

# Electrical Business

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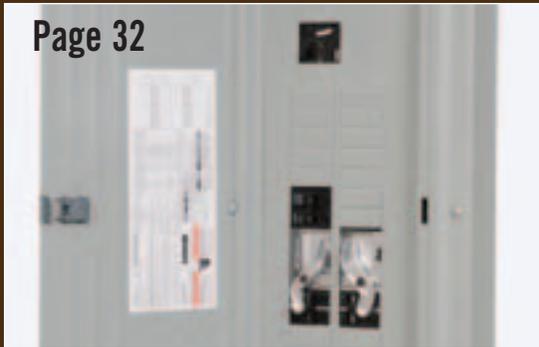
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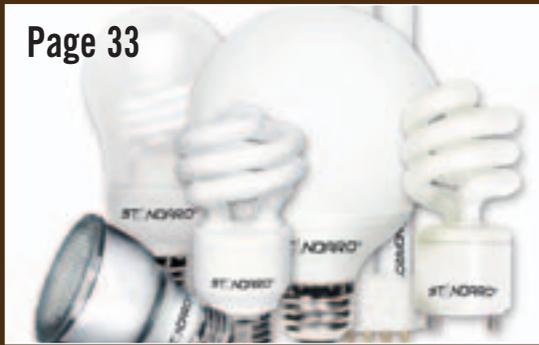
Safety-coated lighting products are useful in food prep areas.

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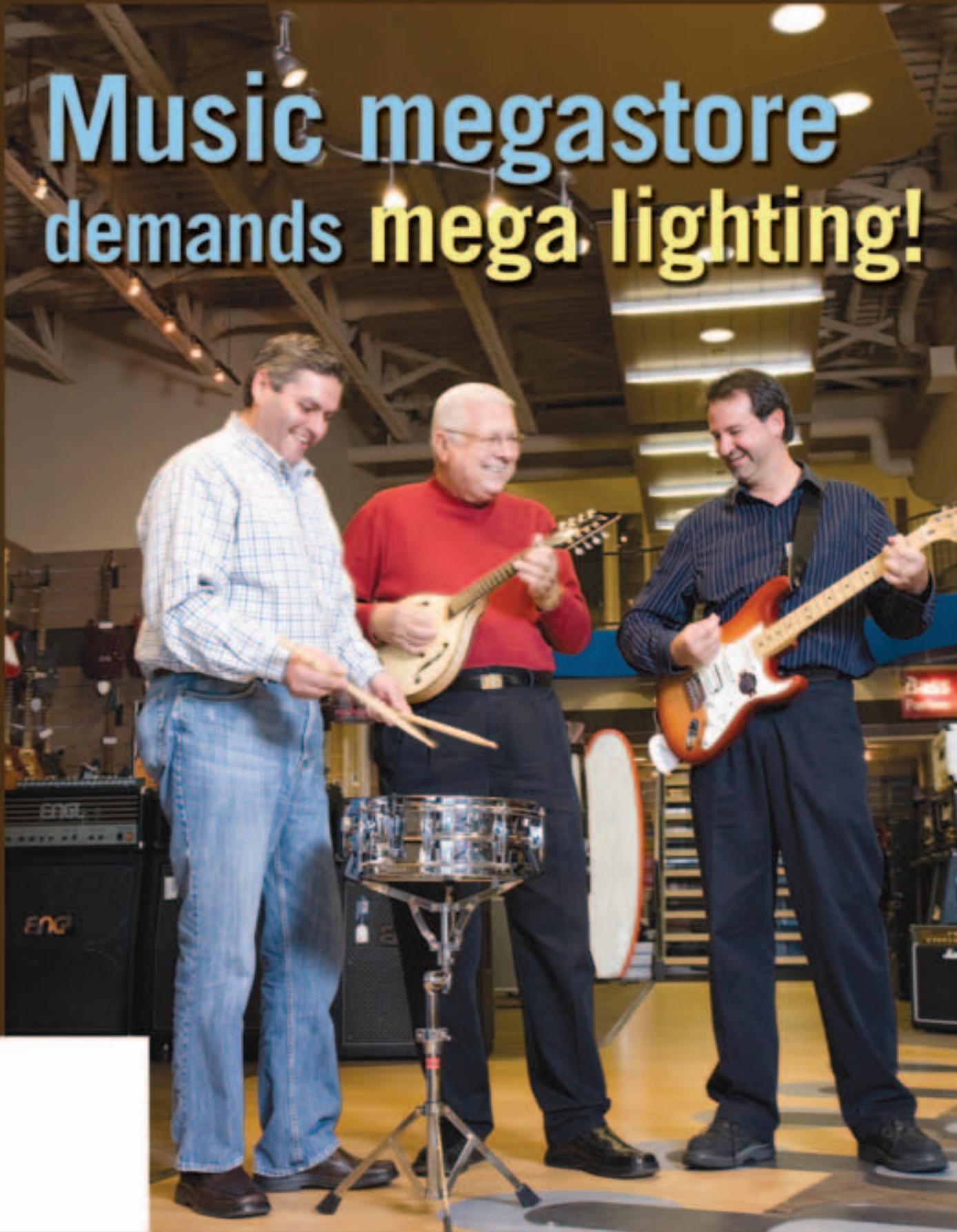
Residential generator-ready load centre minimizes future rewiring and expense.

