
20/04/2016	20/04/2016	Jandakot
26/04/2016	26/04/2016	Joondalup
2/05/2016	2/05/2016	Joondalup

ELECTRICAL CONTRACTOR TRAINING PROGRAM (ECTP)

This EnergySafety WA approved course satisfies the Electrical Contractor Training Program (ECTP) and provides licensed electricians with the training, skills and knowledge rquired to identify, investigate and apply statutory and legislative rquirements, manager jobs and operate a business and inspect and test electrical installation work according to regulatory requirements. This course can be delivered fulltime on campus or through distance learning (correspondence).

Start date	End date	Location
4/04/2016	8/04/2016	Jandakot
9/04/2016	21/04/2016	Jandakot
11/04/2016	15/04/2016	Joodalup
16/04/2016	28/04/2016	Joodalup
9/05/2016	13/05/2016	Jandakot
14/05/2016	26/05/2016	Jandakot
16/05/2016	20/05/2016	Joodalup

HIGH VOLTAGE SWITCHING SYSTEMS OPERATIONS COURSE

This industry endorsed course, derived from the UEP12 Electricity Supply Industry-Generator Sector Training Package and the UET12 Transmission, Distribution and Rail Sector Training Package, is intended for electrical workers and electrical engineers working with HV switchgear in industrial facilities and networks.

Start date	End date	Location
22/02/2016	26/02/2016	Jandakot
29/02/2016	4/03/2016	Jandakot
14/03/2016	18/03/2016	Jandakot
4/04/2016	8/04/2016	Jandakot
11/04/2016	15/04/2016	Jandakot
2/05/2016	6/05/2016	Jandakot
9/05/2016	13/05/2016	Jandakot
16/05/2016	20/05/2016	Jandakot

10146NAT COURSE IN ELECTRICIAN- MINIMUM AUSTRALIAN CONTEXT GAP TRAINING

This course provides the Minimum Australian Context Gap training to holders of an Offshore Technical Skills Record (OTSR) for the UEE308011 Certificate III in Electrotechnology Electrician qualification.

Start date	End date	Location
22/02/2016	4/03/2016	Joondalup
4/04/2016	15/04/2016	Jandakot
2/05/2016	13/05/2016	Joondalup
16/05/2016	20/05/2016	Jandakot

FUTURE SKILLS
WWW.FUTURESKILLS.ASN.AU

CERT IV HAZARDOUS AREAS (HA - PART 2) - ELECTRICAL (UEE42611) - GAP TRAINING PROGRAM

This is a nationally recognised post-trade qualification. Skills and knowledge to supervise installation, breakdowns, maintenance, testing, detailed inspections of hazardous areas and installations relating to gas, dust atmospheres and pressurisation. This two day course delivers five units for those who have completed the Electrical Equipment in Hazardous Areas (EEHA) training.

Start date	End date	Location
29/02/2016	1/03/2016	Salisbury
11/03/2016	12/03/2016	Salisbury
21/03/2016	22/03/2016	Salisbury
8/04/2016	9/04/2016	Salisbury
13/05/2016	14/05/2016	Salisbury

CERTIFICATE IV WORK HEALTH AND SAFETY (CERT IV WHS - BSB41415)

A nationally recognised qualification in Work Health and Safety. Five days face-to-face training.

Start date	End date	Location
22/02/2016	26/02/2016	Salisbury
29/02/2016	4/03/2016	Alice Springs
7/03/2016	11/03/2016	Darwin
14/03/2016	18/03/2016	Salisbury
18/04/2016	22/04/2016	Salisbury
18/04/2016	22/04/2016	Darwin
16/05/2016	20/05/2016	Salisbury

ELECTRICAL EQUIPMENT IN HAZARDOUS AREAS (EEHA - PART 1)

Skills and knowledge to select, install, commission, maintain and test explosion-protected equipment and systems for control and monitoring of plant and processes. Four days face-to-face training covering 17 units of the nationally recognised Cert IV in Hazardous Areas - Electrical (UEE42611).

Start date	End date	Location
22/02/2016	25/02/2016	Salisbury
7/03/2016	10/03/2016	Darwin
7/03/2016	10/03/2016	Salisbury
14/03/2016	17/03/2016	Salisbury
4/04/2016	7/04/2016	Salisbury
11/04/2015	14/04/2015	Darwin
9/05/2016	12/05/2016	Salisbury

HAZARDOUS AREAS REFRESHER TRAINING

This course if for those who have previously completed the Electrical Equipment in Hazardous Areas (EEHA) training. Required by industry practice every two to three years. Two day face-to-face training.

