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50 years Electrical Business

Also in this issue…

- 'Tis the season… for approved equipment
- Tool up for home automation opportunities
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EBMag is featuring a different guest editor on this page every issue during our 50th anniversary year. You can always reach the editor at acapkun@annexweb.com.

Les Dzwonkiewicz is a past-president of Electrical Contractors Association of Alberta (2013) and owner-president of Builder's Electric Co. Ltd., an electrical contractor based in Grande Prairie, Alta.

A place of big trucks and big bucks!

The wild, Wild West... big trucks and big bucks... these are just a few ways I could describe the oil patch in Western Canada. As you drive through any oil town or city, you will see growth at a very fast pace, with "Now Hiring" signs everywhere.

The money is great... more than what you would make at the same business in, let's say, Toronto, Montreal or Halifax, which brings me to the labour shortages we are experiencing now. The electrical and construction industries are screaming for qualified tradespeople. With 25% of the construction workforce retiring in the next 10 years, who is going to do the work?

We must start promoting both the trades *and* life skills to the next generation at an early age. Yes, life skills! Skills for managing your life and your money once you attain your dream of becoming a qualified tradesperson, and learning that saving money is *not a bad thing*.

Our society is now spending more than ever on credit; we live for the day, not for the lifetime. Back in the 1950s, banks would give out small piggy banks with cartoons printed on the boxes; when they got full, the children would take them to the bank and put the money into a Savings account. This helped them develop good habits for the future.

With all the opportunities in one of the greatest countries in the world, why do we have 32-year old children still living with mom and dad? Because they *can't find a job?*

There must be greater harmonization of apprenticeship training at the federal level and closer cooperation between provinces. Our federal and provincial governments need to step up to the plate and promote the trades *as a whole*; let's make being a tradesperson the Flavour of the Month (and maybe there should be an app for that!). We are *one* great country (with *two* official languages) so let's act like one!

Speaking of promoting the trades, I want you to know about the Professional Electrical Contractor (PEC) program run by the Electrical Contractors Association of Alberta (ECAA). The PEC program is designed for Master electricians that are in business (or thinking about it), and offers courses on Law, Accounting, Estimating, to name just a few. While the program is available to journeypersons, professional status can only be conferred upon those who hold an Alberta Master Electrician certificate.

This certification tells consumers the electrical contractor with whom they are dealing has upgraded status, which implies professional workmanship and safety, that all permits are taken out and in place, and so forth. Once you complete the program, you become a PEC—attaining the professional status of an engineer, doctor or lawyer.

Members of ECAA get access to this program at a discount, so I encourage all contractors coming to Alberta to join ECAA and help us continue our work with government and private sector partners and be the voice of the electrical industry. EB

On the Cover and Page 18

Non-contact tools help protect workers

The best way to avoid the hazards of electrical shock and arc flash is to stay away from the source, but that's easier said than done. Or is it? Perhaps this growing list of non-contact test tools can help.

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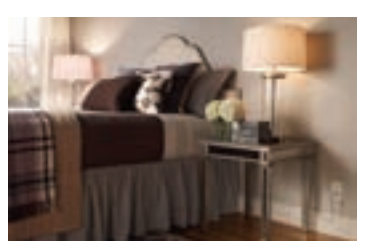

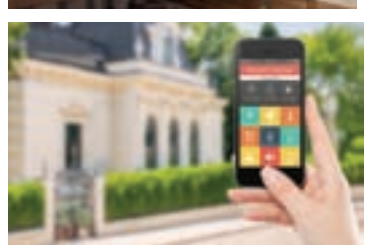

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Time for the ultimate phone upgrade!
Our friends at Samsung want EBMag readers to enjoy the latest and greatest in smartphones for the professional tradesperson with the Samsung Galaxy S5 Active (www.samsung.ca). Built to military spec and IP67-rated, this smartphone resists salt, dust, humidity, rain, vibration, solar radiation and thermal shock.

ISN'T IT TIME YOU LET YOUR OLD PHONE GO?

The Galaxy S5 Active can also become the ultimate mobile office with Locqus Field Service Management, which enables you to schedule and dispatch jobs, track employee location and get real-time status. Locqus' billing feature also allows easy and fast acceptance of debit and credit card payments from customers right on the spot (through Moneris Solutions).

INTERESTED? Send us a photo of your old, junky cell phone for a chance to win this beautiful Samsung. Only 1 available! Email the Editor at acapkun@annexweb.com (be sure to include your full name, mailing address and daytime phone number). After judging the submissions, we'll announce the winner in an upcoming edition.

Illegal electrical work = jail-time for Hazel

Richard Hazel was recently sentenced to 30 days in jail and fined $6250 on charges related to performing electrical work illegally and violating several Ontario College of Trades' (OCoT)requirements.

This is the first time a jail sentence has been handed down by an Ontario court for this type of offence. Hazel was also placed on two years' probation.

"The court has delivered a strong, clear message with this conviction and sentence that repeated, unlawful behaviour that puts public safety at risk has serious consequences," said Normand Breton of Ontario's Electrical Safety Authority (ESA).

Visitors to EBMag.com weighed in:

#1 Duffi - Why did it take so long to verify his credentials?

#2 Larry - It's bad enough we have to deal with property owners pulling their own ESA Permits and doing shoddy electrical work. Now we have to deal with non-certified people who are producing bogus credentials. Put them somewhere and *throw away the key!* A desert would be a good place!

Operating as Voltcom Electrical Services, Hazel was found guilty on eight charges: four counts of working without an electrical contractor's licence; one count of failing to obtain the required inspections; two counts of producing a false C of Q ; and one count of leaving behind unsafe electrical conditions at four homes in Hamilton and Burlington.

In October 2013, an ESA inspector identified a renovation in a Hamilton home had been done without a permit and, upon further investigation, determined Hazel had completed the work. Numerous electrical hazards were found, noted ESA. The investigation also found that he falsely produced an OCoT certificate of qualification to gain employment with two licensed electrical contractors.

Hazel was previously convicted in 2012 on 19 counts of violating electrical safety regulations at seven sites in the Windsor area, resulting in a fine of $23,750.

"Despite previous convictions, this individual continued to flout the law," added Breton. "We are very pleased to see that the court has taken this next important step, which we hope will deter others in the underground economy who are working outside the law."

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CCAB BPA WORLDWIDE BUSINESS

Overachievers recognized at inaugural EFC Marketing Awards


PHOTO COURTESY EFC.

Convectair's Bernard Pitre and Étienne Bolze with EBMag's Anthony Capkun.

Congratulations to Electro-Federation Canada's (www.electrofed.com) inaugural annual Marketing Awards winners, who were recognized for "demonstrating marketing excellence and innovation"! Kudos to the following:

Customer Event/Tradeshow Category
(sponsored by *Electrical Business Magazine!*)

1. Convectair (www.convectair.ca)
2. GE Industrial Solutions (www.geindustrial.com)
3. Lumen (www.lumen.ca)

Merchandising & Promotion Category

4. RC Lighting (www.rclighting.ca)
5. Vaughan Electrical Supply (www.vaughanelectrical.com)
6. Gescan (www.gescan.com)

Social Media Category

7. Hammond Power Solutions (www.hammondpowersolutions.com)

Sustainability Category

8. BRK Canada/Jarden Branded Consumables (www.brkcanada.ca)

"The program is a success due to the initiative and dedication of the marketing and communications professionals representing EFC member companies," said John Jefkins, EFC's vice-president, marketing & communications, adding that the winners were selected, not by EFC staff, but by an independent panel of judges.

Also announced were the 2015 Marketing Award categories. EFC will start accepting 2015 entries in the new year (February), so stay tuned to EBMag.

EB correction

How embarrassing!

In EBMag October 2014 (p.8) we told you some lucky writers of Letters to the Editor may receive a very-limited edition Tuff-Tote tool pouch, customized with EBMag's 50th Anniversary logo. While we got the website right (www.idealindustries.ca), the friends in question should have been noted as Ideal Industries (Canada) Corp. not Ideal Supply. Sorry guys!

How would YOU relight Niagara Falls?


PHOTO © THE NIAGARA PARKS COMMISSION.

The Niagara Falls Illumination Board has issued a Request for Qualifications (RFQ) to investigate new lighting technology and capabilities to improve the overall illumination of both the Canadian Horseshoe and American Falls.

"By undertaking this RFQ, we hope to learn more about what can be done to further shine a positive light on Niagara for all our visitors, so they can truly appreciate the beauty and majesty that is Niagara Falls at night," said Jim Diodati, mayor of the City of Niagara Falls, Ont., and chair of the board.

Currently, both Falls are lit using Xenon light technology. As it undertakes this process, the board would like to assess what new technologies could be used to enhance or upgrade the existing lighting systems now in place, as well as the potential for improvements in energy efficiency. (It has been almost 20 years since the Illumination Board made a major investment in lighting technology.)

The RFQ has been developed to assist the board in identifying experienced, capable and qualified lighting firms to provide information on how the lighting of both the Canadian Horseshoe and American Falls can be improved or enhanced. Based on the submissions received, firms must demonstrate expertise in the lighting selection design, construction technology and successful implementation of similar projects in other jurisdictions. This RFQ will also be used to pre-qualify firms for any subsequent RFP that may be issued with respect to the enhancement of the illumination of both Falls.

Those interested in participating in the RFQ can obtain more information and register via the MERX procurement database.

Stop calling in sick... wind turbine noise isn't killing you


STOCK PHOTO

Health Canada published findings from the Wind Turbine Noise & Health Study, which was prompted by "questions from residents living near wind farms about possible health effects of low-frequency noise generated by wind turbines", and the bottom line is... well, not so much.

EBMag informed you about the study's launch in July 2012 (tinyurl.com/m2tlagk). In collaboration with Statistics Canada, the study explored the relationship between exposure to wind turbine noise and the health effects reported by, and measured in, people living near wind turbines.

