

Electrical Business

OCTOBER 2012



Alternative-fuel work trucks go mainstream

Also in this issue...

- Cognitive lighting solutions
- Troubleshooting electrical equipment
- CEC's Rule 4-004



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EBMag is your Partner in Training

Electrical Business magazine wants to help you increase your uptime and maximize your assets with our **Partners in Training: Electrical Maintenance & Reliability Forum**. This one-day training event—which we’re putting on with our sister publication Plant Engineering & Maintenance (PEM)—strictly focuses on the needs of those involved with a facility’s electrical system’s maintenance and reliability.

This event will feature industry leaders speaking on topics of paramount importance to you, such as:

“Critical Power System Reliability Case Studies” by **Patrick J. Lynch, P.Eng.**, principal of Power Line Systems Engineering Inc.

“Creating & Maintaining Sustainable UPS Infrastructure” by **Joe Oreskovic**, platform manager with Eaton Power Quality Company.

“Despite your best efforts, problems happen... now what?” by **David Moncur, P.Eng.**, principal of David Moncur Engineering.

“The Dangers of Counterfeit Products” by **Daniel B. Langlois, B.Sc., CET**, senior manager of CSA Group’s Global Mark Integrity Team.

“Electrical Maintenance & CSA Z463” by **Kerry Heid**, president of Magna Electric Corp.

“Motor Repair to EASA Standards using Best Practices” by **Thomas H. Bishop, P.Eng.**, senior technical support specialist with Electrical Apparatus Service Association (EASA).

This full-day forum is complemented by an interactive tradeshow featuring leading solutions providers for all your maintenance and reliability needs. So **mark your calendar now!**

October 23, 2012
Gambrel Barn, Country Heritage Park
8560 Tremaine Road
Milton, ON L9T 2Y3

We’re very excited about this event, and we hope you’ll join us. For more information, visit EBMag.com and click the Partners in Training link. **EB**

* Information subject to change without notice



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Alternative-fuel work trucks go mainstream

Weren’t able to attend The Work Truck Show 2012 earlier this year? We have compiled several alternative-fuel work truck stories from the event, with options ranging from fully electric and liquid propane to natural gas.

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A visit to the Ontario Science Centre can make for a fun and educational class trip, family adventure or rainy day excursion, but how can visitors stay safe when getting “lost in science” if a fire alarm is triggered?

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Currently, all sensors and daylight harvesting systems are driven by controls and power rather than using light as the starting point. Some argue these intelligent lighting systems aren’t as smart as they could be.

26 Flash hazard awareness while troubleshooting electrical equipment

Sometimes, troubleshooting electrical equipment leads to more problems than results. Testing often requires the troubleshooter to temporarily connect test instruments to live terminals, which can introduce two main hazards: shock and flash.

30 Reducing energy consumption one prison at a time

The Government of Canada has committed to a range of measures aimed at reducing emissions to help protect and conserve the environment, as well as contribute to the economy. A one-time investment in energy efficiency today will achieve ongoing financial benefits for many years.



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Increased Dow E&T prices for October 2012

Effective this month, Dow Electrical and Telecommunications (www.dow.com/electrical) will increase the prices of its products in North America, as follows:

- All Power and Telecom Jacketing Grades will increase \$0.10 per pound.
- All Medium and High Voltage Insulation Compounds will increase \$0.12 per pound.

- All Semicon and Shield Compounds will increase \$0.15 per pound.
- All Specialties including our Unigard and Unipurge product lines will increase \$0.19 per pound.
- All other grades not included in the above categories will increase \$0.15 per pound.

Further details will be communicated to customers by local Dow Electrical and Telecommunications account executives.



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Electrical Business

October 2012 • Volume 48 • Issue 10

ELECTRICAL BUSINESS is the magazine of the Canadian electrical community. It reports on the news and publishes articles in a manner that is informative and constructive.

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Published by Annex Publishing & Printing Inc.
222 Edward Street, Aurora, Ontario L4G 1W6
Tel. 905-727-0077 • Fax 905-727-0017

Publication mail Agreement #40065710
Return Undeliverable Canadian Addresses
to Circulation Department
P.O. Box 530, Simcoe, ON N3Y 4N5
e-mail: kthomson@annexweb.com

United States Second Class Postage
paid at Lewiston, NY
(USPS-741-470) US POSTMASTER:
Send address changes to
ELECTRICAL BUSINESS,
P.O. Box 8145, Lewiston, NY 14092

Printed in Canada
ISSN 0013-4244

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SUBSCRIPTION RATES:

Canada: Single issue \$7.00
12 issues: \$35.00 (includes tax)
USA: \$59.00 (US)
International: \$75.00 (US) per year

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We acknowledge the financial support of the Government of Canada through the Canada Periodical Fund (CPF) for our publishing activities.



Worker shocked, Transgear Manufacturing fined \$150,000

Linamar Holdings Inc., carrying on business as Transgear Manufacturing, a car part manufacturer, has been fined \$150,000 after a worker was injured from a violation of the Occupational Health and Safety Act (OHSA).

On May 20, 2009, a worker at the company's facility in Guelph, Ont., was trying to determine the cause of a leak in a machine and opened the cage surrounding the machine and went into the enclosed area. The worker had not been told the area contained exposed parts that were electrically charged. The worker's head came into contact with a charged part of the machine, causing electrical shock and burns.

The company was found guilty of failing to provide information about the presence of electrically charged exposed parts in the enclosed area of the machine. The court also found the company failed to provide information, instruction and supervision to a worker on the safe procedure for dealing with a leak.

The fine has been imposed, along with a 25% victim fine surcharge, as required by the Provincial Offences Act.

SaskPower reminds farmers to stay safe during harvest

With swathing and combining dominating the thoughts of Saskatchewan farmers this time of year, SaskPower asks farmers to remember overhead powerlines while crossing fields and farmyards.

Check out SaskPower's farm safety video "You've Got a Lot on the Line" at bit.ly/O3FF5z.

"While Saskatchewan's farmers know their land like the backs of their hands, farmers need to always stay mindful of the powerlines on their property," said SaskPower president and CEO Robert Watson. "It's important to remember that this is a risk that never goes away. It only takes a moment to forget and, when people are working hard and under pressure, it's easy for accidents to happen."

To make sure the farming season is safe and productive, SaskPower urges farmers to keep the following safety tips in mind:

- Plan a safe route around overhead lines and power poles, and make sure everyone working with you is aware of the route and the location of potential dangers.
 - Use a safety spotter to help watch for powerlines when moving equipment.
 - Lower equipment before moving it and watch out for powerlines when constructing grain bins and carrying tall equipment.
 - If your vehicle contacts a powerline, stay in the vehicle and call SaskPower at 310-2220. Call 911 for help if someone is injured.
 - Carry a communication device at all times when out in the field.
- For more information, visit www.saskpower.com/safety/farm.



More **news** can be found online. Visit us at **EBMag.com**

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Siemens acquires Kaon; expands energy distribution solutions portfolio for overhead lines

Siemens Infrastructure & Cities (www.siemens.com/infrastructure-cities) has acquired Australia's Kaon Holdings Pty Ltd., headquartered in Brisbane, Queensland. With subsidiaries Kaon Electric Pty Ltd. and Kaon Consulting Pty Ltd., the new acquisition develops and sells products for energy distribution via medium-voltage overhead lines.

"We plan to develop Kaon's innovative products further, sell them worldwide by utilizing our global sales presence and, thus, tap new markets," said Stephan May, CEO Medium Voltage of the Siemens Infrastructure & Cities Sector (www.siemens.com/low-medium-voltage).

Siemens will take over and continue to sell all of Kaon's existing products. It sees the Kaon acquisition as a way of expanding its share of the global market in energy distribution solutions for overhead lines. It will establish a centre of competence in Australia for medium-voltage products, and will continue to pursue Kaon's R&D work.

Tom Torokvei Award 2012 recognized David Nathaniel of Standard Products

At its annual general meeting this year, the Independent Electrical Distributors (IED) Limited Partnership II recognized outstanding performances by both suppliers and distributor partners, as well as honoured a special individual with the Tom Torokvei Award. Congratulations to the following:

SUPPLIER AWARDS

- Canlyte recognized Beaulieu & Lamoureux
- Cooper recognized EECOL Electric
- Hubbell recognized Marchand Electrical Co.
- Ipex recognized EECOL Electric
- Ouellet recognized Tradelco
- Panduit recognized House of Electrical Supplies
- Royal Pipe recognized Diversified Ventures
- Sylvania recognized EECOL Electric
- T&B Canada recognized Tradelco IED Award Winners
- General Partners Award of Excellence recognized Darren Buim of EECOL Electric
- Tom Torokvei Award recognized David Nathaniel of Standard Products
- Supplier of the Year recognized T&B Industrial
- Marketing Activity Award recognized Grey Bruce Electric
- IED Support Award recognized Western Equipment
- Greatest Increase in Purchases recognized House of Electrical Supplies
- Marketing Partner of the Year recognized Greenlee

Increase your Uptime AND Maximize your Assets with EBMag



Electrical Business will be hosting its inaugural **Partners in Training** event—**Electrical Maintenance & Reliability Conference & Tradeshow**—a one-day training program with a strict focus on the needs of those involved with a facility's electrical system's maintenance and reliability.

Electrical Maintenance & Reliability will be held October 23, 2012, at Gambrel Barn, Country Heritage Park in Milton, Ont. Registration is now open.

Who should attend?

This event is tailored specifically for electrical contractors; service contractors; industrial engineers; maintenance professionals; plant operators; industrial engineers; and anyone associated with maximizing a facility's uptime.

Increase your uptime! Maximize your assets!

This event will feature industry leaders speaking on topics of greatest importance to you, such as:

- lockout/tagout (LOTO)
- hazard versus risk assessment
- motor predictive maintenance
- the dangers of counterfeit and unapproved product
- open panel discussion and more.

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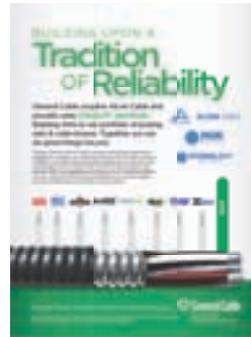
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General Cable completes acquisition of Alcan Cable's North American business

General Cable Corp. (www.generalcable.com) has completed the acquisition of the North American portion of Alcan Cable for \$151 million that, according to General, represents about 85% to 90% of overall revenues of Alcan Cable (www.cable.alcan.com). The company expects to complete the acquisition of the business operating in China for \$34 million in a separate and subsequent closing before the end of 2012.

"We welcome Alcan Cable associates to General Cable and look forward to immediately sharing best practices as we realize manufacturing, logistics and purchasing synergies created by



this acquisition," said Gregory J. Lampert, president and CEO, General Cable North America. "Expanding our product portfolio through an enhanced aluminum-based cable offering further strengthens the value proposition to our electrical distributors and utility customers alike. The addition of aluminum rod and strip manufacturing provides vertical integration benefits as well as a new segment of valued OEM customers."

General Cable says it estimates the overall Alcan Cable business will contribute about \$650-\$700 million in annual revenues at current aluminum prices and, over a cycle, the operating margin profile is expected to be consistent with the company's existing North American businesses.

New Brunswick premier offers update on "energy sector that was fractured and in disarray"

New Brunswick's Premier, David Alward, recently provided an update on progress being made to rebuild the province's energy sector during an event overlooking the Mactaquac Dam, saying "During the last two years, our government has worked with New Brunswickers and our utility to rebuild an energy sector that was fractured and in disarray".

Alward highlighted achievements in support of the energy sector, including:

- the development of New Brunswick's first comprehensive energy policy in a decade;
- the lowest electricity rates in Atlantic Canada, with another year of a rate freeze ahead;
- the "record profitability and new culture of performance" at NB Power;
- an environmentally sensitive solution to the issue of high industrial electricity rates;

- the establishment of aggressive renewable energy targets.