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Expanded CFL series boasts new technologies promising higher energy savings.

## Music megastore demands mega lighting!

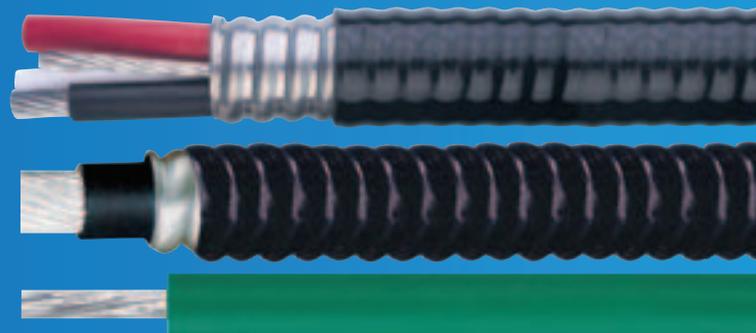


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ELECTRICAL BUSINESS is the magazine of the Canadian electrical industry. It reports on the news and publishes articles in a manner that is informative and constructive.

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## ▼ From the editor



## Learning to see *without* our hands

Arc flash continues to dominate electrical health and safety discussions, and with good reason; it's not that other safety aspects—such as proper footwear and head gear, and correct use of fall arrest systems, etc.—are less important, it's just that when an arc flash happens, the aftermath is just so damn cataclysmic.

It was the sole topic of discussion at a recent Industry Speaker presentation put on by EEMAC (Electrical Equipment Manufacturers Association of Canada). The opening speaker was Bill Giffen. On August 16 last year, he was involved in an arc flash incident with a 13,800-volt switch.

"The resulting arc flash explosion left my left leg disfigured," says Bill, "and took me through an odyssey of pain, hospitals, skin grafts and drug dependencies."

He received third-degree burns to his left leg and second-degree burns to his arm, back and groin area. As if that weren't bad enough, Bill faced substantial fines because of the incident. (He tells me now, thankfully, that no charges/fines are forthcoming).

The incident happened while he was working to get a high-tech company's substation back online. "A lot of guys put themselves in harm's way as maintenance electricians," says Bill. "It's all about uptime and production."

Bringing the statistics into better perspective was EEMAC's second speaker, Dr. Mary Capelli-Schellpfeffer, an American expert in the field of "uncontrolled, unintentional energy release during operation, maintenance and construction work". In the United States, contractor fatalities more than double those among utility workers, even when working on the same jobs in the same regions. The only explanation is that electrical contractors and their crews are taking more risks (and paying dearly for them).

Another condition that sets the stage for arc flash incidents, says Mary, "is that humans, from infancy and biologically, *see with their hands*". So despite catchphrases like "test before you touch", we simply cannot resist our biological impulses that make us do the exact opposite.

In case you're feeling like the good doctor is just picking on you, don't worry: she singled out architects/engineers as part of the arc flash problem as well. "Do they design with an eye toward allowing an operator [you] to 'keep a safe distance'?" Valid question indeed.

The statistics can, however, be turned around, says Mary: "We have an enormous ability to change things, but what we need is an enormous commitment". Are you up to the challenge?