The new findings show no evidence to support a link between exposure to wind turbine noise and any of the self-reported or measured health endpoints examined.

"Based on the summary, the Health Canada study is an important new addition to scientific research on wind turbines and human health," said Robert Hornung, president of the Canadian Wind Energy Association (CanWEA). "The balance of scientific evidence to date continues to show that properly sited wind turbines are not harmful to human health, and that wind energy remains one of the safest and environmentally friendly forms of electricity generation."

The study did demonstrate, however, a relationship between increasing levels of wind turbine noise and annoyance toward several features (including noise, vibration, shadow flicker and the aircraft warning lights on top of the turbines) associated with wind turbines.

It is important to note, says Health Canada, that the findings from this study do not provide definitive answers on their own, and must be considered in the context of a broader evidence base.

Visit this news item at EBMag.com to access PDF downloads that include the study's experts, brochure of results and summary of results (tinyurl.com/mvogoqb).

Irwin Tools asks: Are you the Ultimate Tradesman?

Irwin Tools has expanded its efforts to raise awareness and appreciation for trade professionals by launching the Ultimate Tradesman Contest, where participants have a chance at winning one of nine monthly prizes worth up to $250 and a new Ford F-150 truck (www.irwin.com/nominateatradesman)!

"We are excited to launch a program that will give communities an opportunity to join us in celebrating the trade professionals who make a positive difference in each of our lives," said Nick Mastrone, vice-president of marketing. "We look forward to reading the submissions and continuing to celebrate all that trade professionals do to contribute so meaningfully to our lives."

Each month, one nominated tradesperson will be selected to win an Irwin tool bag with up to $250 in tools. One grand prize winner will receive a 2015 Ford F-150 4x4 SuperCrew Cab Pickup truck, new Irwin tools and an expenses-paid trip for two to attend the Irwin Ultimate Tradesman crowning ceremony at the company's North American HQ in North Carolina, September 2015.

Nominations must include an essay of up to 500 words stating why the entrant believes they or a tradesperson they know has made a difference in their community. The competition runs through June 30, 2015, with a limit of one nomination per entrant.

And, YES, the competition is open to residents over the age of majority in Canada!

Cara Backman, director of marketing, Franklin Empire, accepts the award for Best Annual Planning Process.

Leaders of Robertson Electric accept the award for Canadian Affiliate of the Year for Performance.

Carol McGlogan, director of marketing, Philips Lighting Canada, and Pierre Legare, vice-president sales, accept the award for Canadian Supplier of the Year for Performance.

Kudos to AD Spirit of Independence Award Canadian winners!

"I am truly inspired by the performance of our distributors and suppliers," said Jim Milne, president of AD Canada (www.adrewards.ca). "Our market-leading growth is fuelled by our exclusive AD Rewards program and the power of many entrepreneurs working together to provide exceptional end user value."

EBMag was pleased to attend Affiliated Distributors' (AD, www.adhq.com) 2014 Electrical Supply Division North American Meeting in Chicago, which was the largest to date, welcoming over 1000 attendees—including 173 first-timers—from over 390 companies in the United States, Canada and Mexico.

And speaking of inspiration, several Canadian firms were among those honoured during the meeting's Spirit of Independence Awards banquet. Congratulations to Franklin Empire (www.feinc.com) for Best Annual Planning Process, Robertson Electric for Canadian Affiliate of the Year for Performance, and Philips Lighting Canada for Canadian Supplier of the Year for Performance.

The next North American Meeting of the Electrical Supply Division is being held September 28 to October 1, 2015, at the Gaylord Texan Resort in Grapevine.

VIDEO: Four "intrepid cyclists" catch the Power2Feed spirit

As Debra Kerby, president & CEO of Canadian Feed The Children explains in **our exclusive video**, "four intrepid cyclists" from Canada's electrical industry "caught the Power2Feed spirit" and, through their efforts, were able to present the charity with a cheque of over $37,000 earlier this year.

Visit EBmag.com and check out our video (tinyurl.com/ml5puzy direct link).

Power2Feed (www.power2feed.com) is the Canadian electrical industry initiative that began life as Hungry for Change. To date, it has raised more than $1 million dollars in life-saving and life-changing funds to help feed hungry children in Canada and around the world.

The Power2Feed Cyclists are George Balla, Tim Horsman, Tere McDonald and Brian Power, who cycled from Toronto to Montreal for EFC's Electrical Council's annual conference. Well done, gentlemen!

Read "Who are Balla, Horsman, McDonald and Power cycling for?" at EBMag.com (tinyurl.com/kdqtz4k direct link).

OACETT 2014 salary survey shows designations equal more cash

A college education in engineering and applied science technology opens the door to an average salary of more than $75,000 annually for a typical engineering technology professional in Ontario. What's more, certification leads to a quantifiable and substantial increase in total annual compensation.

According to a recent salary survey of its membership, the Ontario Association of Certified Engineering Technicians & Technologists (www.oacett.org) concludes OACETT certification can produce a "significant annual increase over base salary for engineering technology professionals".

Based on responses gathered from more than 3400 members across a variety of industries and disciplines, OACETT's 2014 Salary Survey shows graduating with a technician or technologist diploma leads to a mean base salary of $75,436.

And certification correlates strongly with higher levels of compensation. Compared to associate members, certified technologists and technicians earn more on average in annual base salary. The average base salary for associate members who responded to the survey is $57,869, compared to $75,960 for Certified Technicians and $80,919 for Certified Engineering Technologists.

"These findings demonstrate that an investment in certification continues to pay dividends for our members," said David Thomson, CEO of OACETT. "The salary increases they enjoy are a true representation of what certification means in the workplace and how it is valued by employers."

OACETT promotes the interests of engineering and applied science technicians and technologists in industry, educational institutions, the public and government. Members hold one of the following designations: C.E.T. (Certified Engineering Technologist), C.Tech. (Certified Technician) or A.Sc.T. (Applied Science Technologist).

Mersen plants comply with ITAR and Controlled Goods Program

Mersen (formerly Ferraz Shawmut) announced that its Mississauga, Ont., plant is registered with Canada's Controlled Goods Program, while the Rochester, N.Y., plant is registered with International Traffic in Arms Regulations.

Registration in Canada's CGP is required for all companies who possess or transfer controlled goods in Canada. The U.S. government, meantime, requires that all companies involved in the manufacture of goods for the military be ITAR-compliant. Compliance means that a company has registered with the Directorate of Defense Trade Controls (DDTC) and follows the regulations.

Mersen's Rochester plant manufactures laminated bus bar, while the Mississauga plant manufactures products for the cooling of power electronics.

Prompt Payment Ontario: a new "force to be reckoned with"

According to the Electrical Contractors Association of Ontario (ECAO), 25 construction industry stakeholders representing ICI (industrial, commercial, institutional) and residential trade contractors, labour unions and benefit plan administrators gathered earlier this month at the inaugural members' meeting of Prompt Payment Ontario (PPO).

"The number of committed members from so many different constituencies who attended the first meeting is a clear signal that Prompt Payment Ontario will be a force to be reckoned with in the fight for prompt payment legislation" said Eryl Roberts, ECAO's executive vice-president and one of PPO's founding directors.

Lambton-Kent-Middlesex MPP Monte McNaughton makes a statement supporting Prompt Payment in Ontario (tinyurl.com/k4rq9me).

Roberts highlighted the three main reasons for creating the new entity:

- PPO will keep the Ontario government focused on fixing the issues of prompt payment and fair distribution of risk as promised prior to the election. "Since the election, Prompt Payment appears to have moved to the back burner and does not appear in the ministerial mandate letters, though it was in the Liberal pre-election platform."
- The proponents want to expand the scope of stakeholders beyond the group of trade contractor organizations who championed Bill 69: The Prompt Payment Act. In addition to Trade Contractors, PPO includes pension plans, labour organizations, supplier associations, benefit administrators and other supporters.
- The push for Bill 69 was seen by some as focused on the ICI sector. PPO has been created to attract supporters from all sectors, including residential and roads.

PPO is a single-issue organization dedicated to promoting and achieving Prompt Payment Legislation for Ontario's construction industry, says ECAO, with membership open to all stakeholders who support and wish to participate in achieving this goal.

Acuity building "world-class" engineering facility in Decatur

Acuity Brands (www.acuitybrands.com) announced it is building a "world-class" engineering and technology centre at a site it owns in Decatur, Ga., and will invest in facility upgrades at its complex in Conyers, Ga., as part of a plan "to enhance a workplace that will drive innovation and technology advances".

In the $11-million Decatur project, the company will retrofit an existing 167,000-sf building to become its new Engineering and Technology Centre. Located at One Lithonia Way, the building will incorporate "leading workplace design, technology and systems". The project will begin immediately, with completion scheduled for mid-2015. Acuity will relocate about 200 software and electrical engineers, technologists and support staff to the Decatur facility from its Conyers location once construction is completed.

Beginning later this year—and over the next several years—Acuity will invest in redesigning and retrofitting the four main buildings on its Conyers campus to include open workspace design, new infrastructure and technologies, as well as new furnishings.

Acuity says it will also receive various incentives from the state and the counties involved in support of its investment.

RCMP charges Montreal-Import for counterfeit products

The Mounties recently laid charges against a company named Montreal-Import and its owner, Rene Major Jr. of Terrebonne, alleging that Major sold electrical products bearing counterfeit UL certification logos.

A police investigation was initiated by the RCMP Federal Investigation Section in January

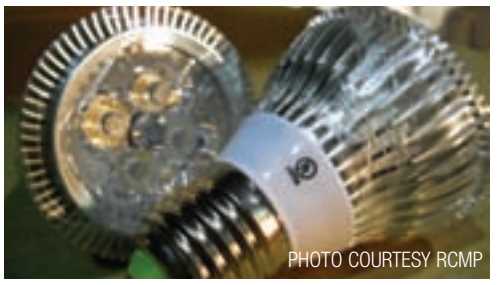
PHOTO COURTESY RCMP

2014 in response to a complaint laid by Underwriters Laboratories (www.ul.com), and "in view of the potential public safety hazards associated with the sale of counterfeit electrical products".