The New Brunswick Energy Blueprint, released in the fall of 2011, establishes a 10-year vision for energy in New Brunswick. "Our blueprint laid out a plan that would provide low and stable electricity rates for New Brunswickers, not just through the rate freeze, but for the long term," said Alward. "During the past year, we have been working on all 20 action items, and we are seeing significant progress and benefits as a result. Through cost reductions and efficiencies, NB Power now has the lowest electricity rates in Atlantic Canada while earning record profits and building equity."

As recommended in the blueprint, the provincial government is streamlining and re-integrating NB Power and the New Brunswick System Operator into a single Crown utility.

To continue reading this article, visit bit.ly/PMCFeA.

Visit GE Lighting's Facebook page to win a trip to Universal Studios



Logged into your Facebook account? Visit GE Lighting (www.gelighting.com)'s Facebook page for a chance to win a grand prize VIP trip to Universal Studios Hollywood or a Blu-ray combo pack for the animated film "Dr. Seuss' The Lorax" as part of a GE Lighting nationwide sweepstakes.

In celebration of the film's Blu-ray and DVD debut, GE is working with Universal Studios Home Entertainment to share "the film's environmentally conscious message in conjunction with its energy-efficient light bulbs", it says.

The grand-prize trip to Universal Studios Hollywood in California includes round-trip airfare for the winner and three guests to L.A., a three-night hotel stay, four Universal Studios VIP Experience tour tickets and free admission to the Universal Studios Hollywood theme park. The contest runs now through October 31, 2012.

In addition to the grand prize, 100 winners will receive a Blu-ray combo pack, which includes a DVD, digital copy and ultraviolet, of Dr. Seuss' The Lorax. Entrants can print a coupon toward GE's energy-efficient light bulbs.

"We share a belief with Dr. Seuss' The Lorax when it comes to the environment. At GE Lighting, we are committed to investing in innovative and environmentally preferable solutions that provide value to our customers," says Jeff Patton, general manager of consumer marketing, GE Lighting.

"We are leading a lighting revolution with products that combine long life and energy savings with the reliability of the GE brand," he said.

While entering the sweepstakes, consumers can learn more about GE's energy-efficient light bulb options and access a cost-savings calculator.

Siemens Canada celebrates 100-year anniversary at new Oakville HQ



Visit bit.ly/U9f3U6 and <http://bit.ly/UgLyDv> for photos and video from the event.

Siemens Canada (www.siemens.ca) officially kicked off its 100-year anniversary on August 28 with a celebratory event at its new 110,000-sf headquarters in Oakville, Ont., which will be completed later this year. The event, attended by Siemens senior executives—including Siemens AG CEO Peter Loscher (in photo)—dignitaries, guests and Electrical Business Magazine, begins two days of celebration to "mark past accomplishments and launch the company's second century of innovation and excellence in Canada".

Siemens Canada's parent company, Siemens AG, was founded in Germany 165 years ago, and conducted its first work on the shores of Canada shortly after Confederation, laying one of

the first transatlantic telegraph cables between Europe and North America—from Ireland to Halifax—in 1874. The company was chartered federally as the Siemens Company of Canada Ltd., in Montreal in 1912.

Siemens Canada says it was involved in several Canadian firsts, including the first national telex network, providing early text-based message network communication (1957); one of the first modern light rail systems in North America (Edmonton, 1975); the design and installation of the world's first retractable roof at Toronto's Rogers Centre (formerly SkyDome) in 1989; and the first filmless hospital in Montreal (allowing for simultaneous digital image and data viewing) in 1998.

"With a hand in so many notable projects in this country's history, Siemens Canada has made its mark on the character of the nation," said Robert Hardt, Siemens Canada's CEO. "We've stood for innovation, quality and reliability for a century and our commitment to Canada will continue to define us in the future as we address the most challenging questions of our time."

Siemens has 4400 employees in 61 offices and 13 manufacturing plants throughout Canada, including the new headquarters in Oakville.

New electrical manufacturer agency—SLR Marketing—is born

A new electrical manufacturer rep agency—SLR Marketing Inc. (www.slrinc.ca)—was officially launched yesterday by Denis Ricard. Its territory includes the Province of Quebec and the Ottawa Valley.

Ricard says he has been in the agency business for the past 27 years. The SLR sales team consists of four sales reps, one

specifications rep, and two inside sales reps. Five manufacturers are already on SLR's line card:

- Ventes Electra
- Ushio Canada
- Universal Lighting Technologies
- Pappi Lighting
- Triumph Lighting

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LEDs become the law for Nova Scotia roadway lighting

Nova Scotia is closer to becoming the first jurisdiction in North America to exclusively use LED roadway lighting. Energy minister Charlie Parker finalized amendments to the Energy-Efficient Appliances Regulations last month, requiring all road and highway lighting in the province must be converted to LED.

“With LED road lighting, Nova Scotia will save millions of dollars by using about half the energy of current lighting, and improve our air quality while reducing our carbon footprint,” said Parker.

The regulations require Nova Scotia Power to complete its conversion by December 31, 2019. Municipalities will have until Dec. 31, 2022, and now have one year to outline the conversion.

The regulations are expected to save Nova Scotians about \$5 million a year in energy costs alone after all the lights have been converted, says the government. Nova Scotia Power is proposing a new rate plan for streetlight customers which will not increase annual costs for seven years and offer a rate reduction if they use Nova Scotia Power-owned lights. Municipalities that choose to own their own lights could also benefit from lower financing costs.

“The province is also making low-cost financing available so more municipalities can take advantage of these savings sooner,” said Parker.

The regulations were drafted by the Department of Energy after public consultations and meetings with the LED Working Group that includes Halifax Regional Municipality, Union of Nova Scotia Municipalities, Efficiency Nova Scotia and Nova Scotia Power. Visit bit.ly/S5CTAB for the regulations.

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Oleg's Electric drives off with loaded Camaro after Spice Up Your Summer Promo



From May 1 through June 30, IED Rewards (www.iedrewards.ca) ran the “Spice Up Your Summer” promotion in which one lucky participant could win a loaded 2012 Chevy Camaro convertible. That grand prize was picked up by Oleg’s Electric Inc. of Winkler, Man.

As part of the promotion, customers of IED distributors received PIN cards for purchases over \$100. Those PINs would be entered online to receive plays toward prizes. The regional prizes were Ultimate Backyard Giveaways: approximate value of \$10,000, it included Rab Design outdoor LED lighting, Napoleon Prestige BBQ, Andrew Richards patio furniture and more.

The regional winners are:

Atlantic Canada

- Current Electric (Customer of Eddy Group)
- City-Lite Electrical (Customer of McLoughlan Supplies)

British Columbia

- Killops Electric (Customer of EECOL Electric)
- R.P.M. Electric (Customer of EECOL Electric)

Manitoba

- D.A. Loewen Electric (Customer of EECOL Electric)
- Mid-Lite Electric (Customer at E.G. Penner)

Northern Alberta

- J.C.I.B Electric (Customer of EECOL Electric)
- Shane Messal Electrical (Customer of EECOL Electric)

Southern Alberta

- M&R Electrical (Customer of EECOL Electric)
- CITLET (Customer of EECOL Electric)

Ontario

- Modee Investments (Customer of Robertson Electric Wholesale)
- Control Tech Electrical (Customer of Robertson Electric Wholesale)

Quebec

- Entr. Elect. Christian Clermont Inc. (Customer of Électrimat Ltée)
- Michel Robert Entr. Electricien Inc. (Customer of Tradelco)

Saskatchewan

- Community Electric Ltd. (Customer of EECOL Electric)
- JD Electric Ltd. (Customer of EECOL Electric)

Conergy celebrates 10th anniversary of its Canadian business

This year marks the 10th anniversary of solar player Conergy’s Canadian operation (www.conergy.ca). The company entered the Canadian market through its acquisition of ETI Solar, whose operations in Canada date back to 2002. Congratulations!

“We are proud of the work that we have completed together with our customers and partners over the last 10 years and we look forward to continuing to support the growth of this market over the decades to come,” said Jared Donald, Conergy Canada’s president. “The solar market in Canada is one that is ever changing and companies like ours are successful here because we continue to innovate to ensure that we can provide solutions that help our partners’ businesses.”

From planning, engineering, financing and installation, to maintenance and technical management, Conergy says it brings together “complete knowledge and strategies” from the solar world. **EB**



Ajay Gupta

Saying it will further strengthen its channel and distribution partner operations across Canada, **GE Energy Management's**

Industrial Solutions business (www.ge.com) appointed **Ajay Gupta** as the lead Canadian channel commercial director. Gupta will be responsible for developing national channel strategies while creating a distributor framework to help grow business with Canadian channel partners. He will support Adrian Thomas, GE's regional sales leader in Canada. "Our channel partners along with commercial markets are a vital part of our Canadian business," said Gupta. "Our goal is to create a highly effective channel management infrastructure within the Canadian market." Gupta brings more than 15 years of GE experience to his new position. Most recently, Gupta was the technical channel director for Canada and North U.S. at the GE Energy Global Center of Excellence.

E.B. Horsman & Son (www.ebhorsman.com) has named **Rocky Blondin** as its newest member of the Process, Instrumentation & Controls Group team. Blondin will be focusing on business development for automation and control. He is a graduate of British Columbia Institute of Technology (BCIT) and holds ASCT credentials to complement his industry experience. As a skilled programmer and controls technician, Blondin will "become a great asset" to all the customers he calls on in the Lower Mainland and on Vancouver Island, said E.B. Horsman.



Arcangelo Limanni

Bender Canada (www.bender-ca.com) has announced **Arcangelo Limanni** as the new sales manager for Northern Ontario. "We

are expanding our sales force with this young and well-educated engineer," said the company. "Arcangelo worked for a local electrical distributor in the past for many years and knows many of his future customers."

Enbridge (www.enbridge.com) has announced **Al Monaco** as president and CEO, retiring **Patrick D. Daniel** from the role, effective October 1, 2012. Daniel will also retire from his position on the board at that time. "Enbridge has a long and successful history in delivering energy in North America and I feel privileged to

have this opportunity to lead the Company," said Monaco, who is currently a board member.

E.S. Gallagher Sales Ltd. (www.esgallagher.com) and its Ontario sales force have joined the **FLIR Canada** (www.flir.ca) sales team, working as FLIR sales agents with industrial and MRO distributors in

Ontario. E.S. Gallagher will conduct traditionally expected FLIR sales services, including: counter mornings; lunch & learn seminars; joint sales calls and demos, etc. All E.S. Gallagher sales reps are Level I thermographers with over four years of experience in selling both FLIR and **Extech** (www.extech.com) products. **EB**

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Preserving life and property at Ontario Science Centre

PHOTO COURTESY ONTARIO SCIENCE CENTRE

Set on the edge of a ravine, the 540,000-sf Ontario Science Centre is the size of a large airport, with three separate buildings on different elevations as they descend into the valley. Nearly 1.4 million people visit the centre annually to take in everything from the science of electricity and space exploration to how the body works.

The centre's drive to have its visitors get "lost in science"—wandering from building to building, level to level—is a great premise. However, this lost theme can be a detriment to life safety when a fire alarm is triggered somewhere within the massive complex.

"We needed a system that would be user friendly, making it easier for security staff to pinpoint where the alarm was. One that would allow us to zone out an area during private parties," says John Bradshaw, manager of facility operations and services at the Ontario Science Centre.

"All of that combined...that's what we wanted."

To develop a flexible, life-long solution to replace the centre's aging fire alarm system, consultants and facility managers came together with the provincial government (which owns the property) to design a system to meet the centre's myriad of fire protection challenges.

"We knew we needed a new system that would go in the future for a minimum of 10 years. And we needed it to address the needs of the multiple operations we have here—we have the public coming into the building, we rent our facilities out in daytime, nighttime, and there's shop people and offices in the background," Bradshaw explains.