*Anthony Capkun*

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#### When lighting and the arts combine: music megastore demands *mega* lighting

When Cosmo Music decided to move into a new, unified superstore, it enlisted the expertise of a retail store designer to map out a complementary, innovative look and lighting blueprint. Making the lighting work was up to Dial One Wolfedale Electric Ltd. With such an inspiring lighting scheme, an impromptu 'jam' session is to be expected. In the photo are: Rudi Brouwers, Cosmo Music vice-president, and Wolfedale's Norm Bilous, marketing director, and Sergio Cappuccitti, project manager. Photos by Sandra Strangemore.

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(Case Study) CMD, a manufacturer of plastic bag-making machines, needed help finding a solution that would improve performance quality and usability, reduce delivery time and lower the total cost of its machines.

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A digital low-resistance ohmmeter (DLRO) is a high-precision portable test set that typically measures resistance from 1μΩ to 60Ω, and we present some practical uses for it in detecting high-resistance connections.

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**EB rewards reader survey respondent**

Electrical Business is pleased to announce the random-draw winner for the Milwaukee 0920-24 combo kit, valued at \$650.00: **Harold Barton of Hark Electric** (Morinville, Alta.)

Back in August, EB conducted an online reader survey, with every respondent's name entered into a contest to win the V18 combo kit. Thanks to everyone who took a few minutes out of their busy day to participate. Stay tuned to Electrical Business and E-Line (our free electronic newsletter that you can sign up for at [EBMag.com](http://EBMag.com)) for upcoming opportunities for cool prizes.

**Hubbell files lawsuit against Watt Stopper**

Hubbell Inc. and its subsidiary, Hubbell Building Automation Inc., have filed a federal lawsuit against The Watt Stopper Inc. (Watt Stopper), alleging infringement of several patents for adaptive sensing and zero crossing technology.

The complaint was filed August 14 in the U.S. District Court for the Western District of Texas. Hubbell and Hubbell Building

Automation allege that Watt Stopper is infringing eight of their patents by making, using, importing, offering for sale and/or selling room occupancy sensors designated as models: WS 200, PW 100 and PW 200 (formerly WA 200 and WA 300), WN 100, WI 200, WI 300, WD Series, UW 100, UW 200, DW 100, DW 200, TS 400, WPIR, CX 100, CI 200, CI 300, CI 355, CI 12, CI 24, CB 100, W Series, WT Series, UT 300, UT

355, DT 200, DT 300, DT-355 and other models. Hubbell and Hubbell Building Automation seek a court-ordered injunction against the production and sale of the infringing products as well as additional damages. An injunction entered against Watt Stopper would also extend to anyone with notice of the injunction that acts with—or on behalf of—Watt Stopper to promote sales of the products named in the suit.

**Judge finds for P&S/Legrand in GFCI complaint**

Pass & Seymour/Legrand announced that a U.S. International Trade Commission (ITC) judge ruled a number of Chinese manufacturers of ground fault circuit interrupters (GFCIs) have violated P&S's patent rights.

ITC Administrative Law Judge Carl C. Charneski's rulings followed an evidentiary hearing that took place in June. P&S's complaints alleged, among other things, violations of Section 337 of the Tariff Act of 1930 by importing into the U.S. GFCIs that infringe six P&S patents.

The following Chinese and American companies were named in the investigation:

- General Protecht Group Inc.
  - ◆ Shanghai ELE Manufacturing Corp.
  - ◆ Shanghai Meihao Electric Inc.
  - ◆ Wenzhou Trimone Science and Technology Electric Co. Ltd.
- Cheetah USA Corp.
- Colacino Electric Supply Inc.
- The Designer's Edge Inc.
  - ◆ General Protecht Group U.S. Inc.
- GX Electric
  - ◆ Ingram Products Inc.
- Lunar Industrial & Electrical Inc.
- Nicor Inc.
  - ◆ Orbit Industries Inc.
  - ◆ Quality Distributing LLC
- Universal Security Instruments Inc.

(General Protecht Group U.S., GX Electric, Ingram Products, Lunar Industrial & Electrical, Quality Distributing and Universal Security Instruments all settled with P&S before Judge Charneski's rulings.)

The next step in the ITC process is for the full commission to review Charneski's ruling together with any appeals, and make a final decision by December 24. P&S has a related suit pending in U.S. District Court for the Northern District of New York, seeking additional damages. There, it is also pursuing infringement claims against Hubbell Inc. for infringing patents in issue in the ITC ruling and other patents.