As a result of a search conducted at Montreal-Import, the police seized more than 13,000 counterfeit electrical items valued at more than $154,000.

Rene Major Jr. faces charges for having, by deceit, falsehood or other fraudulent means, made illegal use of the UL trademark on electrical products. He is scheduled to appear at the Montreal Court House on January 26, 2015.

If you have information on individuals or groups of persons you believe to be involved in fraudulent activity, contact the RCMP at (800) 771-5401, or your local police department.

Altec celebrates 30th anniversary in Canada

Altec is celebrating 30 years of service in Canada this year. Altec is an equipment and service provider for the electric utility, telecom, contractor, lights and signs, and tree care markets. Congratulations!

"It's the relationship with our customers that drives our business," said Jeff Benda, regional vice-president at Altec Inc. "We've always believed that earning business is first about earning trust; that's why we listen to our customer's needs and work with them every day to provide the best quality solutions."

Altec Canada provides nationwide support through a mobile service network. Combined with service centres located in Ontario, Manitoba and British Columbia, Altec promises "the most comprehensive, factory-direct service support in the industry".

Horizon and IBEW Local 636 raise $15k for MySafeWork

PHOTO COURTESY HORIZON.

Horizon's president & CEO Max Cananzi; Rob Ellis, founder of MySafeWork (www.mysafework.com); Barry Brown of IBEW, Local 636.

Horizon Utilities' (www.horizonutilities.com) president & CEO Max Cananzi joined Barry Brown of IBEW Local 636 (www.ibewlocal636.com) to present a $15,000 cheque to Rob Ellis, founder of MySafeWork—a not-for-profit charitable organization created to prevent workplace accidents.

"IBEW Local 636 was happy to partner with Horizon Utilities on October 4th for our annual golf tournament," said Brown, business manager/financial secretary. "All proceeds from the tournament support the efforts of MySafeWork, a deserving charity which provides education on workplace safety, and educating our young workers in schools in every community."

"Through the efforts of our employees and industry partners like the IBEW, we are part of the solution to eliminating workplace tragedies," said Cananzi.

EB personalities


Barry MacGowan

Following a courageous battle with cancer, it is with great sadness we announce the passing of **Barry MacGowan** of Cooper Wiring Devices. Barry passed away peacefully, with his family by his side, on November 22, 2014, at his home in Burlington, Ont. He was 57. Visit tinyurl.com/m89kpf3 for more info.


Mike Chabot

Mike Chabot, vice-president of business development, U.S., has retired from **Stelpro** (www.stelpro.com) after 42 years in the electrical industry. "Mike held an invaluable role in the grassroots growth of the various companies founded by his brother, John Chabot, that eventually led up the acquisition of Stelpro in 1994," reports the company.


Gianluca Arcari

CSA Group (www.csagroup.org) has appointed **Gianluca Arcari** to the new position of executive director, Canadian Standards Association, and vice-president CSA Group, where he is responsible for leading the standards division while developing standards and products, expanding membership and growing the global standards portfolio. Over the years with CSA Group, Arcari has served as a director of Learning Services, Appliance & Gas and Service Quality.


Jack Ballard

Specialized Power Solutions (www.specializedpwr.com) is welcoming **Jack Ballard** to the position of sales manager, who possesses over 30 years of experience in the power distribution and motor control field. "Jack will be a great asset to the Specialized Power Solutions team," noted the company, adding he will work with customers to provide technical and commercial support.

LED Roadway Lighting (www.ledroadwaylighting.com) has appointed **Peter Conlon** as CEO. The company's founder, **Charles Cartmill**, retains his majority ownership stake and position on the board. Conlon most recently served as president and CEO of Nautel Ltd., a player in high-power radio frequency products and solutions.


Brian Bentz

Electricity Human Resources Canada (EHRC) has selected **Brian Bentz**, president & CEO of PowerStream, as winner of its **Leader of the Year** for "outstanding leadership and vision in the workplace, and his exemplary commitment in developing an organizational culture that engages and motivates employees".

Paul Mercier—of **Lighting Design Innovations** in Calgary, Alta., and Batavia, N.Y.—will lead the **Illuminating Engineering Society** (IES, www.iesna.org) as 2014-2015 president, succeeding **Dan Salinas**.


Jon DeArment

Channellock (www.channellock.com) has named **Jon DeArment** its president and COO, succeeding his father, **William S. DeArment**, who will continue as the company's CEO and board chair. With nearly 20 years of experience, Jon began his Channellock career working in the plant while on break from college. He most recently served as vice-president of manufacturing & engineering.


Tom Cromwell


Brian Melka

Tom Cromwell, president of Kohler Engines since 2009, has assumed responsibility for **Kohler Co.'s** worldwide power operations (kohler.com) as group president, where he will provide strategic and operational leadership for the group's engines and power systems businesses worldwide. Meantime, **Brian Melka** has been promoted to president, Engines Americas.

Shermco Industries (www.shermco.com) has hired **Rob Stewart** as utility business development manager for both Canada and the States. The company says Stewart possesses years of sales and sales management experience, focusing on multi-national corporations in electrical transmission, distribution and generation.

SNC-Lavalin has named **Marie-Claude Dumas** executive vice-president, Hydro, for the company's Power group (www.snclavalin.com), where she is responsible for growing the business in Canada and "key" international markets. Dumas joined SNC-Lavalin in 2006 in the Global Procurement group, then went on to hold increasingly senior positions within the company's Hydro East business unit.

The **Industry Data Exchange Association** (IDEA, www.idea4industry.com) board—chaired by **Jack Carlson** (president of Southwire's North American business)—has announced president & CEO **Bob Gaylord** has stepped down to pursue other areas of interest. **Chris Curtis**, former CEO of Schneider Electric's NA Operations, will manage daily operations while chairing the search process for a new executive officer.


Adam Tappe

The **Professional Electrical Apparatus Recyclers League** (www.pearl1.org) has certified **Adam Tappe**, a 22-year veteran at National Switchgear, as its first Level 1 electrical reconditioning certified technician. According to PEARL, this certification proves to industry that individuals have knowledge of the reconditioning standard, as well as the expertise to complete tasks properly.


Jose Varela

3M (www.3m.com) has named **Jose Varela** vice-president & general manager of its Personal Safety division, where he will oversee the company's global safety business and more than 40 major protection platforms, including respiratory, hearing, fall, eyewear, head & face, and reflective materials.

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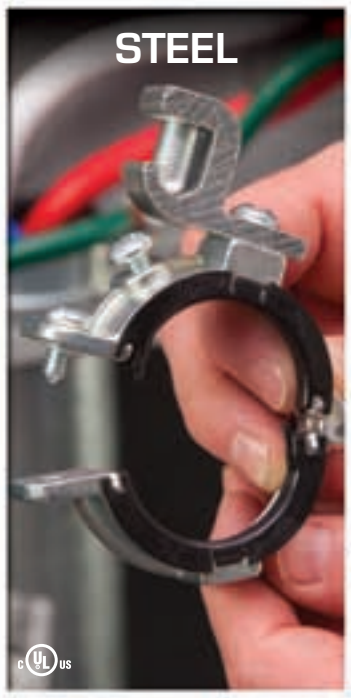

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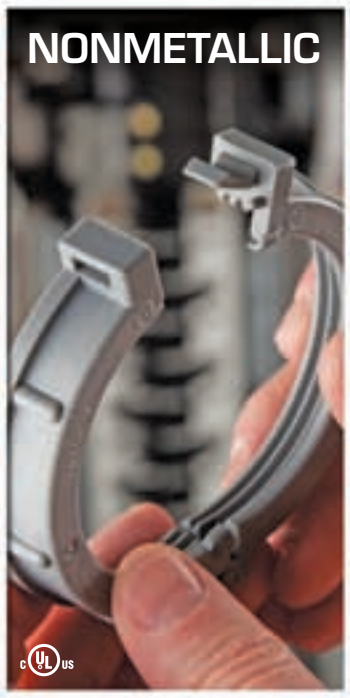

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A major change for residential safety

Expanded AFCI requirements in 2015 CE Code

Pierre Desilets

A major change happened at the Canadian Electrical Code meeting in June 2014 where, as usual, the members of the CE Code, Part I committee met to discuss all the changes going into the January 2015 edition, including one that will impact electrical safety in Canadian homes.

There are thousands of home fires across Canada each year, with a significant number involving great material disaster and, tragically, some human loss. The sheer number is overwhelming.

For a better analysis, one must deconstruct the total number of fires by source. One specific trait of Canada is that firefighting and fire reporting are under provincial jurisdiction, and each province and territory has its own parameters when reporting and classifying those fires. As such, reports are not in the same format across Canada; sometimes, correlating data between provinces is not readily possible.

That said, the desire to prevent losses and save lives is the same among jurisdictions, and we thank the provincial authorities who shared their data to the full extent possible, especially Ontario and Quebec, which have invested greatly in scientific analysis for with the ultimate goal of creating plans for reducing material and human losses caused by home fires. (Both Quebec and Ontario publish their findings and recommendations in an annual report.)

(In her Code File column, "Do we need arc fault circuit interruption in the code?" [EBMag March 2014], Nancy Hanna of Electrical Safety Authority referenced Ontario's overall numbers regarding location and source of home fires. See Table 1.)

The technical experts of CE Code Section 26 looked at the sources of fires and their locations. They also looked at available technologies and determined that raising the safety requirements for residential electrical distribution with arc-fault circuit interrupters (AFCIs)—despite their higher cost—would bring a definite gain to home fire prevention. (This in-depth review took six years and went through 10 rounds [officially] of adjustments to the original proposal which, in itself, is an impressive record in depth and length of deliberations.