Start date	End date	Location
30/03/2016	31/03/2016	Salisbury

HIGH VOLTAGE SWITCHING (HV)

This training program is designed to provide you with the practical skills and knowledge to be able to develop switching programs, perform switching operations, operate HV circuit breaking devices, and LV secondary circuit devices. The course is intended for electrical workers, technicians and engineers involved with maintaining high voltage electrical equipment. It covers the legislation, theory and practical aspect to high voltage installations and maintenance.

Start date	End date	Location
21/03/2016	24/03/2016	Salisbury
4/04/2016	7/04/2016	Salisbury

TRADESTUFF

THE ONLINE STORE FOR TRADIES

AS/NZS 3000:2007 The Wiring Rules (includes Amendment 1:2009 and Amendment 2:2012)

For electricians, the Wiring Rules are probably your most valuable tool, designed to protect you, your customers and their property – and every electrician in Australia and New Zealand is urged to familiarise themselves with the this Standard and its associated Amendments. Part 1 of this document provides uniform essential elements that constitute the minimum regulatory requirements for a safe electrical installation. Part 2 provides installation practices that achieve certainty of compliance with the essential safety requirements of Part 1. Recognised as the benchmark for safe and efficient electrical installations, this is one of the most widely used Standards in Australia and has played an important role in reducing the incidences of electrical mishaps and injuries.

$229.00 Spiral bound ..... **CODE 431s**

Electrical Principles for the Electrical Trades

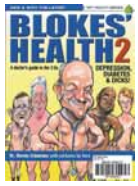
Volume 1 & 2

Volume 1:
Ideal for electrical apprentices, the 6th edition of *Electrical Principles for the Electrical Trades* is the first volume of a two-volume set. Written by two TAFE/VET teachers, the book looks at the fundamental knowledge required to become a successful electrician. A portion of the proceeds from this book will go to WorldSkills Australia.

Volume 2:
Volume 2 of *Electrical Principles for the Electrical Trades* explores the electrical applications of the principles learned in Volume 1. This is an excellent learning resource for electrical apprentices and teachers, as well as being a suitable long-term reference for tradespeople. A portion of the proceeds from this book will go to WorldSkills Australia.

$136.00 ..... **CODE 085**

Blokes' Health 2 – Depression, Diabetes and Dicks!



Following in the footsteps of Dr Bernie Crimmins original best-seller, Blokes' Health: comes Blokes Health 2. We all want to live as long and as healthy as we can, with good quality of life. In this book Dr Bernie Crimmins outlines the main health problems that affect males and gives some simple advice on how to prevent, or detect early, those particular diseases which may lead to an early demise.

$19.95 ..... **CODE 826**

Electrical Wiring Practice

Volume 1

Volume 1 of *Electrical Wiring Practice* has been updated to provide guidance in the use of the Australian and New Zealand Wiring Rules, AS/NZS 3000:2007, including the 2009 Amendments. Taking a practical approach, this book employs clear visual tools to illustrate the knowledge and practices required by specified products and the Standards.

$89.95 ..... **CODE 086**

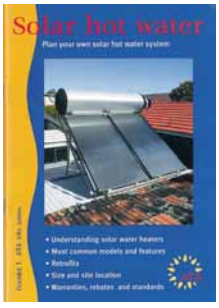
Electrical Wiring Practice

Volume 2

Volume 2 of *Electrical Wiring Practice* has been updated to provide guidance in the use of the Australian and New Zealand Wiring Rules, AS/NZS 3000:2007, including the 2009 Amendments. Taking a practical approach, this book employs clear visual tools to illustrate the knowledge and practices required by specified products and the Standards.

$95.95 ..... **CODE 364**

Solar Hot Water



This booklet gives you an understanding of solar hot water heaters and the most common models and their features. It also covers retrofits, size and site locations, including mains pressure versus low pressure, collectors, tanks, boosting and freeze protection, warranties, rebates and Standards.