**Advance repositions, recognizes corporate parent Philips**



Advance is launching a repositioning campaign that will serve to both acknowledge its long-standing position and history in the ballast industry while reflecting its affiliation to corporate parent, Philips. As part of the initiative, Advance will officially become known as Philips Lighting Electronics North America (N.A.) and will adopt Philips Advance as its product brand on all existing electronic and magnetic fluorescent and HID ballasts.

The move toward more consistent Philips branding is designed to facilitate a broader range of market opportunities and a simplification of its corporate affiliation in the marketplace, says the release.

"As a proud member of the Philips family, we are very excited to drive these measures as a means of acknowledging the critical role we play as a leading components supplier within Philips and as a way to promote the strength we can deliver through the combination of our two recognized brands," said

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CEO of Philips Lighting Electronics N.A., Pieter de Haan.

Beginning this year and continuing throughout next, Advance's repositioning activities will manifest themselves in the form of updated product packaging, collateral and commercial documentation reflecting the new organization and product brand names.

### Venture's global metal halide center

In an effort to become the world's leading education hub for metal halide (MH) lighting, the Venture Lighting Institute (VLI) has launched a strategic plan that involves an intensive ongoing educational series with leading industry professionals as guest lecturers.

"This is one of the ways we're expanding the VLI," said Amanda Foust, VLI's new director, adding the VLI features hands-on activities to assist with applying lighting concepts to real lighting applications.

The fall lineup includes: Fundamentals of Metal Halide; The Great Debate (focuses on MH versus fluorescent systems); and The Green Challenge (which is delivered by Mark Lien, director of Hubbell Lighting's Lighting Solutions Center in Greenville, S.C.).

Visit [www.thevli.com](http://www.thevli.com) for more information and to enrol.

### IEC publishes second edition wind turbine standard

Citing a rapid evolution in the technology, the IEC (International Electrotechnical Commission) has published the second edition of its standard for measuring the power quality of wind turbines.

Developed by IEC Technical Committee 88 (Wind turbines), IEC 61400-21 sets out the tests that can be used to compare wind turbines of different types/makes, as well as different electricity grid requirements. (The latter are complex, says IEC, as they typically consider the capability of a wind farm rather than that of a single wind turbine.)

Some 20 years ago, the common wind turbine was rated at about 50kW. Today, multi-MW wind turbines are concentrated on big wind farms. Modern wind farms may control the reactive power or voltage just like any other power plant, and may also control active power or frequency as long as wind conditions permit. Hence, connecting modern wind power plants to the grid presents very similar challenges to those of connecting any other power plant.

Different wind turbine types have different power quality characteristics. IEC 61400-21 provides a uniform methodology for ensuring consistency and accuracy in the presentation, testing and assessment of power quality characteristics of grid-connected wind turbines. The power quality characteristics described in the standard include: wind turbine specifications; voltage quality (emissions of flicker and harmonics); voltage drop response; power control (control of active and reactive power); grid protection; and reconnection time.

### W.A.C. promotes Responsible Lighting



To reflect its efforts to support energy-saving strategies, social progress and community involvement, W.A.C. Lighting has changed its logo and tagline to: Responsible Lighting. The company says it has been adding CFL and LED lighting products to its lineup, and working toward developing a sustainable lighting line with the most energy-efficient technology available.

"We are working hard to make a difference in the world by contributing to social progress with responsible manufacturing practices and energy-saving technology," affirmed Shelley Wang, the company's vice-president and general manager. **EB**

### Hubbell offers contractor sample pack

Hubbell Wiring Systems has extended its offer to electrical contractors for a free sample pack of HomeSelect products featuring the JLoad multimedia outlet and Quick Thread duplex receptacle.

The pack is to introduce you to the new line of Hubbell's HomeSelect products specifically manufactured for the residential market. It also includes switch, wallplate, additional voice/video components, and the HomeSelect product brochure.

To order one online, visit [www.homeselect.net](http://www.homeselect.net) and click on the Free Sample Pack picture.

Hubbell's JLoad outlet incorporates power, Cat. 5e, and coax in a single device no larger than a duplex receptacle. The Quick Thread receptacle provides you with a mechanical feature that permits a standard wallplate with screw to be pushed onto the receptacle without the use of a screwdriver.



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.