AFCI technology in Canada today

Today, only bedroom circuits are required to be protected, and present AFCI protection is only reliable in the in-the-wall portion of the branch circuit. Without getting into too much detail here, AFCI technology does not presently fully monitor/protect plug-connected loads. A significant portion of reported failures occurs in cords and appliances that have degraded from overuse, abuse and the passage of time, but those loads are not fully monitored because of the technological limitations of older AFCI technology, and because not all appliances are plugged into bedrooms receptacles.

In the 2015 CE Code, all residential receptacle circuits will be covered by AFCI protection. There are, however, a few exceptions, such as circuits for some "white" goods, such as refrigerators, dishwashers and microwaves, and circuits protected by a GFCI (ground-fault circuit interrupter), like in bathrooms and new kitchens.

(For now, the Section 26 Subcommittee is not extending AFCI requirements to appliances having larger motor loads, such as a fridges, until end users [i.e. the general public] become familiar with the device and its purpose.)

In the period following the introduction of AFCIs into bedrooms several years ago, a number of breaker trips were interpreted as false. This situation gave bad press to the technology at the time, and the CE Code Part I Committee adopted a gradual approach based on understanding and acceptance of the technology prior to an all-around requirement.

So what does an AFCI protect us from?

AFCI's protect us against arc faults. Many will say a short circuit is an arcing fault; at least, it starts that way in many cases. While this is true, those short circuits interrupted by a breaker tripping or a fuse melting were large enough to be handled by overcurrent protection. AFCIs, on the other hand, protect us against short circuits that are too small to be detected by simple overcurrent protection i.e. arc faults that are below the threshold of a circuit breaker.

Statistics show that the number of reported cases attributed to electrical distribution and appliances can, in large part, be attributed to arcing of some kind. Simply stated, conventional overcurrent protection cannot help in these cases. There are two types of arcing fault: parallel and series.

A *parallel* arc fault occurs between a live part and another part to ground, or connected to a different voltage. The *series* arc fault is a bit more difficult to describe: it happens when a connection is loose, when a wire is broken and the broken ends are almost touching so that current flows through the plasma (energized gas) that appears between the broken ends.

IEEE IAS Electrical Safety Workshop (ESW)
January 26-30, Louisville, Ky.
Visit ewh.ieee.org/cmte/ias-esw

NEMRA Annual Conference
January 28-31, San Diego, Calif.
Visit www.nemra.org

EFC Electrical Council Ontario Region Gala
Electro-Federation Canada
February 6, Brampton, Ont.
Visit www.electrofed.com

EIAA Technical Conference
Electrical Inspectors Association of Alberta
February 6-7, Edmonton, Alta.
Visit www.eiaa2004.com

BICSI Winter Conference & Exhibition
February 22-26, Orlando, Fla.
Visit www.bicsi.org

NETA PowerTest
InterNational Electrical Testing Association
March 2-6, Nashville, Tenn.
Visit www.powertest.org

OCS State of the Industry & Outlook Conference
Ontario Construction Secretariat
March 3, Toronto, Ont.
Visit www.iciconstruction.com

The Work Truck Show
March 4-6, Indianapolis, Ind.
Visit www.ntea.com/worktruckshow

University of Innovative (Industrial) Distribution
March 8-11, Indianapolis, Ind.
Visit www.univid.org

Affiliated Distributors Spring Network Meeting
March 30-April 1, Tampa Bay, Fla.
Visit www.adhq.com

EFC Annual General Meeting
Electro-Federation Canada
April 15, 2015, Brampton, Ont.
Visit www.electrofed.com

MCEE (Mécanex/Climatex/ Expolectriq/Éclairage)
April 22-23, Montreal, Que.
Visit www.mcee.ca

BICSI Canadian Conference & Exhibition
April 26-29, Ottawa, Ont.
Visit www.bicsi.org

OEL Electrical Industry Conference
Ontario Electrical League
April 29-May 2, Huntsville, Ont.
Visit www.oel.org

Lightfair
May 3-7, New York, N.Y.
Visit www.lightfair.com

IEEE Industrial & Commercial Power Systems
May 6-8, Calgary, Alta.
Visit ias.ieee.org/conference-schedule.html

EAM (form. MEL) Showcase
Electrical Association of Manitoba
May 20-21, Winnipeg, Man.
Visit www.meleague.ca

ECAA Training Day & AGM
Electrical Contractors Assoc. of Alberta
May 21-24, Invermere, B.C.
Visit www.ecaa.ab.ca

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TABLE 1

Ignition Source		Single Units		Multi-unit	
		#	%	#	%
1. Circuit Wiring - Aluminum (including conductors)	✓	123	2.6%	12	1.2%
2. Circuit Wiring - Copper (including conductors)	✓	1375	29.3%	198	20.4%
3. Cord, Cable for Appliance, Electrical Articles	✓	704	15.0%	175	18.0%
4. Distribution Equipment (includes panel boards, fuses, circuits)		573	12.2%	174	17.9%
5. Extension Cord, Temporary Wiring	✓	541	11.5%	114	11.7%
6. Meter		75	1.6%	6	0.6%
7. Other Electrical Distribution Item		416	8.9%	113	11.6%
8. Service/Utility Lines (includes power/hydro transmission lines)		252	5.4%	45	4.6%
9. Terminations - Aluminum (includes receptacles, switches, lights)	✓	96	2.0%	16	1.6%
10. Terminations - Copper (includes receptacles, switches, lights)	✓	520	11.1%	92	9.5%
11. Transformer		21	0.4%	26	2.7%
Total		4696	100%	971	100%

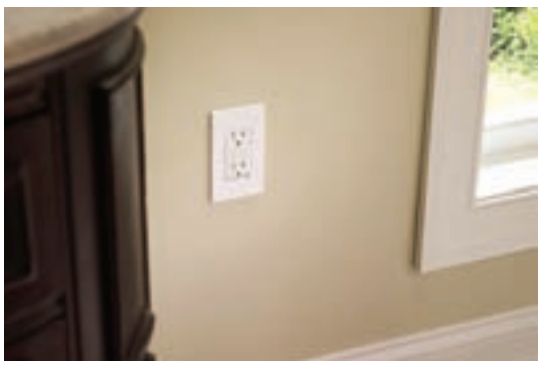
Source: Office of the Fire Marshal Ontario 2000-2011 data -Electricity as the Fuel of the Ignition Source of the Fire

✓ Ignition sources that could be prevented by complete or partial branch circuit protection through the use of combination AFCI breakers or receptacles and/or a system of both.

This kind of arc is only present when equipment with the broken connection is ON.

A parallel fault occurs when, for example, we insert a screwdriver into equipment and the tip touches a live part and the shank touches the grounded structure. The resulting spark is the parallel arc. Another example is manipulating a live wire and touching the enclosure of the equipment with the bare tip.

A typical example of a series arc is a receptacle with a loose terminal connection. (Some of us are old enough to remember the failures of aluminum cable in residential installations about 45 years ago, where we may have seen the oxide preventing a proper flow of current, leading to termination overheating, then failure.) A number of broken strands at a termination will also arc when there is sufficient current, especially when the wire and terminal are held together in their proper position.



Why arc fault protection in the home *and nowhere else?*

It boils down to where these arc fault failures are found, and their quantity. Statistics are blunt about the high number of electrical distribution failures, and we find them primarily in residential installations. Sure, you find them elsewhere, but in fewer numbers. It is simple: branch circuit wires and cables are mechanically protected by conduit, tubing or armour... except in residential installations.

In residential installations, wires and cables are hidden in the walls, subject to breakages due to the passage of time or deficient installation, and involuntary damage caused by, say, one of us driving a nail/screw into the wall to hang a picture or support a cupboard. Another set of incidents is related to the sheer number of appliances we use daily.

Once upon a time, very few receptacles in the home were the norm. Nowadays, a receptacle can be found in every 2 metres of wall. In days past, extension cords proliferated, and multiple octopus-like connections were often found. Pinching or walking traffic created internal wire breakages that led to series arcs of the "sneaky" variety, as they presented themselves only when an appliance was ON. They create heat, contact degradation and failure—sometimes with disastrous consequences. Worn-out receptacles with little or no retention left are also an example of a degraded electrical contact that can lead to a series arc fault.

An arc fault circuit interrupter monitors the flow of current in the circuit through a set of coils around the branch circuit conductor. Current exhibits minute variations as it flows; the AFCI analyzes this current, looking for harmful arc signatures. When they are found, the AFCI interrupts the current.

Where should an AFCI be located?

The 2015 CE Code will recognize two types of AFCI from January 1: the combination AFCI and outlet branch circuit (OBC) AFCI. The *combination* AFCI is a breaker-type device that replaces the former type presently mandated. This combo device is able to analyze parallel and series arcs all the way down plug-connected loads. The previous type cannot.

The OBC is also a combination-type AFCI that is to be installed in an outlet box. The CE Code mandates it to be installed at the first outlet in a branch circuit. Since the interrupting mechanism inside the OBC AFCI is not at the beginning of the branch circuit, there is a length of cable between the panel box (with the standard breaker) and the OBC AFCI, and the code requires that this length of cable be mechanically protected by conduit, tubing or armour.

The CE Code's AFCI residential scope is this:

- 120vac, 15A and 20A branch circuits containing receptacles
- Lighting circuits are not yet required yet to be protected by AFCI
- Some receptacle circuits are exempt, such as sump pumps, and some white goods

Of course, the number of AFCIs will vary according to the size of the installation but, with a maximum of 12 receptacles per branch circuit, we can expect four to six AFCIs to be installed in the average home.

Analogy between a GFCI and an AFCI

We all have seen GFCI receptacles; they can be found in bathrooms, outdoor installations and, now, kitchens. The most common form is the receptacle type, with two buttons on the face: one to Test and the other to Reset the device after it has tripped (or been tested). There is also the breaker-type GFCI with two buttons, performing in the same manner as a receptacle-type: they trip when a ground fault from 4-6 mA is detected in the branch circuit.