The group settled on a fire alarm and voice evacuation system from Notifier. Engineering consultant Morrison

Hershfield specified a network of six NFS2-3030 fire alarm control panels. These were placed throughout the three buildings and networked together with two ONYXWorks graphic workstations providing monitoring and control of the entire network.

Master control with a birds-eye view

The speed of emergency assessment and response was a critical factor in the system's design. The centre's network of fire alarm control panels, smoke detectors, sprinkler monitoring points—and even specialized gas and aspirating detection devices—are tied to the two workstations. Providing information on the location, cause and progression of fire alarm events, these graphic layouts of the centre and its major fire alarm components help facility and security officials quickly decide on the appropriate response.

According to Frank Detlor of Robinson Solutions (the company that engineered and installed the signalling system), several weeks of work went into designing the floor-by-floor graphics that would appear in the workstations to accurately represent the intricate mix of odd-shaped buildings, levels and sub-basements that make up the Ontario Science Centre.

Designed to have an intuitive interface, the workstations identify system alerts by magnifying the event location and device(s) in alarm while providing both a graphical and written description.

"Now with addressability on all inputs, they can hone right into where the problem is and deploy their security faster," says Detlor.

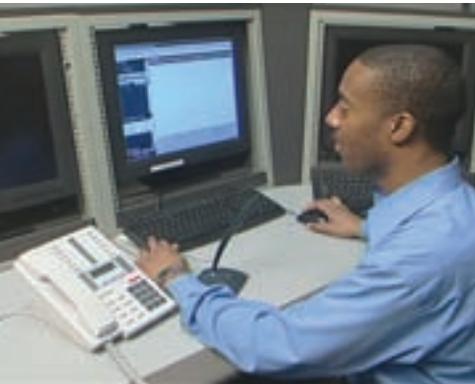
In addition to pinpointing where a problem resides, the fire alarm monitoring system provides operators with a new level of control over any part of the network. The flexibility of simply clicking icons to temporarily deactivate certain devices will help the centre practically eliminate nuisance alarms.

"That flexibility is necessary because the museum takes in a lot of temporary exhibits each year, and bringing them in and setting them up would often lead to false alarms of one sort or another," states Detlor.

Private events held in different areas of the centre have historically led to increased false alarm incidents—a dilemma Bradshaw believes the new monitoring workstations can cure.

Security operators can turn off sound alarms in specific areas of certain buildings when, for example, they are being rented out for a private party or a corporate function, says Bradshaw. "The





Modern fire response technology

The consultants who wrote the project's spec were big proponents of including a unique emergency scene assessment tool, made for and designed by firefighters. The First-Vision tool is a touchscreen display located at the centre's main doors for easy access. The unit helps first responders determine the origin and migration of a fire, and locations of

emergency alerts, potential hazards or areas of refuge within the affected areas. Interactive floor-by-floor layouts of the centre—depicting activated fire alarm components, water supplies, fire barriers, emergency shut-off valves and other site-specific details—enable emergency officials to make response plans. **EB**

— With files from Notifier

strobes still flash, but the event isn't disturbed by what's likely a non-emergency in another part of the building. If there is a problem, security staff can easily sound alarms in the rented sections."

In a building containing its own shops for paint, carpentry and other trades, aspiration detection systems play a significant role in quickly and unequivocally verifying true smoke emergencies. Although not required by code, these air-sampling systems provide very early warning smoke detection—a necessity for high-value and critical facilities such as museums, hospitals, data centres and more.

Saving life, property and investment

The options of using third-party contractors to perform service and maintenance with parts available through a handful of authorized distributors in the region were big benefits of utilizing this line of technology in the minds of the property's management team. Distributors with factory-trained personnel that are well-versed on the proprietary equipment will handle higher-level programming or additions.

The centre's failing public address system was also in need of help, but its replacement was estimated to cost more than \$100,000. Following a few software and programming enhancements made by distributor Robinson Solutions, Ontario Science Centre staff were able to utilize the fire alarm system to broadcast routine messages in English and French through its 1124 speakers throughout the facility. Robinson Solutions' repurposing the alarm system's intelligible audio capabilities in this way saved the centre close to \$90,000, according to Rowe.

To protect its life safety investment, the centre made sure its new system had both the capacity and capability to be easily expanded to accommodate future facility expansions. Additional nodes and devices can be added when needed, though the centre claims to have no plans to do so at this point.



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Shareholders need to pound sand

In a recent series of columns, I provided a brief outline of the development and implementation of an electrical maintenance program, and explained the cost benefits of various maintenance management philosophies. Unfortunately, cost is upfront, real and apparent, whereas the benefits are not.

Several years ago, I wrote an article describing the challenge that Hicks Waldron—then CEO of Avon—had every three months when his major shareholder, an institutional investor from Colorado, phoned with one question: What's the dividend?

There was no concern about anything other than money. I have experienced a number of instances where international investors have owned Canadian plants with no other intent than to fleece them. They drained every penny out of them that they could, with little or no re-investment, then dumped the facility back onto the market.

As training consultants, we know it's a waste of time talking to the people in these facilities. They lack budgets, they are under a tremendous amount of stress to perform and produce, and they live with the continuous fear they are going to be out on the street, and all the personal losses that would ensue.

We have evolved a system of professional financial managers who operate facilities with the skills, ability and intent to maximize the return on shareholder investment. And no matter how well they do in one quarter, they are expected to meet or exceed it in every subsequent quarter.

This demand for return exists in most of us. Any person who moves their savings from one institution to another to gain a quarter of a percent, or

who moves their RRSP from one mutual fund to another, is equally part of the problem.

We are in the midst of a sea of change in electrical safety and maintenance that started slowly 10 years ago in Canada with the early adopters of NFPA 70E. This progressed into the passing into law of Bill C-45 and the advent of CSA Z462. Our current development of CSA Z463, Guideline on Maintenance of Electrical Systems, is going to become the next phase of this sea of change.

Bill C-45 is federal legislation that amended the Canadian Criminal Code and became law on March 31, 2004. It established new legal duties for workplace health and safety, and imposed serious penalties for violations that result in injuries or death. The bill provided new rules for attributing criminal liability to organizations, including corporations, their representatives and those who direct the work of others.

NFPA 70E and CSA Z462 have raised the reality of electrical danger to the executive levels of most companies, and they have responded accordingly; at the same time that we are seeing these real improvements in human safety performance, our facilities continue to age.

There is a real and impending danger in the lack of electrical maintenance, and I believe that managers and executives of companies taking short-term measures to appease evermore demanding shareholders will be putting themselves personally at risk. Some time in the next 10 years, an explosion is going to happen; should someone get seriously injured, a judicious safety investigator is going to find a paper trail of warnings leading back through the executive chain. When this is measured against the intent of Bill C-45, there's going to be hell to pay.

We all want to keep our jobs and support our families. No matter where we are on the ladder, we want to maintain that level and, usually, improve our circumstances. It's a natural human desire, but when someone on the ladder is dancing to satisfy shareholders, then they put both themselves and the people who operate their facilities in jeopardy.

Developing safety programs that will give workers policies, procedures, practices, tools and PPE (personal protective equipment) is a very visible and concrete response to the new electrical safety standards. Requiring a multi-million dollar budget to replace an aging switchgear lineup is a subjective situation, open to debate and easily delayed year after year. Eventually, an event will occur and a senior manager will have a difficult time explaining why the required money was not made available for what, in hindsight, would appear to be a necessary investment when viewed through the lens of CSA Z463.

In the next decade, these changes are going to reverberate all the way up the chain, and all the shareholders—small, medium, large and institutional—are going to have to pound sand. Shareholders have the right to a great return on their investment, but no one should have to spill their blood to ensure they get one.

Until next time, be ready, be careful and be safe. © EB

Canada Training Group has been providing consulting services to industry since 1980; Dave Smith, the president, can be reached at davesmith@canada-training-group.ca. At www.canada-training-group.ca, you will find this article (and others) to help support your own safety initiatives.

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Alternative-fuel work trucks go mainstream

Vehicle news from The **Work Truck Show 2012**

EBMag Staff



■ Ram builds North America's only OEM CNG-powered pickup

Ram Truck (www.ramtrucks.com) announced it will become the only manufacturer in North America to offer a factory-built compressed natural gas-powered (CNG) pickup truck. The Ram 2500 HD CNG pickup is designed for fleet and commercial customers, and offers cost and emissions benefits using a domestically sourced fuel.

"Our commercial fleet customers have been asking us to build a CNG powered Ram," said Peter Grady, VP Network Development and Fleet, Chrysler Group LLC.

The Ram HD CNG is powered by the 5.7L Hemi V8 and features both compressed gas storage tanks and an 8-gal gasoline fuel tank. Canadian customers can opt for a 35-gal gasoline tank.

"As a fuel, CNG is readily available, well-suited to run in our 5.7L Hemi engine and is clean-burning with a low environmental impact.

In fact, CNG demonstrates a reduction of 70% to 90% of smog-producing pollutants, and significantly reduces greenhouse gas emissions," said Robert E. (Bob) Lee, VP and Head of Engine and Electrified Propulsion Engineering, Chrysler Group LLC.

The Ram's bi-fuel engine has been modified to run on CNG as well as gasoline. Redesigned cylinder heads with specifically designed CNG-compatible valves and valve-seat materials allow the engine to burn both fuels. It also gets a second, CNG-specific fuel rail and set of injectors. New spark plugs improve combustion and durability, and a new powertrain control module allows the Hemi to operate on either of the two fuel sources.

In use, the system is automatic; eliminating operator switches altogether and utilizes either CNG or gasoline, transitioning from one to the other with little discernible difference in operation or capability, says Ram.

CNG-only range is estimated to be 255 miles, while the backup supply of gasoline extends the range to 367 total miles.

The Ram 2500 Heavy Duty CNG's two 130-L CNG tanks are located in the forward portion of the Ram's 8-ft pickup bed. Both tanks are mounted to the frame and covered by a painted 50 ksi high-strength steel cover.

The CNG filler connection is located next to the gasoline fuel neck, accessed through the Ram's fuel filler door. The CNG tanks provide a gasoline gallon equivalent (GGE) of 18.2 gallons.

The Ram 2500 CNG offers 1580 lb of payload, 4x8-ft usable bed length and 7650 lb of towing capability. It is delivered ready-to-tow and standard equipment includes the integrated 4- and 7-pin connectors along with a Class IV hitch receiver. The Ram CNG also comes with a trailer brake controller with customer-programmable electric or electric-over-hydraulic trailer brake options.

A 5-year/100,000-mile powertrain limited warranty covers the Hemi V8 and transmission, and adds internal engine components specific to CNG—the upgraded valves, valve seats, fuel injectors and rail, and the specially designed spark plugs.

Covering virtually every other aspect of the Ram 2500 CNG is a 3-year/36,000-mile bumper-to-bumper limited warranty. Specific to the CNG engineering, this covers all non-engine components, including the tanks, storage compartment and fuel filler equipment.

The Ram 2500 CNG is available exclusively as a Crew Cab 4x4 model with 169-in. wheelbase, in either an ST or SLT trim level. Pricing starts at \$47,500 US, including \$995 destination charge.



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Scepter® F Series double gang boxes, weather-proof covers and cover plates have been redesigned for universal compatibility with any industry standard double gang box or cover. CSA approved, the new universal boxes and covers are easy to use, have more internal wiring space and include reducer bushings to accommodate various sizes of conduit. All the weatherproof covers have been designed to ensure a watertight seal using a new foam gasket, with an adhesive layer for ease of installation.

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Simple yet innovative, the new Round Floor Box Stand is designed to raise the Round Floor Box off the concrete form allowing the ENT or conduit to enter

the Box in a flat and straight path. Installed together, the Floor Box and Stand accommodates the different rebar and post-tensioned cable heights and slab depths found from job-site to job-site.