## Thomas & Betts



Nathalie Pilon

**Nathalie Pilon** has been named president of **Thomas & Betts Canada**, with responsibility for all facets of T&B's Canadian and Australian operations. The announcement was made by **Michael B. Kenney**—president, Thomas & Betts Canada, Australia & EMEA/Asia. A chartered accountant (CA) since 1990, Pilon occupied the position of senior manager, Professional Practice with KPMG, where she was employed for eight years prior to joining Thomas & Betts. In October 1999, she received the Young Achievers Award from the HEC Montréal network.



Amy Whitehead

**Amy Whitehead** has been promoted to sales manager, Industrial and Commercial Sector, for **Venture Lighting International**, announced **Ken Hawley**, vice-president of sales. Whitehead has worked as regional sales manager for four years. Previously, she worked as a manufacturer's consultant for process improvement and as an advisor for technology-intensive start-up companies. She will manage Venture's regional sales force and be responsible for sales growth in OEM and agent market channels, and the execution of new sales programs and initiatives.



Carol McGlogan

**Michael Gentile**, president of **Canlyte Inc.**, recently announced a couple of organizational changes. **Carol McGlogan** has been appointed vice-president, sales and marketing, where she is responsible for the overall sales activities for Canlyte across Canada. She will continue to lead the company's Corporate Marketing and Channel Distribution activities, as well as its Lighting Concept Centre. She has been with Canlyte for over 23 years, beginning her career in product marketing for Keene-Widelite, and later promoted to vice-president, marketing and distribution channels for Canlyte. McGlogan is also actively involved with Electro-Federation Canada



Gilles Leblanc

(EFC), having served as both chair of the Supply & Distribution Council in 2002 and EFC in 2006. Meantime, **Gilles Leblanc** has been appointed vice-president, operations, and has overall responsibility for all Canlyte manufacturing and operations across Canada, including the Customer Service Group. He has been with Canlyte for over 35 years, progressing from operations manager to director of manufacturing. Leblanc is currently an Advisory Council member to the S&D Council.



Nasir Hasan

**Cooper Industries (Electrical) Inc.** announced the appointment of **Nasir Hasan** to the position of senior sales representative to its **Cooper Lighting (Toronto) Factory Sales** team. Hasan has eight years of experience in technical sales, primarily in Oman and Dubai, and holds an Engineering degree and MBA from Aligarh University, India. Meantime, **Brenda Quies** has been appointed to senior specification representative with the Toronto sales team. She served most recently as a specification rep with Thomas



Brenda Quies

Lighting, and has over 20 years of lighting experience. She's also held positions with Nedco and Holophane, and is a board member of the Illuminating Engineering Society (Toronto Section).

**Allan Gibbins**, president of **Hubbell Canada LP**, recently announced the return of **Kevin Mallory** to Canada and his promotion to vice-president, where he is responsible for directing all activities for Hubbell Canada.

**Juan Macias** has been named general manager for **GE Digital Energy's** Protection & Control product line. Based in Markham, Ont., Macias is responsible for the growth strategy, global operations and new technology development for this product line, which includes the Multilin brand of products and services. He joined GE Consumer & Industrial's Electrical Distribution business in Plainville, Conn., in 2005, where he first served as product general manager for industrial breakers and controls. He then served as product general manager for electrical construction products. Before joining GE, Macias held a number of leadership roles at ABB in the areas of sales, marketing, and global and general management.



Pat Lawson

**Pat Lawson, LC**, has joined **The Medgar Lighting Group Inc.** as both a business partner and the firm's sales and marketing manager. She is a certified Lighting Professional by NCQLP and a member of IES (Toronto Chapter). Further to her past and present service as a lecturer, board member, president of IES (Toronto) and vice-president IES Canadian Region, she is currently serving as an executive of the IIDA (International Interior Design Association) committee. Also joining the team is **Jess Perucho, LC**,



Jess Perucho

as exterior lighting specialist. He has over 18 years of experience in the lighting industry—both in Asia and North America—and has previously worked with Philips Lighting (Philippines), Cooper Lighting in Canada, and the City of Toronto. Perucho is also a certified Lighting Professional by NCQLP and a member of IES (Golden Gate Chapter).