The AFCI device comes into two form factors, the same ones as a GFCI device. They have the same two buttons (Test and Reset) and work internally in a similar fashion as the GFCI. The difference is that an AFCI is monitoring for an arcing—not a ground—fault.

First, two more coils are required to complete the current readings from a branch circuit when an AFCI is compared to a GFCI. An AFCI device is therefore slightly bigger in volume when compared to a GFCI of the same build. (In concept, the monitoring circuit of a GFCI is similar to part of the monitoring circuit of an AFCI.)

Second, the sum of currents in the various coils is not what is of concern in an AFCI, as opposed to a GFCI. What is of concern is the behaviour of that current. When an arc occurs, the behaviour of current varies. In a short circuit, the current goes to infinity and the voltage goes to zero (as per Ohm's Law). With low power arcs—below the threshold of any branch circuit overcurrent protection to trip—current and voltage vary less extremely, and the arc is extinguished twice per cycle—at the zero-crossing of the sine wave.

We may one day see ground and arc circuit interruption functionalities combined in a single device but, at present, no manufacturer has unveiled such a device.

Those of us with a passion for electrical safety expect a significant change for the better in seeing fire occurrences go down in the years to come, with a reduction in the number of fire occurrences and associated losses. We are able to statistically track the diminution of electric shock since the advent of GFCIs and, with a small investment, we expect to see a similar downward trend in losses with AFCIs. EB

Pierre Desilets is manager, regulatory affairs & product training, at Leviton Canada (www.leviton.com), and Canada's go-to subject matter expert on wiring devices, such as tamper-resistant receptacles, and GFCIs. He is a voting member on CE Code, Part I, chairs Sections 30 and 86 of the CE Code, and is the president of CANENA (Council for Harmonization of Electrotechnical Standards of the Nations in the Americas).

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TOOL UP *for* HOME AUTOMATION *opportunities*

STOCK PHOTO

David Herres

In a volatile construction climate, electricians are better able to survive than other trade practitioners because the field is more diverse, and there is always the opportunity to spin off in new directions. After all, there are only so many ways you can install drywall. In contrast, electrical work consists of numerous subcategories: everything from PV generation and wind power to data cabling, appliance repair and upscale lighting.

To keep ahead of the competition, it is an ongoing endeavour to move into new areas and tool up—physically and intellectually—to integrate them into the workflow.

Home automation is one such field. The basic technologies have been around in the industrial environment for generations. Building automation, consisting of self-diagnostic fire alarm systems integrating with sprinkler, elevator and telephone subsystems, became viable in the late 1800s as electrical power and control equipment became available. Still, few home automation projects were completed due to the high cost. Except for the occasional bored millionaire or high-achieving DIYer, building automation became a reality only in factory and large commercial settings where abundant capital in an age of mammoth projects made it possible.

All that has changed. Mass-produced, inexpensive semiconductors—including silicon substrates populated by billions of interconnected transistors—have enabled a number of vendors to market lines of home automation equipment at surprisingly affordable prices.

What this means to the working electrician or medium-sized electrical contractor is that there is the potential for an enhanced revenue stream. With an in-place clientele consisting of homebuilders and individual homeowners, the enterprising electrician can leverage a large amount of new work. Using existing knowledge, expertise and tooling, it won't be difficult to complete residential home automation projects, beginning with small jobs and growing in an incremental fashion as in other types of power, light and data wiring.

Home automation has numerous applications, extending into areas such as remote-controlled lighting and HVAC, timers, occupancy and leak sensing, access control (including door locks), audio and video control, and energy measurement and savings. Over-use of heat and air-conditioning is costly, and home automation is a way to fine-tune this usage. The emergence of smart meters adds an interesting dimension. There is the potential for the utility to shed remote loads so as to prevent brownouts or complete outages. This can happen to the entire premises and it is also possible, within an automated home, for individual appliances to be controlled—beginning with the heaviest or least essential loads.

EVEN ENCRYPTED HOME AUTOMATION SYSTEMS SAY A LOT ABOUT YOU

Regulating heating systems to save energy, adjusting lighting levels based on the time of day, watering houseplants automatically, raising or lowering blinds at the required times... the benefits of today's smart home automation systems are numerous and becoming increasingly popular. However, studies by Christoph Sorge and his research team at Saarland University show these wireless systems also pose a security risk.

"Many of the systems do not provide adequate security against unwanted third-party access and, therefore, threaten the privacy of the inhabitants," said Sorge, an expert for IT security, data protection and encryption technology.

For the purposes of their study, researchers took on the role of a malicious attacker. "Using a simple mini-PC—no bigger in size than a packet of cigarettes—we eavesdropped on the wireless home automation systems (HASs) of two volunteers, and were thus able to determine just how much information a conventional wireless HAS reveals about its user," explained Sorge.

No other information about the users was available to the research group. The result? "Non-encrypted systems provide large quantities of data to anyone determined enough to access the data, and the attacker requires no prior knowledge about the system, nor about the user being spied on," said Sorge.

"The data acquired by the attacker can be analyzed to extract system commands and status messages, items which reveal a lot about the inhabitants' behaviour and habits. We were able to determine absence times and to identify home ventilation and heating patterns," explained Sorge. The analysis enabled the research group to build up profiles of the inhabitants.

Even systems that use encryption technology can supply information to third parties: "The results indicate that, even when encrypted communication is used, the number of messages exchanged is enough to provide information on absence times," said Sorge. Potential attacks can be directed against the functionality of the system or the privacy of the inhabitants. "An attacker with malicious intent could use this sort of information to plan a burglary," Sorge concluded.

"A great deal still needs to be done to make wireless home automation systems secure. Improved data encryption and concealment technologies would be an important step towards protecting the privacy of HAS users," Sorge concluded.

— From Energy-Manager.ca, July 2014

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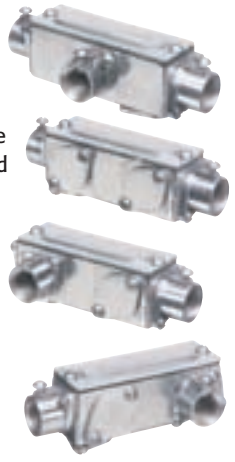

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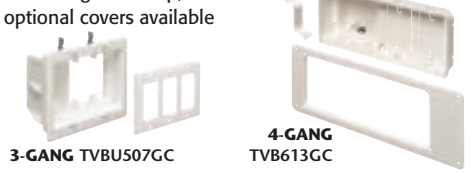

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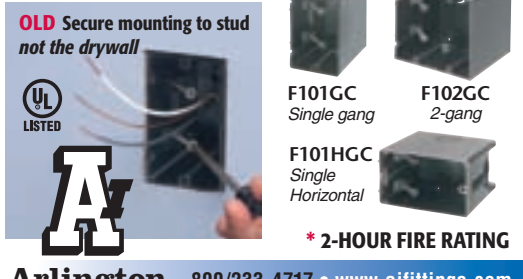

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ZIGBEE PRESIDENT NOT HAPPY WITH CHINESE "ROGUE PLAYER"

ZigBee president & CEO Tobin J.M. Richardson today issued an alert to alliance members and interested stakeholders regarding a Chinese company named Wulian (also operating under the name Nanjing IoT) that "has been misrepresenting itself as the ZigBee Alliance in China and other areas, despite the fact that they have no present affiliation with the ZigBee Alliance".

Moreover, writes Richardson, Wulian has been "inaccurately and intentionally mis-advertising its products as ZigBee Certified, which they are not".

"The ZigBee Alliance takes these transgressions very seriously and is taking active steps to resolve this issue. Promoting and protecting the interests of the stakeholder members of the ZigBee Alliance is of utmost importance."

"While we have attempted in good faith to amicably correct this situation directly with Wulian, they refuse to comply. Subsequently, the ZigBee Alliance has taken steps to address these issues," explains Richardson, including contacting appropriate U.S. and other country trade representatives, filing objections to Wulian's use of the ZigBee trademark and name, and contacting the Chinese Trademark Office (CTMO).

"While the actions of this one rogue player are of serious concern, we remain excited and confident about the opportunity ahead for ZigBee Alliance stakeholders as we enable the vast benefits of the Internet of Things," said Richardson.

ZigBee is a platform of wireless standards for interconnecting a variety of devices. The alliance promotes worldwide adoption of ZigBee standards as the "leading wirelessly networked, sensing and control standard for use in consumer, commercial and industrial areas".

— From EBMag.com, October 2014

Getting off to a good start

There are a few points to keep in mind at the outset. First, the conventional electrical infrastructure should be well built, meaning efficient and compliant in all respects. Since home automation equals the deployment of a certain amount of new equipment, the service out of necessity should be adequately sized for the home in terms of building footprint as well as occupancy and projected usage.

The grounding system that is or will be in place should be properly sized to protect the home and occupants from the twin demons of electrical fire and shock, as well as threat of lightning. GFCI and AFCI (ground/arc fault circuit interrupter) protection must be present as required, and the overall wiring should be orderly and well documented so that homeowners—now and in the future—will be able to operate, maintain and expand the home automation system as desired.

The automated home is not constrained by a precise definition, but rather limited only by the imagination and ingenuity of the designers, installers and, finally, the end users. It is not possible to make a definitive list of all the subsystems, as almost any object or process in the home is capable of being automated... capable of operating independently of the human element. Some of the things that can participate in home automation are:

- Windows, shades and doors (including garage doors)
- Home appliances
- Audio and video equipment
- Pet feeders and irrigation
- Room lighting and lamps
- Telephones and clocks
- Surveillance cameras
- Air-conditioning and heating
- Central fire alarm systems and individual smoke detectors
- Home electrical and energy management systems

A variety of skills and knowledge bases are needed to bring the whole thing together, but that is also generally the case in electrical wiring, so no daunting leap is needed.

I recommended you find a single supplier to facilitate the design and installation of a home automation system. Components made by different vendors are sometimes compatible (interoperable), but there's always the threat of incompatibility when you mix and match. It can prove a veritable Tower of Babel! Fortunately, the principal vendors provide comprehensive and user-friendly documentation, explaining how to hook up the components with the prospect of success, and pointing out potential pitfalls. Beware, however, of some vendors who exaggerate the capabilities of their merchandise.