$16.95 ..... **CODE 589**

DELIVERED DIRECT TO YOUR DOOR

TRADESTUFF
THE ONLINE STORE FOR TRADIES

ORDER FORM

Name:

Company:

Postal address:

City:

State: Postcode:

Phone:

Mobile:

Fax:

Email:

◯ CHEQUE ◯ MASTERCARD

◯ VISA ◯ AMEX ◯ DINERS

Expiry: _____ / _____

Cardholder's name:

Signature:

CODE	QTY	UNIT COST	TOTAL $
		$	$
		$	$
		$	$
		$	$
		TOTAL PAYABLE	$

POST FORM TO:

CONNECTION MAGAZINES, UNIT 2/18-22 LEXIA PLACE, MULGRAVE VIC 3170

* PRICES ARE IN $AUD AND INCLUDE GST & POSTAGE. ALL PRICES CORRECT AT TIME OF PRINTING. PRICES SUBJECT TO CHANGE WITHOUT NOTICE. LIMITED STOCK AVAILABLE, SPECIAL ORDERS CAN TAKE 3-4 WEEKS FOR DELIVERY.

PHONE 1800 623 214
FAX (03) 9542 9090

Electrical Estimator's Labour Unit Manual

14th edition

This labour unit manual has been produced to assist contractors to allow a realistic labour allocation to their jobs. These units have been developed over a number of years using actual time studies. This publication also includes a CD estimating spreadsheet and templates for calculating hourly charge out rates and minor installation quotations.

$120.00 ..... **CODE 583**

Electrical Installation Standards

AS/NZS 3008.1.2:2010
Selection of cables for alternating voltages up to and including 0.6/1kV

Plus Amendment 1

This Standard specifies current-carrying capacity, voltage drop and short-circuit temperature rise of cables, to provide a method of selection for those types of electric cables and methods of installation that are in common use at working voltages up to and including 0.6/1kV at 50Hz AC. It is applicable to typical Australian installation conditions where the ambient air temperature is 40°C and ambient soil temperature is 25°C.

$200.00 ..... **CODE 347**

AS/NZS 3001:2008
Transportable structures and vehicles including their site supplies

Plus Amendment 1

This Standard sets out requirements for electrical installations associated with transportable structures and vehicles intended for connection to low-voltage AC supply systems (i.e. exceeding 50 V AC but not exceeding 1,000 V AC). For the purposes of this Standard the term transportable structure includes vehicles and structures with or without wheels that are capable of being readily moved from one site to another either under their own motive power or otherwise.

$110.25 ..... **CODE 196**

AS/NZS 3080:2013:
Generic cabling for commercial premises

The Standard provides building owners, managers, architects, designers, manufacturers, installers, maintainers and users with the necessary requirements to ensure compatibility with equipment and services, and to ensure performance of infrastructure to meet present and foreseeable future requirements.

$219.95 ..... **CODE 179**

AS/NZS 3012:2010
Construction and demolition sites

This Standard sets out requirements for electrical installations that supply electricity to equipment on construction and demolition sites. It includes requirements for the inspection and testing of electrical equipment used on building construction sites.

$150.00 ..... **CODE 345**

AS/NZS 4836:2011
Safe working on or near low-voltage electrical installations and equipment

This Standard outlines the principles and procedures of safe work, organisation and performance on or near low-voltage electrical installations and equipment. It provides a minimum set of procedures, safety requirements and recommendations to manage the hazards associated with electricity, specifically arc blast, arc flash, electric shock and electrocution.

$150.00 ..... **CODE 574**

AS/NZS 3017:2007
Verification guidelines

This Standard provides testing procedures and inspection guidelines to ensure that an electrical installation complies with the requirements of AS/NZS 3000 with regard to the prevention of a fire or preventing a person from receiving an electric shock. It includes tests for earth continuity, insulation resistance, polarity and incorrect circuit connections, fault-loop impedance and operation of residual current devices.

$155.95 ..... **CODE 127**

TRADESTUFF.COM.AU

Lifetime Warranty

... Only from Voltex

VOLTEX®
For Life

www.voltexelectrical.com.au

LUMEX®
LED LIGHTING

Innovating with Energy™

7 Year Industrial Installed Warranty for Floodlights and Highbays

Register your project details online now

SEVEN YEAR
7
INSTALLED WARRANTY

INDUSTRIAL

How to get your 7 Year Industrial Installed Warranty

With your new Lumex installation comes the quality assurance by the 7 Year Industrial Installed Warranty.

Simply purchase eligible Lumex Industrial products, have them installed by a licensed electrician and register the site through the website.

100% Australian

2014 CONNECTED HOME MOST POPULAR LED LIGHTING

VOTED #1 AUSTRALIAN OWNED BRAND FOR LED LIGHTING

1300 897 287
lumexlighting.com.au

enerspec
energy efficiency partnerships

N 5522