**Drew Molnar**, **Dimplex's** director of sales N.A., Professional Products Division, announced that **Robert Peloquin** has recently joined the company as Canadian sales manager, Professional Products Division, Dimplex North America, where he is responsible for **Chromalox** sales to the electrical distribution channel.

**The Black & Decker Corp.** has named **Michael D. Mangan** senior vice-president of the corporation and president of the Worldwide Power Tools and Accessories business. He reports to **Nolan D. Archibald**, chair and CEO. Mangan has served as senior vice-president and CFO for eight years; for the past two, he also had responsibility for the Fastening and Assembly Systems business. His old post will be filled by **Stephen F. Reeves**, who served as vice-president, global finance, for the Power Tools and Accessories business. **EB**



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by Schneider Electric



# Testing lighting controls in the classroom

Research demonstrates controls can help reduce a school's average power density to about half of ASHRAE 2004/2007

By Craig DiLouie

Education has become a major construction market in recent years. In 2005, about \$80 billion in spending made the K-12 and higher education markets the largest non-residential segment, which held in 2006 (\$85 billion) and 2007 (\$100 billion), and will likely hold in 2008-09.

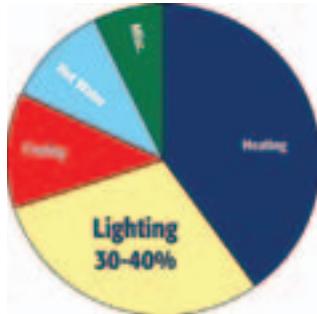
And it's a good thing, too. Each year, more students are using facilities that are getting increasingly older, and using them differently than previous generations.

Consider that, in the fall of 2006, nearly 50 million students began using more than 385,000 school buildings; the number attending public elementary and secondary schools had risen 24% since 1985. According to the U.S. Department of Energy, just a few years before (in 2003), more than 60% of all school floor space had been built before 1980—and 40% of that space had never been renovated.

And students are increasingly using whiteboards, computers, Internet and multimedia, making classroom design as sophisticated as high-tech corporate board rooms and conference spaces. To top it off, energy codes are becoming more restrictive on schools: a maximum power density of 1.6W/sf for classrooms is prescribed by ASHRAE 90.1-1999/2001, 1.4W/sf by ASHRAE 90.1-2004/2007, and 1.2W/sf by California's Title 24-2005.

So the public and private sectors are spending record funds on school construction, renovation and modernization. Demand for lighting quality and flexibility is increasing to keep up with new visual needs, and the amount of power available for lighting is decreasing. This implies that tough design choices must be made; because the average school building built today will last the next 40-50 years, these choices are critical.

The high-performance schools movement (promoted by organizations such as the Collaborative for High Performance Schools), provides guidance on how to achieve schools that have good lighting, indoor air quality, temperature and humidity and acoustics, and minimized energy consumption, resource allocation and costs.



**Figure 1**  
Lighting typically represents 30-40% of school utility costs.

Reducing energy costs is welcome to most schools; lighting alone typically devours 30-40% of school utility expenditures. But is lighting up to the task? Can today's lighting technology provide a quality visual environment with the kind of flexibility required in high-end conference rooms, while minimizing energy costs and meeting tough energy codes?

## Testing lighting controls in the classroom

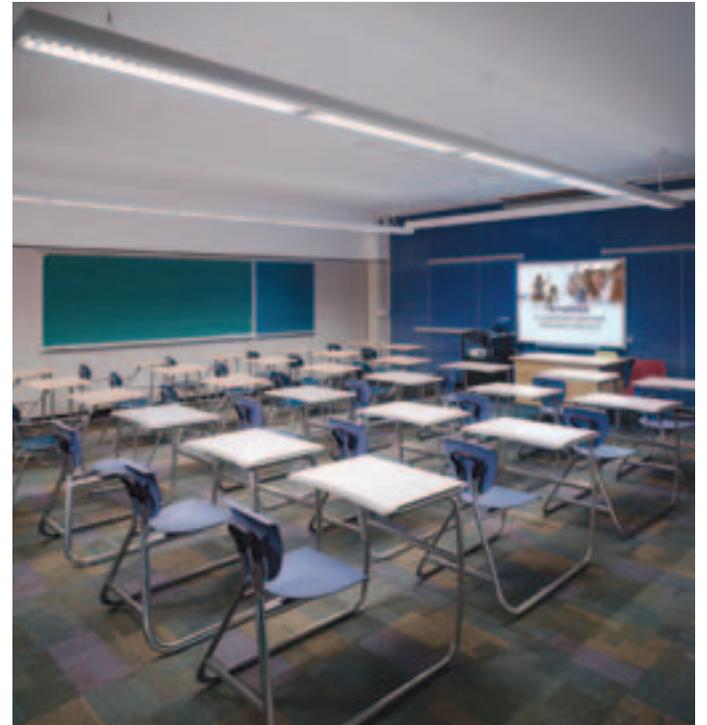
The New York State Energy Research and Development Authority (NYSERDA) took this one step further by basically asking: what's the best value in school lighting, with value being defined as the most appropriate lighting for the lowest energy cost?