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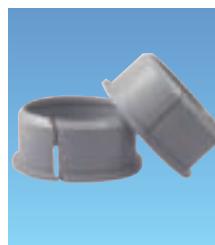
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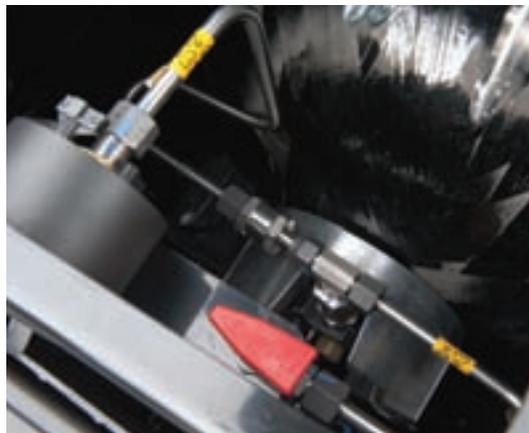
around existing cabling to make repairs quickly and effectively, reducing end-user downtime and complaints, and saving contractors time, labour and money.

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Expansion Joint provides fast trouble-free installation and will ensure the owner receives a secure and appealing installation that will last the life of the system.



■ GMC and Chevrolet unveil CNG bi-fuel pickups

Chevrolet and GMC (www.gm.com) announced details of GM's bi-fuel 2013 Chevrolet Silverado and GMC Sierra 2500 HD extended cab pickup trucks. The vehicles include a compressed natural gas-capable (CNG) Vortec 6.0L V8 engine that seamlessly transitions between CNG and gasoline fuel systems. Combined, the trucks offer a range of more than 650 miles. The Silverado and Sierra will be available in standard and long box, with either two- or four-wheel drive.

"The bi-fuel Chevy Silverado and GMC Sierra provide customers with choices in advanced propulsion technology, and because CNG is a clean-burning, domestically produced fuel, it has wide appeal," said Ed Peper, general manager, GM Fleet and Commercial Operations.

GM says it is the only manufacturer to offer a single-source option for its gaseous fuel vehicles; the bi-fuel trucks are built with a specially designed engine, the fuel system is installed by GM's Tier One supplier, and the completed vehicle is delivered directly to the customer. This process makes ordering the bi-fuel option as seamless and efficient as a standard vehicle.

"The bi-fuel truck provides businesses with added re-fuelling flexibility and eases consumer range concerns that typically come with CNG, all while reducing emissions and controlling costs," said Joyce Mattman, director, GM Commercial Product and Specialty Vehicles. "This turnkey ordering process, combined with the best warranty in the industry for a commercial product, makes our bi-fuel truck an attractive option, especially for commercial customers."

The bi-fuel commercial trucks will be covered by GM's three-year, 36,000-mile new vehicle limited warranty and five-year, 100,000-mile limited powertrain warranty and vehicle emissions warranty. It is the most extensive warranty offered by any manufacturer on commercial products, boasts GM.



SHIFT_

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9:02 AM
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all your tools

3:10 PM
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■ **Smith Electric Vehicles unveils NewtonT step van**
Smith Electric Vehicles Corp. (www.smithelectric.com) unveiled the Newton step van, an all-electric, zero-emission vehicle built on the Newton platform that features a walk-in body produced by Utilimaster.

The Newton step van offers a gross vehicle weight of 14,000 lb to 26,000 lb and a range of about 100 miles on a single charge. The vehicle incorporates Smith's proprietary Smith Drive, Smith Power and Smith Link technologies, which promise superior powertrain performance, battery management efficiency and remote system monitoring.

The first Newton step vans are expected to be deployed in select U.S. markets throughout the remainder of 2012.

■ **FCCC launches S2G liquid propane-fueled chassis**

Freightliner Custom Chassis Corp. (FCCC, www.freightlinerchassis.com)—a subsidiary of Daimler Trucks North America LLC, a Daimler company—introduced its S2G chassis that, according to the company, provides industry with the only factory-installed liquid propane gas (LPG) engine available to the medium-duty truck market.

Built on FCCC's S2 chassis, the S2G's 8L, 325 hp LPG engine promises lower operational costs and reduced emissions without sacrificing payload capability or performance.

"The S2G was developed in response to significant industry interest for an LPG solution without retrofitting or aftermarket additions," said FCCC president Bob Harbin.

Like its diesel counterpart, the front-engine S2G utilizes the Freightliner M2 cab, which features a sloped, forward-tilting hood for better visibility and easier engine access. It has a GVWR of 33,000 lb and comes equipped with an Allison 2300 automatic transmission with PTO provision.

With the support of the Propane Education & Research Council (PERC), FCCC partnered with Powertrain Integration and CleanFUEL USA in the development of the S2G. Powertrain Integration provides custom solutions for OEM engines and drivetrains from the General Motors product lineup.

"We have long recognized that reducing the use of gasoline and diesel fuel is a high priority for many fleet managers, and we want the alternative fuel solutions we engineer to be the most cost-effective way of making that happen," said Powertrain Integration president Bob Pachla. "We believe the time is now for the S2G, a chassis that has the potential to dramatically change commercial fleet fuel consumption habits."

A limited pre-production run of S2G chassis is expected in the fourth quarter of 2012, with full production slated for the first quarter of 2013.

CHECK OUT

EBMag's Videos from the 2012 Work Truck Show!

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■ **VIA Motors drives away with Work Truck Show 2012 Green Award**

VIA Motors (www.viamotors.com), meantime, won The Work Truck Show 2012 Green Award for its full-size extended range electric vehicle (EREV) work trucks. VIA displayed a pick-up truck and cargo van equipped with the company's proprietary eREV power train technology at the show.

Work trucks equipped with VIA's eREV powertrain are able to drive a majority of their daily work routes emission-free and entirely on electric power. They have up to 40 miles of all-electric range using lithium ion batteries, and can drive unlimited additional miles using VIA's onboard electric generator or range extender. The vehicles can be charged from a typical 110V household outlet



overnight. In independent testing, VIA reports that its eREV pickup trucks have demonstrated up to 100 mpg in typical fleet driving.

"VIA is pleased to receive the 2012 Green Award and to be recognized for the significant leap ahead in fuel efficiency and emissions our eREV technology offers full-size working vehicles," said Kraig Higginson, CEO of VIA Motors, adding that VIA's trucks actually cost less to own and operate than a conventional truck or van. **EB**

Visit **EBMag.com** and click **Calendar** to see an extensive list of upcoming events.

IN CASE YOU MISSED IT...

VIDEO • GE Canadian Assembly Centre celebrates 5th anniversary. Visit bit.ly/Mus7R6.

GALLERY • Snapshots from Ontario Electrical League annual golf tournament. Visit bit.ly/OTDSTn.

VIDEO • Siemens Canada unveils new HQ marking 100th Anniversary. Visit bit.ly/UglyDw.

GALLERY • EBMag hits the green at OEN Annual Sunnybrook Foundation Charity Golf Tournament. Visit bit.ly/Nn9IJ4.

CanWEA 2012

Canadian Wind Energy Association
October 14-17, Toronto, Ont.
Visit www.canwea2012.ca



SmartGrid Canada

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Visit www.sgcanada.org/conference

RETScreen Training Institute

October 16, Toronto, Ont. - 201:
Energy Efficiency Project Analysis
November 20, Montreal, Que. - 201:
Analyse de projets d'efficacité énergétique
December 4, Toronto, Ont. - 202:
Heating & Cooling Project Analysis
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EMC EV Conference & Tradeshow

Electric Mobility Canada
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AEE 35th World Energy Engineering Congress

Association of Energy Engineers
October 31-November 2, Atlanta, Ga.
Visit www.energycongress.com

CanSIA Solar West Conference & Showcase
Canadian Solar Industries Association
November 1, Edmonton, Alta.
Visit www.cansia.ca

InfraMation

FLIR, Extech, Infrared Training Centre (ITC)
November 6-8, Orlando, Fla.
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24th Annual Canadian Power Conference & Networking Centre
APPrO (Association of Power Producers of Ontario)
November 6-7, Toronto, Ont.
Visit conference.appro.org



BICSI Canadian Region meetings
November 7, Mississauga, Ont.
November 22, Ottawa, Ont.
Visit www.bicsi.org

OSP Expo International Summit
November 13-15, Denver, Colo.
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EFC E-Tech Marketing Forum II: High Performance Buildings
Electro-Federation Canada
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ENVIRONMENTALLY aware LIGHTING

Intelligent sensors key driver for meeting building and energy mandates

Sajol Ghoshal

Environmental sustainability has become an increasingly important consideration in building design, construction and maintenance in recent years. According to the U.S. Department of Energy, worldwide energy consumption will increase approximately 40% by the year 2035. To help offset this dramatic trend, governments around the world are increasingly implementing mandates to ensure the reduction of energy consumption and related greenhouse gas emissions.

In 2008, The European Union (EU) adopted an integrated energy and climate change policy, including ambitious targets for 2020. It hopes to set Europe on the right track toward a sustainable future with a low-carbon, energy-efficient economy by:

- cutting greenhouse gases by 20%
- reducing energy consumption by 20% through increased energy efficiency
- meeting 20% of their energy needs from renewable sources

To meet the EU renewable energy target, each member state was given a national target based on their existing renewable generation, GDP and a flat-rate increase for all.

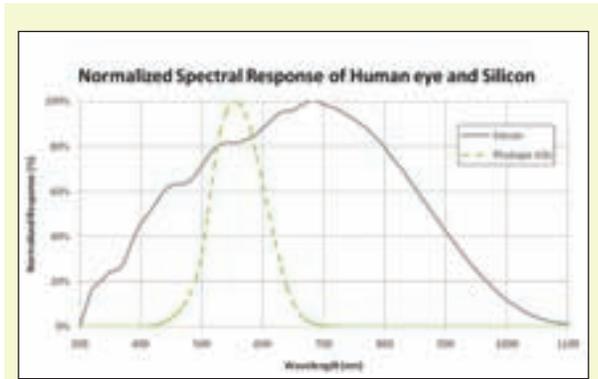
In 2009, U.S. President Barack Obama signed Executive Order 13514 calling on

federal agencies to develop, implement and annually update a plan to meet energy-reduction targets. This resulted in U.S. federal agencies developing sustainability plans for the first time. Additionally, two years ago, the White House announced it will take steps to cut its energy use and reduce its heat-trapping emissions by 28% compared with 2008 levels by 2020.

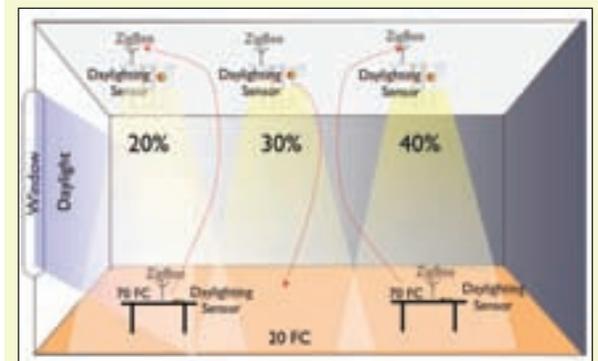
Canadian energy consumption

According to “Survey 2000: Commercial and Institutional Building Energy Use Summary Report” (CIBEUS2), Canadian buildings in the commercial and institutional sector consumed more than 479 million gigajoules of energy, which is equivalent to the total consumption of four million Canadian households. The regional breakdown shows that Ontario accounted for 43% of consumption, The Prairies 23%, Quebec 21%, British Columbia 9%, and The Atlantic Provinces 4%.

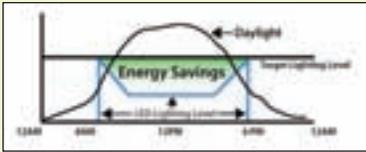
The Office of Energy Efficiency (OEE) is Canada’s centre of excellence for energy, efficiency and alternative fuels information. It is mandated to strengthen and expand Canada’s commitment to energy efficiency to help address the Government of Canada’s policy objectives. While the U.S. has both state and federal building codes that are adopted locally, Canadian building regulation is a provincial and territorial responsibility.