It is sometimes suggested that the use of a proprietary home automation product will simplify the initial house wiring installation and save enough money to pay for the entire project. This is not usually true.

For example, automatic devices used in place of conventional 3- and 4-way switches may obviate the need for running 'travellers' in the cable connecting the switches because they are wirelessly connected. While it is true that such a shortcut will work, many homeowners have questioned the wisdom of this arrangement, correctly pointing out that it limits future options and necessitates costly rework in the event that the protocol becomes obsolete, or some future owner proves himself enough of a *Luddite* to resist the idea of home automation entirely.

A good course of action is to find a single home automation manufacturer and stick with them, at least in the course of your initial installations. Quality hardware, sensible documentation and backward-forward compatibility are desirable features. Cost—always a factor—should not be decisive when you want the finished installation to engage the end user's interest and retain value over the years.

The proliferation of products

From a modest start, home automation products have proliferated over the years. The first was X10, which originated in the 1970s in powerline then wireless forms. It is somewhat limited by today's standards, as it is slower and less able to communicate between units compared to other protocols.

ZigBee is a low-power yet effective wireless product based on IEEE 802.15.4. A group of vendors created products based on the standard and it became one of the principal home automation enablers. Most of the devices communicate well despite the low overall power. Z-Wave is also wireless. It is owned by a single company—Sigma

Designs—which manufactures the chips that permit other vendors to make and market home automation devices and systems.

Wi-Fi, the familiar ethernet variation that is used for many home internet networks, has been adapted by vendors to achieve home automation connectivity. Unlike other protocols, it requires greater power and bandwidth. In contrast, Insteon's modest needs and dual-mesh technology make it very suitable as a gateway to the world of home automation.

Insteon is able to communicate with the internet, over cable connection to premises computers, and with smart phones, tablets and many security panels, by means of ethernet, USB and serial bridges. Many Insteon products, when wired into the powerline, are compatible with existing X10 devices without resorting to a bridging product.

Home automation is very much an open-ended undertaking. The area is subject to continuous new developments and the designer-installer is a key part of the creative process. No two installations are exactly alike, due to the many devices and the amount of software available, as well as the large variation in building shapes and sizes that form the substrate.

All of this is fertile ground for the electrical contractor. As electricians continually rebrand themselves, expanding expertise and fields of operation, home automation is emerging as a work in progress, at the very least and, perhaps, as a transition to ever-greater technological accomplishments. EB

A regular contributor to Electrical Business, David Herres is a Master electrician and author of nearly 40 articles on electrical and telecom wiring. Look for him on Amazon.com.

BEWARE THE BOTNET CREEPING INTO YOUR SMART HOME

A term from the world of computers—botnet—is creeping its way into the world of building automation and, according to Dr. Steffen Wendzel of the Fraunhofer Institute in Bonn (FKIE), you have to anticipate this kind of attack scenario.

Attackers infiltrate multiple computers via 'bots' (from the word 'robots') without their owners' knowledge, weave the computers together into nets, and misuse them for computer attacks.

Wendzel is a researcher with the Cyber Defence department, and an expert in hacker methods. Working with Viviane Zwanger and Dr. Michael Meier, he is studying botnet attacks on smart homes using internet-linked buildings or building operations... and they've found the threat is absolutely real.

"Our experiments in the laboratory revealed that the typical IT building is not adequately protected against internet-based attacks. Their network components could be hijacked for use in botnets," Wendzel said. Internet-controlled electric roller shutters, HVAC and locking systems could all be used for these kinds of attacks.

In the process, the hackers do not have to seek out the PCs as in the past; instead, they look for the components in building automation, like routers in home use, that link the buildings with the internet.

In their analysis of botnet attacks, the researchers sketched out definitive threat scenarios for smart homes. In a worst case scenario, when an attacker hacks into the building operations IT, he will learn where the residents or tenants are located and what they are doing. That includes everything, right down to going to the toilet. Intruders, for example, could use this data to prepare for a burglary. In this case, the hacker is acting in a passive capacity... simply tapping data. However, he could be equally capable of actively invading the systems.

Wendzel is currently advising against carelessly linking all building functions in private homes to the internet.

— From Energy-Manager.ca, Sept. 2014

Don't touch me!

Non-contact tools

Leah Friberg

Any technician will tell you that the best way to avoid the hazards of electrical shock and arc flash is to stay away from the source of those hazards. However, that's easier said than done. Like it or not, there are times when you have to inspect and troubleshoot energized equipment, which means suiting up in personal protective equipment (PPE).

But what if you could safely reduce the amount of PPE required by moving the technician or electrician further away form the electrical hazard? That's now possible with the use of a growing list of non-contact test tools and technologies that we examine here. (N.B. using the tools below does not negate the need for appropriate PPE.)

Non-contact infrared thermometers

Non-contact IR thermometers are among the simplest non-contact test tools to use. Stand within 10 ft of the target, point the thermometer at the object and read the numeric temperature value on-screen. Temperature values are great indicators of electromechanical equipment performance, and IR thermometers that calculate apparent temperature from a distance keep technicians off ladders and away from hot components.

Visual IR thermometers

A visual infrared thermometer collates multiple infrared readings into a digital IR heat map of the inspection target. Technicians can stay up to 10 ft away and view a blended infrared/digital image on-screen to scan equipment for overheated components and other abnormalities.

Infrared cameras

Infrared cameras measure thousands of IR temperature values at once to produce a detailed and highly informative thermal image in which every pixel has a calculated temperature value. The camera uses colours to represent the degree of heat coming from various components, allowing the operator to distinguish the difference in apparent temperatures across the object under inspection and make decisions on what to do next.

Thermal imagers must have direct line of sight to the object under inspection. As noted above, thermographers must still wear PPE... the safety advantage comes from not

that help protect electrical workers

having to directly touch live equipment.

Infrared windows
When properly installed on an arc-resistant-rated panel, some infrared windows are rated to withstand an arc blast and can be installed permanently on panel doors and switchgear enclosures. This allows technicians to visually and thermally inspect energized equipment with the door closed, greatly reducing their exposure to electrical hazard.

Laser distance meters
Non-contact laser distance meters allow one person to electronically measure long distances, such as the lengths of conductor runs between equipment safely from the floor. In addition to improving safety, laser distance measurement can help save labour costs and time.

Non-contact voltage detectors
Voltage detectors either beep or light up when in proximity to electricity. Technicians use these simple tools to verify that a panel, circuit or device is de-energized before they touch it. Panels often have multiple/alternate power sources; shutting off the main supply doesn't guarantee safety.

Remote-display multimeters
Rather than standing directly in front of a large-horsepower motor at start-up, technicians can set up a remote display multimeter and probes or clamps at the de-energized starter, remove the detachable display, move away from the equipment, start the motor and read the results. Remote displays work at distances of up to 30 ft.

Wireless tools
Wireless tools, from digital multimeters to single-function modules, allow technicians to download measurements from a connected tool. Technicians set up multiple voltage, current, and temperature wireless test modules at the equipment, then read the results from a safe distance up to 60 ft away.

Evolving to a safer future
Wireless tools are continuing to evolve. With some wireless tools, technicians can view measurements in real time on their smartphones, laptops or tablets and share those results with team members in multiple locations. Measurement data also can be stored securely in the cloud and accessed by authorized users next time they're on-site, allowing for better decision-making on the fly. That's the true source of electrical safety. EB

Leah Friberg is the education & public affairs manager with Fluke Corp. (www.fluke.com), which manufactures, distributes and services test tools for electrical and electromechanical installation, commissioning and maintenance.

The next LED revolution is control

STOCK PHOTOS

Craig DiLouie

With efficacy and service life steadily increasing and costs declining by about 18% each year, the LED revolution continues to develop at a rapid pace. LED's inherent compatibility with digital control—aided by other trends—is setting the stage for the next LED revolution: smart lighting control.

Many LED products are sold with dimming capability regardless of how the owner plans on controlling them. Drivers and controls are easily integrated. With smart lighting control, luminaires themselves can become addressable nodes in a network, transforming lighting from dumb, fixed-output systems into intelligent, highly flexible systems; that, and a networking platform incorporating other building functions.

The primary driver is energy consumption with a bonus that dimming LEDs can extend service life by reducing lumen depreciation and delaying colour shift. As more jurisdictions adopt a commercial building energy code based on the ASHRAE/IES 90.1-2010 energy standard, demand will continue to increase for controllable lighting.

Besides these requirements, there is evidence owners and specifiers want more controllability. The Sylvania 2010 Commercial Lighting Survey found that 42% of its facility manager, lighting designer and other decision-maker respondents considered the easier dimming and control of LEDs a major benefit.

Where the trend began

The smart lighting trend started with conventional lighting. Digital hardwired lighting control provides the benefits of individual luminaire addressability, control zoning and rezoning using software, instant setup and remote calibration, and two-way communication providing performance analytics.

The advent of digital wireless control simplifies design and installation, facilitates penetration of sophisticated lighting control options in existing construction, and extends control to plug loads. The miniaturization of control devices enables integration of sensors and controllers within each luminaire. Finally, easier colour control of LED lighting provides a new dimension of lighting control, which is white light colour tuning; the applications for this capability, currently limited, may explode based on developing research into lighting's relationship to health.

These trends, coupled with inherent compatibility with digital LED devices, laid the groundwork for greater adoption of intelligent lighting control as demand for LED lighting continues to accelerate. They are being tied together into complete solutions, featuring luminaires and controls, as well as stand-alone control solutions.

Cases in point

Let's look at some recently introduced solutions as examples, starting with Cree's SmartCast Technology, available with select Cree luminaires or other luminaires with dimmable drivers, and Philips Lighting's SpaceWise Technology, currently available as an option for the company's DuaLED luminaires targeting open office applications. Both feature luminaire-integrated occupancy and daylight sensing, two-way wireless mesh communication, and push-button setup with a hand-held remote. These solutions offer a potentially simple, cost-effective path to energy code compliance and energy savings of 50-70% compared to conventional uncontrolled T8 luminaires.