NYSERDA sponsored a demonstration project featuring a new Integrated Classroom Lighting System (ICLS) created by Finelite Inc., a fixture manufacturer, installed as a retrofit into 28 existing classrooms at seven schools and universities. The Lighting Research Center (LRC) assessed teacher and student satisfaction.

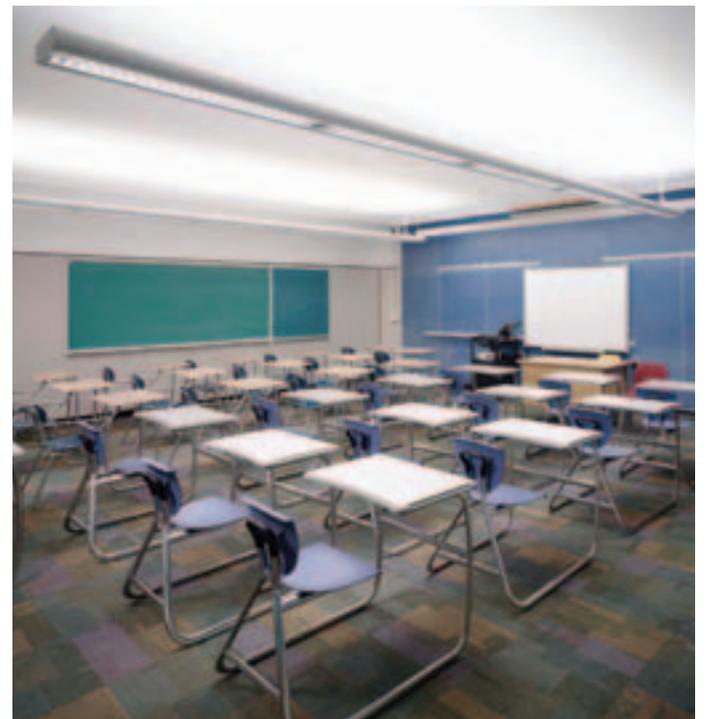
The result is a design template demonstrated to satisfy audio/visual needs and improve teacher and student satisfaction while reducing lighting power density to an average 0.73W/sf—nearly 50% less than ASHRAE 90.1-2004/2007. Although Finelite optimized the design into an engineered system integrating the company's light fixtures with state-of-the-art lighting control strategies, the template—when properly designed—can be treated as open source with suitable products from a range of manufacturers.

The design typically comprises two rows of direct/indirect pendants with a wall washer whiteboard fixture mounted on the main teacher board. The fixtures are placed parallel to the window, with the rows spaced 14-ft to 15 ft apart.

Each fixture uses three high-performance (3100-lumen) T8 lamps—with one inboard lamp providing the down-light component and two outboard lamps providing both