Photopic response, mimicking the spectral response of human vision, senses a narrower range of wavelengths than a silicon photodiode.



Sensor-driven lighting adjustments maintain constant illumination (70 fc on desks) while reducing output based on available daylight.

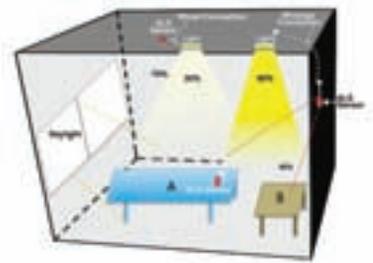


Daylight harvesting saves energy while maintaining target interior lighting levels to avoid keeping lights on at full power.

TABLE 1

MEASURES TARGETING LIGHTING

Lighting	Rate
Energy-efficient ballast	42%
Energy-efficient lamps	30%
Time switches	22%
Reflectors	21%
Manual dimmer switches	21%
Daylight controls that detect natural light	13%
Occupancy sensors	9%



An ALS lighting control system using both wired and wireless communications.

The Canadian building sector can make a significant contribution to the reduction of Canada's greenhouse gases. Nearly half a million commercial and institutional establishments in Canada provide spaces for education, healthcare, government and business services. These buildings represent 14% of end-use energy consumption and 13% of the country's carbon emissions.

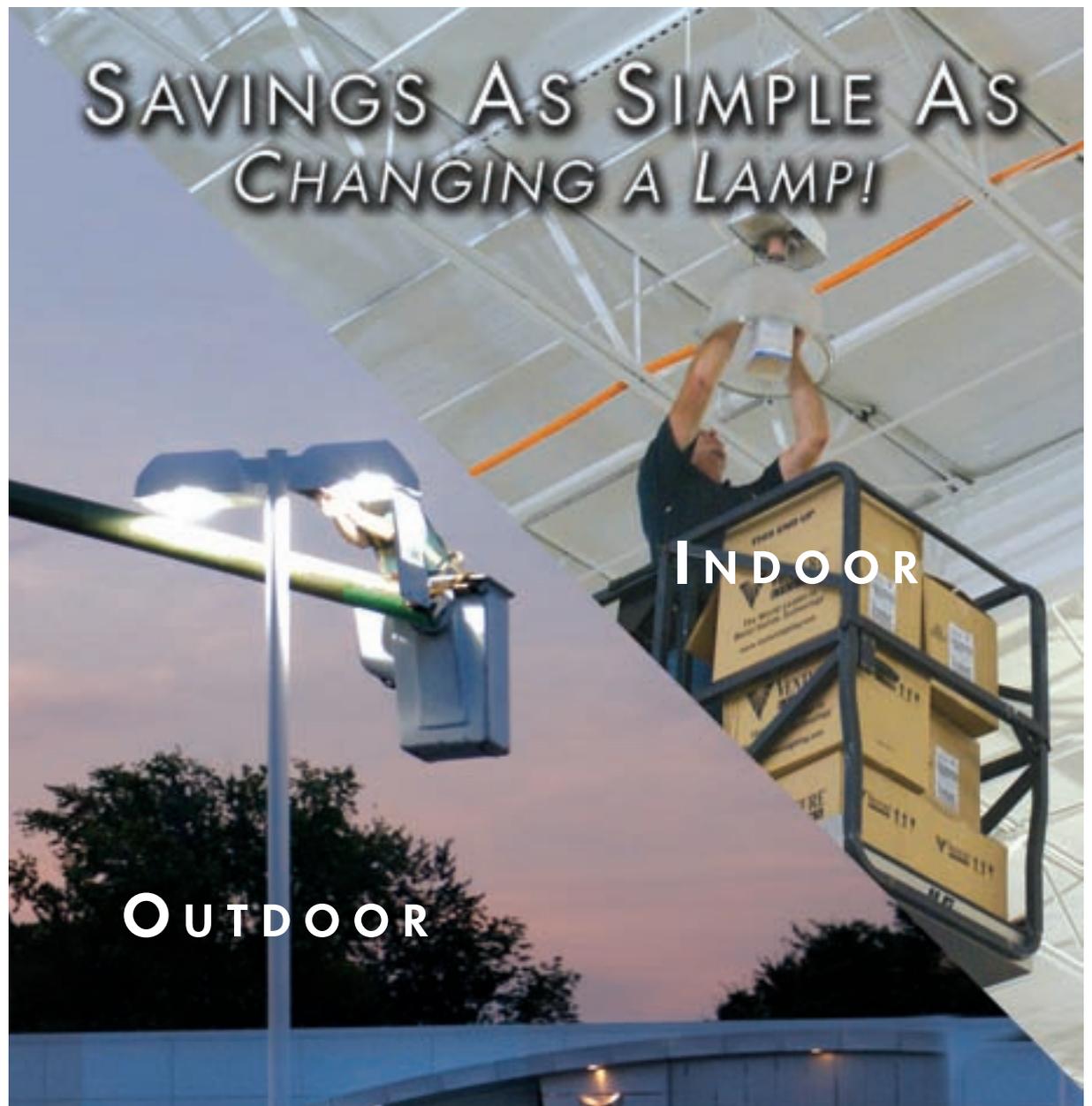
Let's examine a few of the provinces to better understand their energy issues and see specific examples of these mandates.

Ontario

Energy efficiency is a cornerstone of the province's Long-Term Energy Plan and an important element of Ontario's climate change strategy. As a result of the government's energy-efficiency efforts, Ontario has saved more than 1700 megawatts of electricity since 2005. Under the Long-Term Energy Plan, Ontario has set one of the most ambitious energy-efficiency goals in North America: 7100 megawatts by 2030.

In November 2010, the Ontario Energy Board (OEB) assigned local utilities mandatory conservation targets for the period 2011 through 2014. Working with utilities, Ontario Power Authority (OPA), meantime, developed a suite of new conservation initiatives, which were rolled out in 2011.

Energy efficiency is a proven strategy to lower emissions, reduce energy use and costs. Despite this, many Canadian building owners and managers have not taken advantage of the gains to be made by becoming more energy efficient. Energy-efficient technologies, know-how and processes available today are a significant opportunity to reduce costs, improve operating performance and increase occupant comfort while contributing to a cleaner environment. Surprisingly, however, in the CIBEUS2, nearly 30% of buildings had no device for reducing lighting energy consumption (Table 1).



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British Columbia

Provincial energy efficiency building standards help to achieve energy efficiency and conservation targets to support the goal of self-sufficiency, including commitments under BC Hydro's current Integrated Electricity Plan. Regulated standards for buildings are a central component of energy efficiency programs in leading jurisdictions throughout the world.

British Columbia has integrated environmental design standards that apply to all buildings receiving

new funds from the province, supporting the goal of the B.C. government being carbon neutral by 2010 and reducing the growth in electricity demand so that, by 2020, 10,000 GWh of currently forecast needs will be met through demand-reduction measures. Reporting must be completed annually, including audits of all new buildings and "recommissioning" on a five-year basis.

One initiative is the Energy Efficient Buildings Strategy, which sets targets for commercial,

industrial and government buildings. Energy efficiency, conservation and renewable sources are the keys to British Columbia's future success. The Energy Efficient Buildings Strategy sets the most aggressive energy efficiency targets in Canada and is key in achieving British Columbia's goal of reducing greenhouse gas emissions by 33% below 2007 levels by 2020.

Intelligent lighting and daylight

Cutting energy use can take a bite out of buildings' maintenance and upkeep budget, which makes up about 80% of the overall lifetime cost of the average building. With these provinces' mandates and knowing how much cost savings can be realized through energy efficiency, is there a way to make the lighting intelligent such that, in essence, it becomes similar to the human eye and adjusts accordingly to the many light sources—and objects—in a room?

There is. The approach is to focus on the light, not the power supply. The coming wave of *cognitive lighting* will demand independent smart sensors that are 'environmentally aware' so as to provide, not simply data on the surrounding environment, but answers to how best to respond—both to save energy and enhance lighting quality.

Sustainability mandates and financial incentives have driven many companies to set aside the capital budgets needed to upgrade to more efficient lighting systems. Quite often, the light sources in use, such as T8 fluorescents, are both highly efficient and long-lived, which suggests to many facility operators the need to wait until more efficient light sources, such as LED lighting, mature to the point they show a clear operating advantage before making upgrades.

In fact, there are ample incentives to move now, by taking advantage of daylight harvesting. Ambient light sensors combining photopic, human-like sensitivity with wide dynamic range are enabling a new generation of lighting controls that may be built directly into replacement lamps and luminaires to shift more of the interior lighting burden onto available daylight. The additional energy savings that can accrue through the



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	20-2	18-3	18-3	18-3	18-3
	20-3	16-2	16-2	16-2	16-2
	20-4	16-4	16-3	16-4	18-4
	18-2	16-3	16-4	16-3	16-3
	18-3	16-4	14-2	14-2	14-2
		16-4		14-3	
		14-2		14-4	
		14-3		12-3	
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daylight-driven dimming of a facility's lighting system can often produce the level of energy savings that can justify replacing even highly-efficient incumbent technologies.

There is available daylight in a facility with skylights, windows or sidelights, and it varies according to time of day, weather conditions and more. Areas that get light from those sources don't necessarily need much artificial light—at least not during the day—but areas farther from those sources do. In a

smaller facility, companies often simply turn out the lights on sunny days. The challenge typically arises in larger sites with thousands of square metres of space where managing each fixture's light output to compensate for the changing amounts of ambient light during the day is an enormous challenge and, frankly, near impossible to do manually.

To date, facility managers trying to take advantage of daylight have looked to external daylight harvesting sensors that attach to groups of lights. These

aftermarket offerings can provide incremental energy reductions, but still leave substantial savings on the table and have a number of performance issues that result in over- or under-lit areas, and jarring jumps or drops in light levels.

But a sensor built into the luminaire that automatically responds to its environment—whether it's occupancy, available daylight, time of day or other variables—and delivers just the right amount of light when and where it is needed is the perfect solution for reducing energy consumption and costs. Rather than applying controls as an afterthought, the built-in approach truly maximizes energy efficiency.

Added intelligence within the sensor systems also greatly enhances the controllability available to the facility operator. Remote control systems allow the setting of target light levels without a facility manager needing to get up on a lift and adjust switches on sensors controlling 100+ fixtures. By supplementing the working space with only the amount of light needed to maintain a uniformly lit environment, tremendous energy savings can be realized when compared to existing installations that do not respond to changes in ambient light.

System-on-chip light sensor solutions provide a complete light sensing subsystem, including conversion of analogue readings to a digital I2C output signal. This includes correction for any errors caused by the fixture's own imperceptible flicker on an integrated circuit as small as 2mm square, and costs about the same (or even less) than a simple photosensitive component alone. Additionally, sophisticated filters automatically reject the 50-60 Hz ripple typically produced by a building's fluorescent lighting systems, enabling the sensed light levels to more accurately measure the daylight that is entering the building.

Being fully aware of the lit environment also allows optimization that extends beyond energy savings. In integrated building management and control systems, the combination of proximity/motion and light sensing provides an abundance of data concerning the interior environment. Additionally, daylight sensing/harvesting combined with precise control mechanisms enable the lighting system to deliver not just the needed amount of light, but also

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offers the ability to tune the type of light to suit the activity and users in a particular space.

Intelligent lighting and existing light sources

Fluorescent luminaires are already in widespread use, so it makes sense to integrate a system that can improve efficiency of these fixtures up to 50% through smarter lighting controls that match lighting to the demands of the business and environment. A sensor system that connects to today's existing building management structure is critical.