Acuity Controls' XPoint and xCella wireless control solutions offer options as a stand-alone system or the ability to work with other controls to enable implementation of a wireless or hybrid/wireless system offering integration with building management systems, and monitoring and analytics software. While XPoint was developed for lighting management and building applications, xCella targets room-based lighting, HVAC and plug loads, with the potential for networking between rooms.

Cooper Lighting's LumaWatt solution, designed as a control platform for roadway, parking and outdoor area LED luminaires, features integral and/or remote sensors, scheduling, power metering and maintenance diagnostics.

Control solutions such as these bring the best of lighting control and LED illumination together in a way that maximizes energy savings, facilitates asset management, and simplifies implementation.

The best may be yet to come

LED lighting has been called the Trojan Horse of the Internet of Things, and we're at the frontier of this extraordinary revolution. The IoT consists of uniquely identifiable objects represented within

a network similar to the internet. Digital lighting control networks already satisfy this definition, but reflect only a fraction of the true potential to add value.

What makes the LED luminaire a Trojan Horse is it offers the ability to serve as infrastructure for additional onboard equipment and sensors that can collect and share temperature, occupancy and other data, opening a wide range of new applications. The real potential is to expand lighting's value proposition from energy savings and longevity toward data and the business value that data can unlock.

What might this look like? In a commercial building, occupancy sensing (which could be video) embedded in LED luminaires could enhance security and building and resource management by monitoring internal traffic and spatial occupancy. In retail stores, sensors could track everything happening on store floors. In parking lots, sensors could guide visitors to open parking stalls and enhance security. Roadway and streetlighting could collect traffic, temperature and pollution information. The list goes on.

The result is lighting that collects local data useful for strategic management and accumulates big data that fuels strategic ideas.

Besides collecting information, LED lighting can also be designed to enable communication with users. This could be as simple as incorporating public address capability in public spaces, and as

sophisticated as using visible light to talk to user mobile phones and camera-enabled tablets using downloaded apps. Acuity, GE and Philips are all demonstrating visible light communication solutions, which will allow owners such as big box retail stores to communicate with shoppers for wayfinding and targeted messaging.

Smart LED lighting takes the conversation about light from providing desired light levels for the lowest cost toward the benefits of total control. Lighting that generates big data expands capabilities and adds business value in new ways. The next stage in the game is integration—LED lighting as infrastructure. We're in the most exciting period in the history of the lighting industry, and the revolution is just getting started. EB

A regular contributor, Craig DiLouie is principal of ZING Communications Inc. (www.zinginc.com) and education director for the Lighting Controls Association (www.aboutlightingcontrols.org). This article originally posted in July 2014 on the LCA website.

The smartest lighting control systems consider people first

STOCK PHOTO

Brent Protzman

Today, smart building technology is changing the way we think about lighting control and building integration. Manufacturers can increasingly deliver components that maximize energy efficiency and integrate with other building systems to provide automated, data-driven control. But as lighting controls become smarter, it is critical to remember that they should first create the best possible experience for the people who live and work in the space.

Ultimately, the customer's perception of quality starts with the expectation that whatever is installed in the building will work; that it will, first and foremost, achieve its intended purpose. A dimming system, for example, can help optimize energy efficiency, reduce installation and operating costs, and integrate with building management systems but—most importantly—it has to dim smoothly and improve the lighting environment.

With regard to lighting control, quality can be defined by four basic principles:

1. *Devices require a dependable control system*

Think about what happens when a lighting control system fails. A single day of failure over the life of the system can cost a business almost as much money in productivity losses as the cost of the lighting control system itself. Lighting is one of the most operationally essential aspects of any building.

2. *The lighting experience is important*

Lighting control systems are becoming more complex and greater integration is required. Manufacturers have to understand how to apply the best control strategies and how to properly integrate them to achieve high performance and deliver the expected results.

3. *Manufacturers must be accountable for product performance*

No system is perfect, and problems will come up on some jobs. To account for this risk, it is important that manufacturers have a service and engineering organization capable of quickly responding to solve the problem instead of creating delays and additional callbacks.

4. *Devices have to be compatible across systems, even in the face of constantly evolving technologies*

It is difficult to see the future of integration and interoperability. Systems must be designed with this in mind and allow for a wide breadth of existing and future integration possibilities.

A smart lighting system considers both electric light and daylight control.

Lighting systems must provide the right illumination levels for people to go about their visual tasks. And, although it is extremely difficult to isolate the productivity benefits of appropriate lighting levels, research has found a clear link between control over their personal environment and employees' comfort and motivation. A comprehensive approach means that both electric light and daylight control are used to maximize comfort and energy savings.

Shading systems, for example, are primarily designed to reduce glare and provide thermal protection for building occupants. Without effective glare mitigation, a shading system would provide little overall value. However, glare control does not eliminate the ability for advanced daylight harvesting, preservation of occupant views, and opportunities for passive heating or heat reflection. A truly high-performance system understands the hierarchy of control and always maintains primary functionality first before addressing advanced benefits such as energy optimization and data analytics.

Energy efficiency is important—not only as a cost-saving factor but as part of a growing global commitment to sustainability—but the emphasis on saving energy is relatively new. Lighting controls have been around for more than 50 years and the primary purpose has always been to provide a meaningful benefit to the people working and living in the space.

As we evaluate building lighting control strategies, the first point of emphasis must be the sociological impact on building occupants. This results in bottom-line savings in terms of reduced energy consumption, employee effectiveness and overall well-being. EB

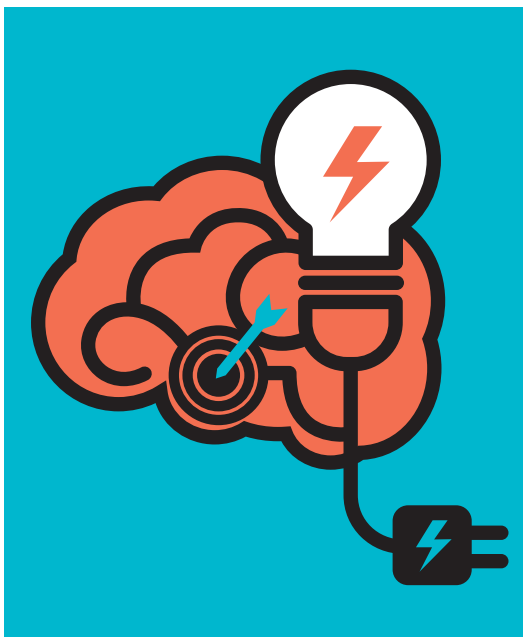
Brent Protzman, Ph.D., CEM, LEED GA, LC, is the manager of energy information & analytics at Lutron Electronics (www.lutron.com), and has published articles on human factors in lighting and lighting energy. He is a former professor and researcher in the Building Systems Program at the University of Colorado where he focused on human factors in lighting, daylighting design and performance, energy audits and simulations, and sustainable lighting systems. This article was originally posted by the Lighting Controls Association (LCA, lightingcontrolsassociation.org) in June 2014.

Mike Doherty

Exponential knowledge curves in electrical safety

One way of defining an 'exponential curve' can be "a visual representation of the relations between certain values plotted with references to a set of axes". If the plotted values are Knowledge and Time, the question you should ask yourself is: Where am I in my quest for electrical safety knowledge?

How much time did it take you to acquire the knowledge you have? Did the knowledge come slowly over a long period at the beginning, then increase as the time axis carried on at the normal rate? You could also wonder where your colleagues are with respect to their own quests.



Did the knowledge come slowly over a long period at the beginning, then increase as the time axis carried on at the normal rate?

This relationship between Knowledge in electrical safety and Time for attaining it—potentially an exponential curve—is especially poignant to me as I reflect on the recent passing of William (Bill) Curtis Jordan this year. He was born in 1929 and received his electrical engineering degree in 1954. He spent five years with the General Electric Co. and 38 with Dow Chemical Co., and worked for a number of years after that in South America, the Dominican Republic and several American states.

So what does Bill have to do with exponential curves and electrical safety? Consider that he had his people using arc flash PPE ensembles back in the early 1980s, yet some people today think this level of PPE is a new concept!

Lanny Floyd, global electrical safety competency leader at DuPont, helped me better understand Bill's impact on electrical safety. Lanny sent me an article from the 21 April 1980 issue of "Chemical Engineering" magazine and a update in 1990 of a 1985 paper entitled "The Use of Protective Flash Equipment", which included some additional case histories illustrating the effectiveness of arc flash PPE (even back then).

After originally receiving and reading the 1980 article, Lanny was told that it was based on practices at the Dow Freeport operations, and that he could contact someone named Bill Jordan to discuss. Bill invited Lanny to his site at Dow to see the methods and practices first-hand, and emphasized that these practices were not proprietary; in fact, Bill wanted to share his knowledge with as many people as possible.

At the 1985 IEEE IAS Annual Meeting in Toronto, Bill presented a paper explaining what they were doing with rubber gloves, arc flash ensembles and voltage detection, for example.

To honour this visionary pioneer, a prestigious award was just recently renamed the IEEE IAS Electrical Safety Committee William C. "Bill" Jordan Founder's Award. This award recognizes individuals who have demonstrated outstanding leadership, service and dedication to the mission and strategies of the Electrical Safety Workshop, and is the highest level of recognition presented by the IEEE IAS Electrical Safety Committee.

Although soft-spoken, Lanny says that Bill's passion and conviction for changing common practices and advancing electrical safety culture were palpable. One of Bill Jordan's great legacies was to compress the electrical safety exponential knowledge curve, and show how it can, should and must be done. EB

A well-known subject-matter expert and speaker on electrical safety, Mike Doherty is a health & safety manager/consultant with PowerTel Utilities Contractors Ltd. He is a licensed electrician and an IEEE senior member. Mike has served as the Technical Committee chair for CSA Z462 since its inception in 2006. His specialties include electrical safety and health & safety management, consulting, training, auditing and electrical incident investigations. Mike can be reached at mdoherty@powertel.ca.