Although modern fluorescent lamps are highly efficient, adding the components to support dimming can be costly, and the nature of the ballast systems does not lend well to the faster on/off cycle times that would be considered ideal for motion sensor or proximity control scenarios. However, through the use of intelligent sensors, the technology senses a rise in ambient illumination and dims the luminaire in response; as the daylight increases, fluorescent light will decrease.

Environmentally aware, decision-directed, multi-sensor networks that optimize light will enhance not only the productivity of the space, but worker and group productivity, as well as increase the health and well-being of individuals.

Autonomous light controls

Although previous smart lighting controls were always centralized, today's technology enables lights that think for themselves. With ambient light sensors built into each lighting instrument, you get on-the-spot decision-making depending on how much ambient light is present. With low-cost and low-power wireless networking (such as ZigBee) or wired networks, group intelligence—semi-autonomous controls aware of what the other is doing, and able to self-organize the most efficient lighting plan for each moment—and centralized control systems can be readily implemented.

A smart sensor-driven lighting system that is aware of the immediate environment and broader operating concerns, and is able to intelligently adapt to user and facility requirements with autonomous local- or centralized- control, is critical to meet government mandates to reduce

energy consumption and lessen greenhouse gas emissions. This next wave of cognitive lighting systems will finally make use of the abundance of data available in the light and autonomously adjust the built environment to enhance comfort, productivity, safety and efficiency at the same time.

The demand for power around the world continues to increase. It's essential, therefore, to have fixtures that reduce this consumption. Currently, all sensors and daylight harvesting systems are driven

by controls and power rather than using light as the starting point. By looking at light differently—and understanding that the future of lighting must be fully adaptive—is the only way to truly lower energy consumption and costs. **EB**

Sajol Ghoshal is the director of the Sensor-Driven Lighting business at Austriamicrosystems, a designer and manufacturer of analogue ICs. Sajol can be reached at sajol.ghoshal@ams.com.



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Flash hazard awareness while troubleshooting electrical equipment

Eugene Williams

Troubleshooting electrical equipment can introduce many new safety concerns, especially when inspecting equipment that is energized. Testing often requires the trouble shooter to temporarily connect test instruments to live terminals, which may involve opening enclosures or cabinets that normally are locked or bolted closed to protect workers.

This introduces two main hazards:

- **SHOCK:** Were you to contact live equipment with your body or a tool you are holding, the current flowing through your body could cause severe injury, burns and/or death.

- **FLASH:** When you are in the vicinity of equipment that fails and causes an electric arc, the ensuing flash, heat and shrapnel can be life threatening.

This article deals with the flash hazard.

Flash hazards

If you are familiar with electric arc welding, then you are aware that the small arc created by the welding equipment can generate enough heat to melt metal, as well as generate enough UV rays to burn your skin.

In the case when electrical equipment fails causing an electrical arc, the energy released

during the arcing can be many, many times greater than the welding arc, and can cause severe flash burns. The burns fall into one of three categories:

FIRST DEGREE: The outer skin layer is damaged; the burn is painful but, since the growth areas are not damaged, the skin is quickly regrown and no scarring is left.

SECOND DEGREE: The outer skin layer is severely damaged and blistering usually occurs. Healing takes much longer as it occurs from the deeper sweat glands and hair follicle areas. Scarring is often the result.

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THIRD DEGREE: Complete destruction of the skin and growth areas. If the burn is small, healing may occur from the sides; however, skin grafting is usually required.

In addition to the burns caused by the heat generated by an electric arc, another hazard exists: when an electric arc is established, the material and air around it are superheated, causing a rapid expansion in the area. Pressures up to 200 psi can be produced. Many electrical enclosures are not designed to contain pressures of this magnitude. The result is that molten metal and parts become shrapnel, flying at great velocities toward anyone in the vicinity.

The greater the amount of energy the arc produces (measured in cal/cm²) the worse the burn. Any heat over 1.2 cal/cm² can cause burns to unprotected skin.

To determine the energy that an arc could possibly produce in various situations, the following factors must be determined:

- Available fault current
- The voltage
- The clearing time for the protective device
- How close the body part is to the arc

Using the above information, the cal/cm² value can be calculated using one of several free software programs. Once you've determined the energy capable of being generated by an electric arc, you can then determine the precautions that need to be taken to work safely on the equipment.

NFPA 70E

Many injuries have occurred as a result of being in the vicinity of electrical equipment failure. NFPA recognized that most of these injuries could have been prevented or minimized simply by wearing proper flash protective equipment, so it developed a document called the NFPA 70E that, among other things, identifies and classifies the hazard risk of each task an electrician would be expected to perform and details personal protective equipment (PPE) required to perform these tasks safely.

Many companies/jurisdictions have adopted the safety measures contained in this document.

Identifying flash hazards

Before working on—or even opening—an electrical enclosure, you should know the hazards and how

to protect against them. NFPA has introduced documentation that has been included in legislation in many jurisdictions to label all enclosures with the level of protection required, and distances to maintain when working on or near equipment contained in an enclosure.

Some types of labelling also show the following information:

- Flash hazard boundary
- cal/cm² flash hazard at 18 inches
- PPE level (the type of personal protective equipment required)
- Approach boundaries to live parts for shock protection

Protecting against flash hazards

Hard hats, safety glasses, gloves and work boots with electrical insulation rating give the worker protection during normal work; however, in the event of circuit breaker or switchgear failure resulting in a thermal arc being created, much greater protection is required.

Flash protection clothing

Clothing can be made from many different materials. These materials have an arc thermal performance exposure value (ATPV) associated with them, which is defined as the

amount of heat energy that the fabric will handle, deflect or absorb, and is measured in cal/cm². Some of these materials offer better protection against the heat caused from an arc than others. Let's look at some of them:

- Synthetic material like **nylon, rayon or polyester** should never be worn when working on or near energized electrical equipment because it is flammable and has a tendency to melt and stick to skin when exposed to high temperatures.
- **Cotton blends with synthetic material** should not be worn near electrical equipment for the same reasons.
- **Pure cotton** provides a minimum barrier to arc temperatures, but can ignite quickly. It does, however, burn and fall away rather than stick to skin.
- Materials like cotton or cotton blends **treated with a flame retardant** chemical provide a minimum level of flame resistance. Some chemical treatment degrades with repetitive laundering. For proper protection, this material should be a minimum of 7 ounces per square yard.

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- **Nomex, Indura or PBI** clothing provide excellent flame protection and are recommended for all work around energized electrical equipment. The material should be a minimum of 4 ounces per square yard.

To provide proper flash protection, shirts and overalls should have long sleeves to protect the arm fully. Flash suits are constructed of heavier material, usually Nomex or PBI flame-resistant material. They usually start at 10 ounces per yard and go up. The heavier materials contain material like Kevlar to protect against shrapnel as well as heat. Typical ratings begin at 7 cal/cm² and go up to about 100 cal/cm². The suit can be in the form of smock and hood, or complete overall style with hood.

In general, all clothing—including undergarments—should be 100% cotton. Flame-resistant clothing should then be worn over this when working on or near energized electrical equipment. When combined in layers, the fabrics gain significant rating from the air space between them, and multiple layers have much higher ratings than the sum of the individual ratings. For example, a pant and shirt made of Indura 301 (ATPV 8.2) that is worn under coveralls made of Indura 451 (ATPV 11.1) achieved test results of ATPV 32.7. Even though the test results proved greater than the addition of the ATPV values of each layer, your outer layer should always be a garment rated for the predetermined arc flash value of the installation.

Safety glasses

Clear lenses are adequate for normal work. Flash-rated eye protection is required for live work, troubleshooting, switching and applying or removing grounds. In some cases, full face protection is required.

Other PPE

Other specialized personal protective equipment may be required when performing work where a flash hazard is present. Some examples include: fire-resistant hard hat liner, leather gloves, hearing protection, and leather work shoes.

Hazard risk category classification

NFPA has identified tasks typically performed on energized electrical equipment and has given each a Hazard/Risk Category. The categories range from 0 to 4: the higher the number, the higher the Hazard Risk.

The document then describes the protective clothing and personal protective equipment required for each category. For example, a Category 0 task may require a long-sleeve shirt and pants of untreated natural fiber

and safety glasses. A Category 1 task may require a fire-resistant long-sleeve shirt and pants/coveralls with hard hat, safety glasses, leather gloves and leather shoes.

What you need to do

Be informed, and be aware of the hazards. Make sure you know and understand all the rules and regulations that apply to the work you are doing. These can be governmental

regulations or policies and procedures produced by your company.

Follow all safety rules and procedures. These are designed to protect you, so follow them. Don't take short cuts. Wear all required personal protective equipment. If you are in the vicinity of equipment failure causing an electrical arc, your PPE may save your life.

Good luck troubleshooting and stay safe! **EB**

Eugene Williams has over 35 years of experience in the electrical industry, both in the field and as an electrical instructor. He currently consults and provides training for various organizations throughout North America, and is a contributor to Simutech Multimedia's Troubleshooting Skills Training software (www.troubleshootingskills.com). He can be reached at eugenew@onlink.net.



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compulsory lighting control provisions outlined by ASHRAE as the directives with which energy codes must abide. And, with the rising cost of fossil fuels, governments are finding that investing in energy efficiency at correctional facilities makes sense. Plus, green energy improves the image of prisons and jails.

Finding new ways to reduce energy usage can be difficult, but budget cutbacks continue to make maintaining a facility difficult. However, lighting controls offer an excellent opportunity.

Occupancy sensor lighting controls are very effective by simply not turning on unless movement is detected by the sensors, which helps cut utility usage by as much as half. The lights in a room do not turn on unless the room is in use. This type of sensor can be placed into the panel board as well so that all electricity is turned off until the room is occupied.

By using resources more efficiently, correctional institutions can free up funding, staff time and facility space for other security-oriented activities. In a

continued on page 33

Maintaining this extensive operation doesn't come without costs. A study by the Quebec Institute for Socio-economic Research and Information revealed that annual maintenance and operation costs for prisons will reach \$1.6 billion for the federal government and \$2.2 billion for the provinces. Additionally, the annual cost of housing a prisoner in Canada can run anywhere from around \$52,000 to \$250,000 per person, depending on the level of security at the facility.

Lighting controls and reducing energy consumption

Lighting in commercial, institutional and industrial buildings often represents as much as 40% of the total electricity costs for those facilities worldwide. Lighting systems are responsible for larger proportions of overall energy usage than other systems, such as HVAC or motors. Aside from indoor environmental controls, lighting systems are responsible for the maximum energy usage and expenses.

To stem the economic burden of commercial enterprises along with the increasing strain of spiraling energy usage on a nationwide electric grid, lighting controls are a standard design practice in businesses and institutions being newly built. The federal government instituted



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Real project success and Plan of Action

Your ability to build a project has virtually nothing to do with the success of the project. I lectured—even co-wrote—three university degree programs in Construction Management at the British Columbia Institute of Technology (BCIT) for a number of years. The

students were mature with full-time jobs, possessing years of construction experience. (Incidentally, this is a great place to visit if you are looking for bright, knowledgeable people.)

I asked my students to identify the problems they experience in their daily businesses, and the replies were usually:

- Communication
- Interpreting contracts
- Getting and motivating good people
- Managing materials supply
- Working with other trades
- Finding enough hours in the day to get everything done

I would then point out that not one of them identified the actual construction of a building, nor the diagnosis of a technical issue, as a problem. Not one of them ever had problems with the building itself, only the processes. And the problem items they listed are exactly the same in all businesses.

Your ability to build a project has virtually nothing to do with the success of the project.

When I work with contractors, I ask them to focus on the processes they use to get the work done. I ask them to identify the frustrations they themselves have, and what frustrations others (e.g. customers, suppliers, employees, etc.) might experience when dealing with them. When I get them working on this, I know they are on their way to joining the top 25% of contractors.

The Takeaways

- Do you know the frustrations that your customers, suppliers and employees feel when dealing with you and your competitors?
- Do you have processes for minimizing them?
- What are you doing to make this a top priority?

Meantime, a construction association asked me to write a business plan education program for its members. I was very reluctant to take on the assignment, as I often find business plans to be a waste of time for

smaller businesses. I eventually did on the basis that at least the template I designed would be action-oriented.

Business plans can be helpful for getting investors and bankers on-side, but they tend to be of little value to the typical owner/manager—mainly because he is too busy to utilize the plan effectively.

When a contractor asks me to do a business plan, I invariably talk him out of it. A business plan becomes a boring book and gets very little real use. Instead, I help him develop a Plan of Action.

Contractors are certainly more action-oriented and less reading-/ planning-oriented. Through the business development process I have customized, the contractor and I determine the outcomes he wants to achieve over the next three years. We then identify the obstacles that may prevent him from achieving those outcomes, and develop a list of actions needed to overcome those obstacles.

We prioritize the list of actions and determine who will do them, and when they are to be done. We focus on the top five to 10 actions and move forward one step at a time. Every three months we review and update the list, and continue the process.

Most of the decisions are made by the contractor, and I just serve as the catalyst. Once we have established the Plan of Action, he delegates as many of the actions as possible to his team. It is not unusual to take three years to make serious changes within a business.

Keeping the contractor on course is the hardest part. I always focus on the lifestyle changes that he will achieve by following the process. I tell him it is not about the money; money is a means to an end, not an end itself.

The Takeaways

- Identify the outcomes you would like to achieve over the coming three years.
- Identify the obstacles. Identify actions for overcoming those obstacles.
- Prioritize those actions. Add dates and responsibilities.
- Develop a support system to help you stay on track. **EB**



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Ron Coleman, a member of the Institute of Certified Management Consultants of British Columbia, just published his latest book, "Building Your Legacy: Lessons for Success from the Contracting Community", which teaches you how to make more money while having more fun. A noted speaker, he has completed many interfirm financial comparisons of groups of construction companies in Canada and the United States. Ron's numerous published education programs include a 36-hour business management course specifically designed for the Electrical Contractors Association of British Columbia (ECABC). Visit www.ronaldcoleman.ca.

sample facility with 1200 beds, should utility prices rise by as little as 5% annually over the next 20 years, the cost to the institution could be as high as \$1,200,000 or more, which is \$1000 per inmate.

Improved lighting control technology

Dimming technology has evolved considerably over the last decade, especially in the arc discharge lamp category. What began as a device for simply matching lighting levels to various tasks and moods has emerged as a tool for reducing energy usage. The reduction in light output can be accomplished either as a step function or as a continuous function.

A ballast is an internal device built into a fixture that is intended to limit the amount of current in the electric circuit. Fluorescent lamps require a burst of power to move to full brightness, and less power once they're fully on; the fixture's ballast regulates this variability. The Toronto South Detention Centre installed a control system requiring the use of a Digital Addressable Lighting Interface (DALI) dimming ballast incorporated into the manufacturing of each fixture.

DALI defines a new standard for the digital communication between the individual components of a lighting system. It provides simplified communication and installation, yet maximum control and flexibility. Wiring is simpler, installation costs are lower and each ballast can be individually controlled. Maintenance costs are also reduced through central monitoring of ballast and lamp status. Energy costs are lowered through daylight harvesting and standard controls, such as occupancy sensors.

Lighting controls in action

Construction of the \$330-million, 1650-bed Toronto South Detention Centre (TSDC) aimed to meet current and future capacity needs, and resolve issues regarding overcrowding at the aging Toronto Jail. The complex includes an integrated state-of-the-art security system and all essential functional components, including admissions and release, health services, education, life skills, counseling, recreational programs, visitation, materials management, and support such as laundry, food services and maintenance.

On behalf of the Ministry of Community Safety and Correctional Services (MCSCS), Infrastructure Ontario constructed a new maximum-security detention centre on the site of the old Mimico Correctional Facility. TSDC consists of four main towers to house inmates, along with a large administration building, and a new Toronto Intermittent Centre that replaces the function of the previous Mimico facility.

The new facility is part of MCSCS' strategy to address health and safety issues and inefficiencies of design, technology and space by replacing older facilities that do not meet current operational requirements, and are experiencing significant and growing remand pressures.

The design and construction of the detention centre adheres to the guidelines and sustainability principles of Canada Green Building Council's (CaGBC) LEED rating system, and achieved LEED Silver certification. LEED buildings focus on healthy indoor environments, reduced greenhouse gas emissions and efficient use of energy, water and other resources. Additionally, it is the first green-certified detention centre in the province.

The form of the facility begins with a two-storey front building that provides the core elements, and rises to two, 7-level housing towers. The entry structure relates to the street and its pedestrian scale. The design was reviewed and approved by the City of Toronto for compliance with urban design principles that went beyond the requirements of zoning and planning ordinance.

To reach high-performance lighting goals and meet LEED requirements within budget, Crossey Engineering—in collaboration with OZZ Electric—selected fluorescent luminaires utilizing 347V DALI dimming ballasts. Over 2500 maximum security fixtures were installed, with about 900 specifically for the cells. Energy-efficient T5HO lamp sources were customized by the

How much does Correctional Service of Canada (CSC) spend on energy each year (figures for last 5 fiscal years)?

	LIGHT AND POWER	NATURAL GAS ¹	OIL	DIESEL FUEL ²
2006-2007	14,015,425.75	12,820,597.89	1,483,816.06	624,425.39
2007-2008	14,063,716.93	13,154,514.66	2,099,288.59	582,981.47
2008-2009	14,641,846.25	15,022,485.98	1,948,099.21	665,693.44
2009-2010	14,741,151.89	10,387,240.13	1,914,792.37	436,648.82
2010-2011	15,709,520.11	10,213,913.08	2,103,707.60	623,771.07
2011-2012 as of March 15, 2012	14,264,603.87	8,104,949.09	1,937,992.07	669,462.34
Grand Total	87,436,264.80	69,703,700.83	11,487,695.90	3,602,982.53

Notes

- 1) Due to a financial system limitation, CSC cannot provide solely the cost of natural gas. The financial information includes the cost of natural gas as well as propane gas.
- 2) Due to a financial system limitation, CSC cannot provide diesel cost solely for generators. The financial information reflects the total cost of diesel for CSC.

How many megajoules of energy does CSC purchase each year (figures for last 5 fiscal years)?

The table below is CSC's energy use in gigajoules for the past seven years. As shown in the table, CSC has been decreasing its energy consumption, even though it has been expanding in terms of number of occupants and its building footprint. Between 2004 and 2011, CSC has decreased its normalized energy use (MJ per m²) by over 6%. CSC will continue its efforts to conserve energy.

CSC ENERGY USE IN FACILITIES

Fiscal Year	Area of Facilities-m ²	Actual Total GJ	Normalized Total GJ	Normalized MJ per m ²
004/05	1,299,085	2,431,255	2,473,358	1904
2005/06	1,298,139	2,381,413	2,511,940	1935
2006/07	1,296,821	2,384,085	2,474,965	1908
2007/08	1,310,568	2,415,477	2,451,854	1871
2008/09	1,323,997	2,401,304	2,416,091	1825
2009/10	1 327 774	2,301,460	2,399,906	1807
2010/11	1,327,832	2,325,161	2,370,729	1785

¹'Normalized' is the amount that facilities would have used if consumption had been adjusted to the norms of the 30-year period from 1971-2000.
GJ=gigajoules; MJ= megajoules

addition of DALI dimming ballasts for use with controls to further optimize the fixtures' efficiency. This has enabled the facility to realize attractive cost and energy savings on an ongoing basis, offsetting the initial cost of the lighting investment.

The building design team's intention was to save as much energy as possible in the new seven-storey, 220,000-sf prison building while creating the correct lighting environment with the appropriate fixtures to provide maximum efficiency.

From a sustainability standpoint, correctional facilities are 24-hour, energy-intensive structures that focus on security. The benefit of greening correctional facilities is that they will consume fewer resources, create less pollution and provide healthier environments for the users—inmates, staff, visitors and administration.

While the primary goal of corrections is safety for the community and for those housed and working within the facilities, sustainability goals and strategies are increasingly being integrated into the policy and planning initiatives of the corrections community. Lighting controls coupled with state-of-the-art luminaires provide an excellent solution to reducing energy consumption and costs. **EB**

Frank Gonzales is regional sales manager with Kenall, which produces and supports durable lighting solutions for environments such as correctional facilities. He can be reached at (847) 263-6055 or fgonzales@kenall.com.

Cooper Lighting releases 6th edition Product Selection Guide



Cooper Lighting has published the sixth edition of its Product Selection Guide (PSG), a 1680-page printed catalogue featuring 23 sections of the company's lighting and controls products, including individual product descriptions and features, photos, dimensions and complete ordering information. The guide is also available electronically and can be accessed from the Cooper Lighting website (vpsg.cooperlighting.com). Smartphone and tablet users can also download the electronic guide at the App Store for the iPad and iPhone, and at the Android Market for other devices.

COOPER LIGHTING
www.cooperlighting.com

Fulham releases FireHorse HotSpot2 LED emergency lighting system

Fulham's new FireHorse HotSpot2 LED emergency lighting system connects small-profile LED drivers and battery packs to the LED modules already in place inside existing fixtures that are driven by constant current



sources. During a power outage, the drivers are designed to provide output current to the modules connected. The HotSpot2 system is an expansion of the existing HotSpot1 series, winner of an LFI Innovation Award.

FULHAM
www.fulham.com

Lind Equipment announces new models for LE970LED floodlight

New models of the LE970LED Lind Equipment 50W portable LED floodlight are now available to help increase the floodlight's usefulness in new applications and job environments. The LE970LED-TD model is mounted on a 4-8' tripod, which features separately moving light heads controlled by individual switches. The LE970LED-MAG model offers three 40lb-pull strength magnets mounted on the yoke. Lastly, a new "ruggedized" add-on package of upgrades to help enhance durability and robustness is available for all



LE970LED models mentioned above, including the original LE970LED-FS (floor stand) and LE970LED-TR (single head tripod mount) models.

LIND EQUIPMENT
www.lindequipment.net

Holophane Glass Washington Postlite LED luminaries



Holophane has introduced its Glass Washington Postlite LED luminaries, available in three styles: Enhanced, Utility and State Street. All versions are available with a variety of shapes, decorative trim and uplight option, and are compatible with installed Washington glass globes and housings. The series incorporates reflecting prisms that redirect over 50% of the upward light into the controlling refractor that creates a soft uplight, says Holophane. The luminaires are CSA listed for wet locations for up to 35°C ambient temperature.

HOLOPHANE
www.holophane.com



Nicor unveils DLR4 LED downlight

Nicor has expanded its Maxcor line of LED lights with the new 4" recessed LED downlight DLR4. The 11W downlight is suitable for retrofit and new construction applications and is dimmable to around 10%. Producing 543 lumens, the downlight is available in 3000°K, 4000°K, and 5000°K temperatures.

NICOR
www.nicorlighting.com



New Lumenpulse website boasts of enhanced navigation and selection tools

Lumenpulse's redesigned website, www.lumenpulse.com, boasts of bolder visuals, enhanced navigation, better product searches and a showcase for recent projects. A selection tool was added to let users save content to a customized page for future reference or for sharing. Other features include a searchable product catalogue, downloadable PDF catalogues, support pages, and a boosted contact page that allows users to locate the nearest Lumenpulse representative. The website is currently in English and French, and will expand to Spanish, German and Italian.

LUMENPULSE
www.lumenpulse.com

Cree debuts KR series LED downlight

Cree has introduced its new KR series LED downlights. With initial models designed to replace 18W and 26W fluorescent downlights, the series claims to be 35% more efficient and last up to five times longer than fluorescents. The 6"-downlight features line voltage dimming to 5%, as well as different colour point, light output and specification-grade reflector options.