Philips flattens the downlight with SlimSurface LED

Royal Philips says it has flattened the downlight with the introduction of the SlimSurface LED family. With a 5/8-in. surface-mount design that claims to be nearly flush with the ceiling, SlimSurface is designed for quick and easy installation to most standard junction boxes. It uses Edgelit technology, which puts LEDs at the edge of the fixture and uses a specially designed lens that promises uniform light distribution, similar to the Philips SlimStyle bulb.

PHILIPS
www.philips.com

IES RP-8-14 Recommended Practice for Roadway Lighting

The Illuminating Engineering Society has published RP-8-14 "Recommended Practice for Roadway Lighting", an ANSI-approved standard. Its primary purpose is to serve as the basis for the design of fixed lighting for roadways and streets, including pedestrian and adjacent bikeways when associated with the public right-of-way. Available in print or as a PDF download.

IES
www.ies.org

RECALL: Philips 12A19 EnduraLED

Philips Lighting Canada has announced a voluntary recall of the EnduraLED, product code 409946 12A19/END/800LM/2700/120V DIM.

Involving about 35,900 units in Canada, the identified hazard is a lead wire in the bulb's housing that can have an improper fitting, which can electrify the entire lamp and pose a shock hazard. That said, no injuries or incidents have been reported to Philips Lighting Canada.

Specifically, the recall involves Philips EnduraLED 12W dimmable bulbs, which are Orange and have "Made in China", "Fabrique en Chine" followed by a slanted "S" and the model number "9290001829" printed on the grey plastic band on the neck. The date code "2L" is printed on the metal screw base.

The products were sold since November 2012 by Philips Lighting Canada only to professional electrical wholesale supply distributors in Canada. Philips will replace all affected units currently installed in end user applications at no cost to the user. Philips will issue replacements to all distributors with affected units in inventory.

Questions? Contact Philips at (800) 363-1464 or by email at canadawarranty@philips.com.

PHILIPS LIGHTING CANADA
www.philips.com

Ilsco's TaskMaster 6-ton crimper, cutter & puncher

TaskMaster's 3-in-1 quick-change system allows you to cut, crimp and punch. The cable-cutting head makes short work of copper and aluminum wire. A universal, four-indent, die-less crimping head promises fast connections, while the hole-punch head boasts precise cable entry holes. The is powered by a quick-charge 18V lithium battery with power-saving Sleep mode. TaskMaster is housed in an impact-resistant nylon body with built-in worklight. The tool is CSA-certified and UL-listed with Ilsco's line of SureCrimp copper and aluminum compression connectors.
ILSCO
ilscotaskmaster.com

CE Code, Part I 2015 available for pre-order (with gift!)

A critical component of the Canadian electrical safety system, the 23rd edition (2015) of the Canadian Electrical Code, Part I contains more than 200 updates and revisions, including major changes to sections on renewable energy, hazardous locations and electric heating. Pre-order your copy of the 2015 CE Code before December 31, 2014, and receive a complimentary copy of the Electrical Quick Reference Guide ($25 value), which provides easy access to commonly used terms, rules, installation practices and calculations, and can help improve safety and efficiency on the job.
CSA Group
shop.csa.ca

Milwaukee jobsite backpack redefines durability

Boasting 1680D ballistic material for extreme durability, the Milwaukee Tool jobsite backpack is designed to survive the jobsite and make the user more productive, says the company. It features padded straps promising ultimate comfort and jobsite performance, as well as a special pocket for protecting laptops and tablets. A fold-down front pocket allows for storage of larger items such as fish tapes, drills and extension cords, while exterior daisy chains allow for additional clip-on storage.
MILWAUKEE TOOL
www.milwaukeetool.com

Get organized with Arlington CED135 cable entry device

Arlington's CED135 cable entry device with brushed opening organizes and protects low-voltage cables against abrasion, with easy insertion of individual cables or a bundle of low-voltage wiring. Mounting holes allow for the attachment of a decorator-style wallplate to the low-voltage side of an electrical box, giving extra support to the installation. Made in the States, the CED135 is non-metallic and available with a decorator-style wallplate (CED135WP).
ARLINGTON INDUSTRIES
www.aifittings.com

CSA Z462-15 "Workplace Electrical Safety" available for pre-order

The 2015 edition of CSA Z462 "Workplace Electrical Safety" has been revised and updated with expanded criteria and guidance material, and has been aligned with changes and revisions in CE Code, Part I (2015 ed.). Z462-15 reflects a shift toward risk assessment, with new definitions that harmonize with other safety standards, such as CSA Z1000 and Z1002. It also adds resource material geared toward organizations seeking to make electrical safety an integral part of their overall safety management system.
CSA Group
shop.csa.ca

Ideal SpliceLine connectors promise to save wiring time

The SpliceLine in-line wire connector from Ideal Industries promises to reduce time and cost for pre-fab shops and electricians. Designed to be an alternative to traditional butt splices, its push-in design aims to eliminate time-consuming crimping, soldering or heat shrinking for end-to-end connections. Ideal says the connector installs in seconds, and can also be used in tight spaces to lengthen wires that are too short.
IDEAL INDUSTRIES
www.idealindustries.ca

Galvan publishes 2014 electrical products catalogue

Galvan Electrical Products has released the latest edition of its product catalogue, featuring information and full-colour images of ground rods, connectors and accessories. The catalogue boasts a comprehensive series-by-series listing of products, including part numbers, dimensional drawings, technical data and application notes, as well as an illustrated cross-reference to competitive products.
GALVAN ELECTRICAL
www.galvanelectrical.com

ADVERTISER INDEX

David Pilon

'Tis the season... for approved equipment

'Tis the season to be jolly... 'tis also the season to be wary of unapproved equipment, like extension cords, Christmas light strings and other wiring products that do not meet the requirements of an accepted standard.

There is a growing market of unapproved and counterfeit products. As an AHJ, we have the authority to have products removed from shelves when they are found to be lacking approval, or are counterfeit. What AHJs and police forces lack, however, are the "human resources" to police such a vast amount of products that are both shipped from across the ocean and produced here at home.

So why do we care? CE Code 4-012 "Uses of flexible cord" lists all the pertinent rules while Table 11 lists all the different types. Subrule 2 says flexible cords shall be permitted to be used for electrical equipment for household or similar use that is intended to be moved from place to place, or detachably connected. The Rule goes on to explain flexible cords *shall not* be used as a substitute for permanent wiring; permanently fastened to structural members; run through holes in walls, ceilings, floors; or run through windows, doorways or similar openings.

Last year, a shipment of counterfeit extension cords were removed from the market (their labels gave them away). The cords were a good deal—or so they appeared—as they were advertised at a fraction of the price of approved cords of the same gauge but, when they were cut open, they contained #22AWG not #16AWG conductors. (This occurrence made me double-check all the cords I owned to make sure I hadn't been stung.)

We've also read about counterfeit breakers, and breakers that have been sent off to be destroyed only to make their way back onto the market with counterfeit labels. Would you want one of these breakers to make it into your workplace or home, or those of your family, friends and neighbours?

Finally, take a look at the Christmas light strings you are using. What does the packaging say for maximum number of strings on a circuit? Are the light strings approved? While installing the old-style incandescents on my last house, the manufacturer recommended a maximum of 7 strings *on a circuit* (not *on a receptacle*). With mini-lights and LED strings, you need to calculate how many strings you can safely install.

I don't want to scare away bona fide new products or good deals from the market, but questionable holiday apparatus and user misuse are a recipe for disaster. Let's make sure we do our homework to safely illuminate our festive homes. Merry Christmas from my family to yours! EB

David Pilon has been an electrical inspector with SaskPower since 2000, and is currently the vice-chair of the Canadian Certified Electrical Inspector (CCEI) committee of the International Association of Electrical Inspectors (IAEI), Canadian Section. David can be reached at dpilon@saskpower.com.

Questions and answers compiled by the Electrical Safety Authority | VISIT WWW.ESASAFE.COM

Tackle The Code Conundrum... if you dare!

Answers to this month's questions in January's Electrical Business.

How did you do with the last quiz? Are you a...

Master Electrician ? (3 of 3)
Journeyman ? (2 of 3)
Apprentice ? (1 of 3)
Plumber ?! (0 of 3)

Question 1

When Type CFC system wiring is used, it shall be covered with abrasion-resistant tape, secured to the floor, so that all cables, corners and bare conductor ends are completely covered.

a) True **b)** False

Question 2

Receptacles having CSA configurations 5-15R or 5-20R installed in buildings under construction:

a) shall be protected by GFCI Class A
b) can be wired by NMSC according to Rules 12-500 to 12-526
c) shall be kept entirely separate from lighting branch circuits
d) all of the above

Question 3

When receptacles are mounted in a trailer park in a vertical position, the CE Code requires the U-ground slot to be:

a) at the top **b)** at the bottom

Answers: EBMag November 2014

Q-1: A pressurized panel marked with "Gb.Ex, pz, IIC, T3" is suitable for installation in:

c) Class I, Zone 2. Ref. Rule 18-052.

Q-2: Vertical clearance between a heating duct and the top of a cable tray carrying 600V rated conductors is:

c) 300mm. Ref. Rule 12-2200(6).

Q-3: The overload protection is not required for a 2hp, manually starting motor connected to a 240V branch circuit with adequate overcurrent protection.

b) False. Ref. Rule 28-308(a).

Reduce wire installation time up to 75%

Mersen USG Series UltraSafe™ Fuseholders

Innovative UltraSafe class CC and midget fuseholders with screw-less, spring pressure, wire termination technology.

ep-ca.mersen.com

MERSEN
Ferraz Shawmut is Mersen