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New Eaton 5P UPS boasts 28% more wattage

Eaton describes its new 5P uninterruptible power system (UPS) as offering industry-leading efficiency for network closets and small data centres. The 5P supports entry-level virtualization strategies through Eaton's Intelligent Power Software Suite, and claims to enhance equipment protection by combining remote metering and power hardware management capabilities with 28% more wattage than traditional UPSs, it says. Through the software, users can also monitor UPS power usage, efficiency and load, enabling better management of electrical consumption and energy footprint. The Eaton 5P UPS models range from 1440W to 2700W.

EATON

www.eaton.com/5P

Arlington's strut clip holds hangers, conduit on strut

Arlington's new UV-rated, non-metallic strut clips hold pipe hangers and conduit on interior or exterior strut. The strut clips work with most pipe hangers, including its QuickLatch hangers, says Arlington, and fits different conduit sizes. The strut clips are threaded for a 1/4"-20 screw (installed).



ARLINGTON INDUSTRIES

www.aifittings.com

Master Lock designs



integrated cable lock

Master Lock's new integrated cable lock allows use of multiple cables connected to a single locking point, maximizing convenience and security, it says. The lock consists of a multi-point stainless steel lock body and a single braided steel cable. According to Master Lock, the locking point can be placed virtually anywhere in the pickup bed, and relies on looping a cable through the cargo and a tie-down

point in the truck bed, then back to the locking point.

MASTER LOCK

www.masterlock.com

Install power poles with Wiremold Tele-Power Pole Extenders

Legrand/Wiremold says it has made it easier to install power poles, including making on-site modifications to accommodate a variety of



height requirements with its new Wiremold Tele-Power Pole Extenders. The extenders are available in 5'-sections that snap together to create a single standard pole, or may be used to extend the length of an existing pole. Legrand/Wiremold is also offering prewired and unwired Tele-Power Pole Extenders that can be combined in the field to make a single 10'-pole. Factory-wired units come with two 20A, 125V duplex receptacles.

LEGRAND/WIREMOLD

www.legrand.ca/Wiremold.aspx

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Paul Murphy
Independent Electricity System Operator



Greg Lyle
Innovative Research Group



Linda Bertoldi
Borden Ladner Gervais

Milwaukee unveils M12 600 MCM cable cutter



EBMag's associate editor Alyssa Dalton was there as Milwaukee Electric Tool debuted its new cable cutter at a special media preview earlier this year. The M12 600 MCM cable cutter claims to eliminate two difficult aspects of installations – fitting the cutting tool in panels/boxes and generating enough force to get the job done – with an open jaw and a breakthrough powered ratcheting mechanism. The cable cutter puts out over 5,000 pounds of force, and is suitable for copper, aluminum, SER cables, G-Type, paired communication cable, and underground cable.

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GOJO INDUSTRIES
www.gojo.com/automotive

Cat G20CM34 generator set produces up to 10MW



Caterpillar's new Cat G20CM34 generator set, capable of producing up to 10MW, is the company's largest natural gas-fired medium-speed reciprocating engine generator set. The engine design

of the generator set is based on the GCM34 family, currently in production with 12 and 16 cylinder models. The addition of the 20-cylinder model expands the number of options available to customers needing a medium speed, natural gas option. According to Caterpillar, the G20CM34 features a Cat electronic control system, precise fuel delivery and long-stroke design to help maintain efficiency.

CATERPILLAR
www.caterpillar.com

Carmanah introduces R247-E solar 24-hour flashing beacon

Carmanah Technologies has launched the R247E Solar 24-hour flashing beacon. The R247E is the third generation of the series, claiming to feature advancements that include increased light intensity and a lighter, smaller solar engine. The device installs onto existing 2"-sign posts or 4"-diameter poles or wood posts, and features an on-board user interface for configuration and troubleshooting. Designed to



help increase vehicle compliance to warning signs and stop signs, the R247-E is an MUTCD compliant warning beacon (yellow indication) and stop beacon (red indication).

CARMANAH TECHNOLOGIES
www.carmanah.com/traffic

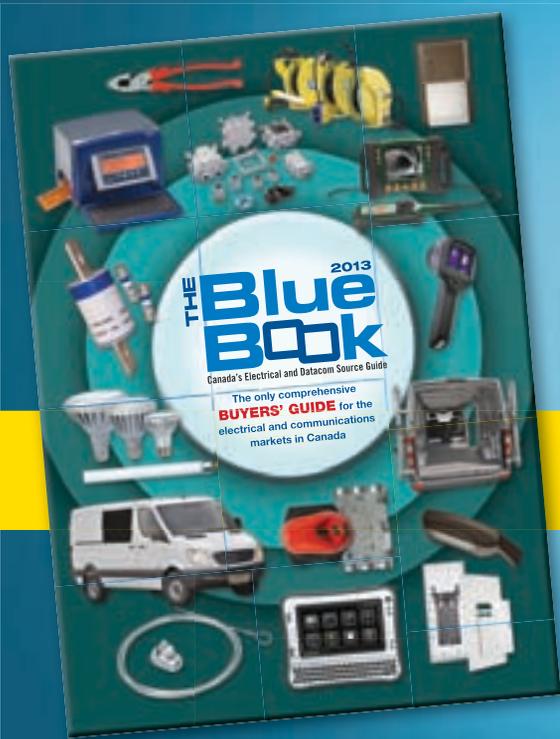
Platinum Tools T62 Recon test set for high line voltages

The new T62 Recon test set from Platinum Tools claims to deliver more line condition and status information than any other telephone line tester in the world, with its menu for measuring data, monitoring and detection of high line voltages. Features of the T62 Recon include a backlit display; a glow-in-the-dark keypad, caller ID/call-waiting Caller ID and error detection; and storage memory for eight numbers. The T62 also includes a Digi-Secure feature which helps protect digital lines from disruption by outside test equipment.

PLATINUM TOOLS
www.platinumtools.com



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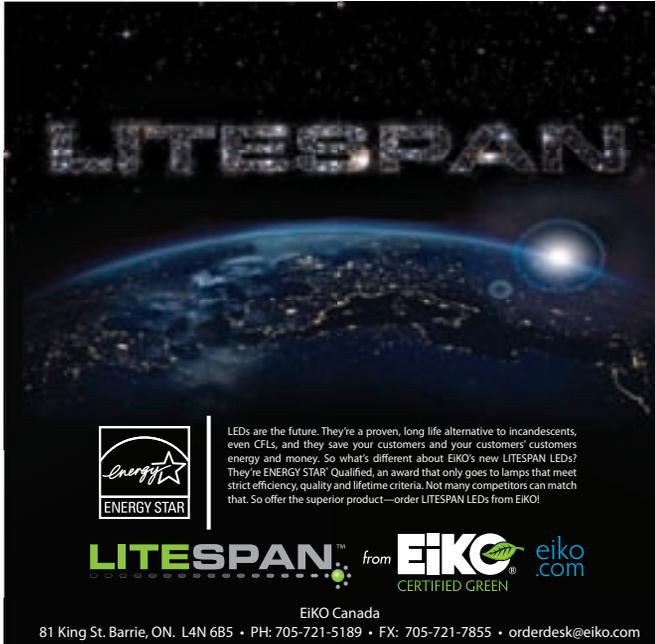
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Rule 4-004: comparable but different

You probably noticed a number of important changes from 2009 to the 2012 edition of the Canadian Electrical Code, with Section 4-Conductors getting the lion's share them. Rule 4-004 has received a good deal of attention, so we'll compare some of the similarities and differences between the 2012 version of Rule 4-004-Ampacity of Wires and Cables with its 2009 predecessor.

Beginning with underground conductors, CEC 2009's rule for calculating the allowable ampacities for underground conductors—direct buried or in raceways—went straight to the point: minimum conductor size #1/0 AWG and allowable ampacities calculated in accordance with IEEE 835. A note, "See Appendix B", led us to an interpretation of the standard: the diagrams and ampacity tables in Appendices B and D. The 2009 rule offered no clues as to what to do about wire sizes smaller than #1/0 AWG or conductor arrangements that differed from the Appendix B diagrams.

Rule 4-004 in CEC 2012 addresses these earlier limitations as follows:

- It refers us directly to the conductor configuration diagrams in Appendix B and the allowable ampacity tables in Appendix D.
- It tells us what to do when we decide to

arrange underground conductors in configurations different from those shown in Diagrams B1 to B4; allowable ampacities are to be based on the IEEE 835 calculation method.

- It tells us what to do for conductor sizes smaller than #1/0 AWG; use Tables 2 or 4, or the IEEE 835 calculation method.

Rule 4-004 of CEC 2009 specified allowable ampacities for single-conductor cables in free air. For cable spacing of at least the diameter of the larger adjacent cable, we could use Tables 1 or 3 to determine allowable ampacities for copper and aluminum conductors. For up to four single-conductor cables in contact with each other, Tables 1 and 3 ampacities needed to be corrected in accordance with Table 5B. With more than four cables in contact, the rule led us to the lower allowable ampacities of Tables 2 and 4.

For single-conductor cables in free air, Rule 4-004 of CEC 2012 is identical to the 2009 version for spacing apart of at least the diameter of the larger adjacent cable, but here is where the similarity ends. Now:

- For single conductors between 25% and 100% of the larger adjacent cable diameter, we must use Tables 1 or 3, with correction factors from Table 5D.

- For up to four single-conductor cables spaced less than 25% of the larger adjacent cable diameter, we must now use Tables 2 or 4 with correction factors from Table 5B.
- For more than four single-conductor cables spaced less than 25% of the larger adjacent cable diameter, we must now use Tables 2 or 4 with correction factors from Table 5C for the total number of conductors. Note, Table 5C correction factors do not apply to runs shorter than 600 mm.

I would be remiss in not mentioning a very important change: Rule 4-006. This rule requires that when equipment (such as circuit breakers) is marked for maximum termination temperatures, allowable ampacities must be based on the corresponding conductor temperature columns in Tables 1 to 4. Remember, this applies to both ends of every conductor or cable. When the equipment is unmarked, the 90 C ampacity column applies. **EB**

Les Stoch is president of L. Stoch & Associates, specialists in quality management/engineering services. He is a member of PEO, OEL and IAEL, and develops and delivers electrical code and technical workshops for Dalhousie University. He also developed the Master Electrician training program and exam (Ontario) for the Electrical Contractor Registration Agency. Visit L. Stoch & Associates online at www.lstoch.ca.

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 November'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

Areas where adequate ventilation is provided and paint finishes are regularly applied by spraying, the interior of spray booths and their exhaust ducts are considered:

- a) Class I, zone 1
- b) Class I, zone 2
- c) Class II, Division 1
- d) Class II, Division 2

Question 2

Receptacles required for maintenance of rooftop HVAC equipment shall be supplied by a branch circuit that does not supply any other outlets or equipment:

- a) True
- b) False

Question 3

What is the maximum continuous load permitted on a service switch if marked for continuous operation at 100% and is supplied by multi-conductor cable?

- a) 100%
- b) 80%
- c) 85%
- d) 70%

Answers: EBMag September 2012

Q-1: Unless the ground fault circuit interrupter is an integral part of an approved factory built spa, or located behind a barrier, it shall be installed not closer than:

- d) 3.0m. Ref. Rule 68-068.

Q-2: For wind turbines forming a small wind system connected to single dwellings, turbine output circuits shall be permitted to have a maximum nominal voltage up to:

- d) 600V. Ref. Rule 64-302.

Q-3: Electrical non-metallic tubing shall not be used where normal conditions are such that any part of the tubing is subject to temperature in excess of 60°C.

- b) False. Ref. Rule 12-1508.

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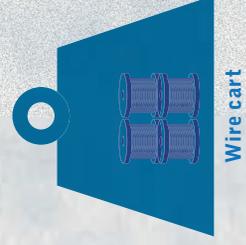
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