**Classroom AV Lights**  
Hunter High classroom with the lights on AV Mode.



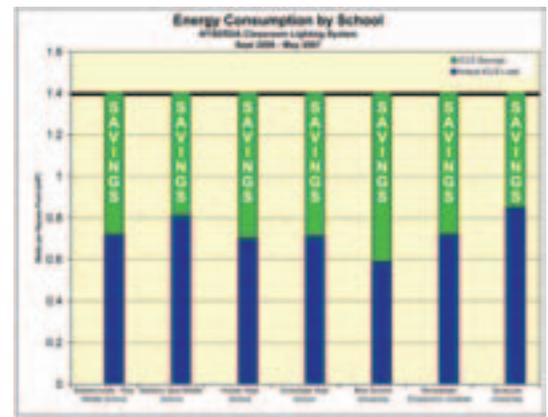
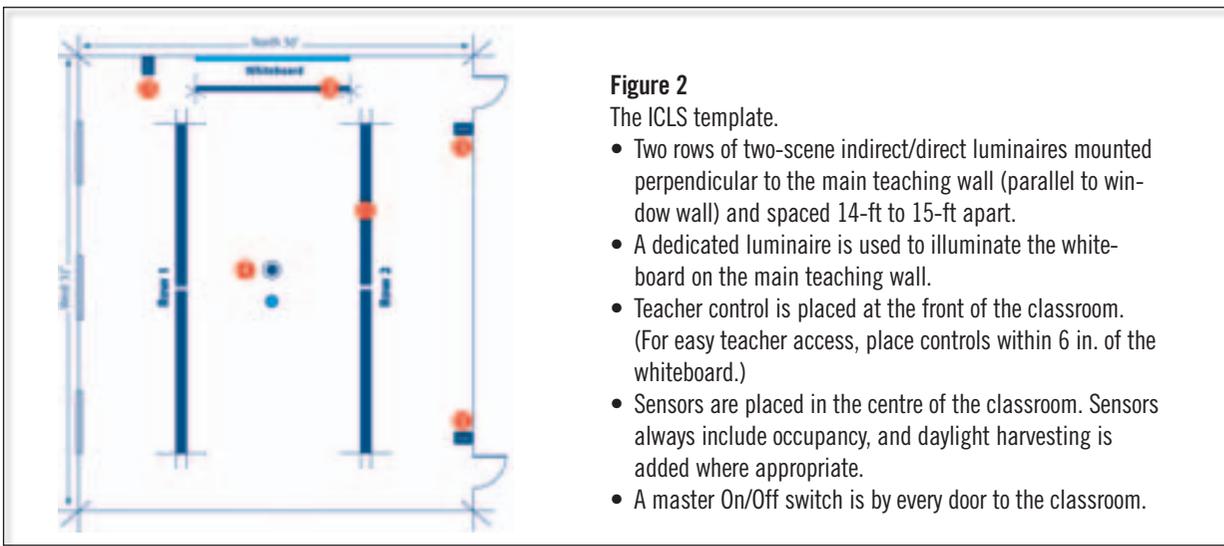
**Classroom Full Lights**  
Hunter High classroom with the lights on General Mode.

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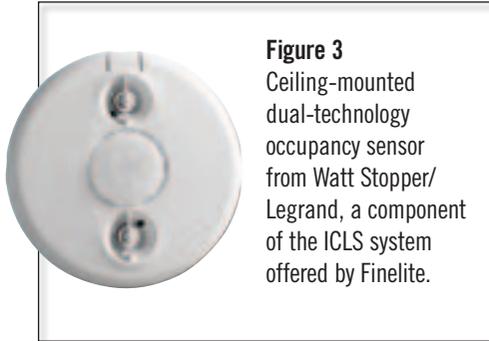
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**Figure 5**  
The combination of energy-efficient lighting and integrated controls reduce average lighting power density to an average 0.73W/sf.



uplight and downlight. The inboard lamp and outboard lamps are electrically separate so that they can be separately controlled.

The fixtures are integrated into a lighting and control system featuring a ceiling-mounted dual-technology occupancy sensor placed between the rows of pendants, a master switch at the door and a 'teacher control centre' located near the main teaching board, which features:

- A 'whiteboard' switch that turns the wall washing fixture mounted on the main teaching board On/Off.
- A 'General/AV Mode' enabling the teacher to switch between General Mode (downlight Off, uplight/downlight On) and A/V and Reading Mode (downlight On, uplight/downlight Off).
- A 'Quiet Time' switch that overrides the occupancy sensor for one hour, keeping the light on during long periods of occupied non-movement, such as standardized testing.

Teachers were also able to access another option, A/V Dimming Mode, which allowed them to turn on and then dim the inboard

lamp, providing the downlight component. This required a dimmable ballast. All controls were connected via a Cat 5 plenum-rated low-voltage line with plug-and-play connections.

Optionally, a photosensor can be added, adjusting light output based on daylight availability.

Watt Stopper/Legrand provided off-the-shelf power and auxiliary relay packs to accomplish the fixture switching, the occupancy sensors with the customized Quiet Time feature, and switches for the teacher control station (through its sister company Pass & Seymour/Legrand).

#### The results?

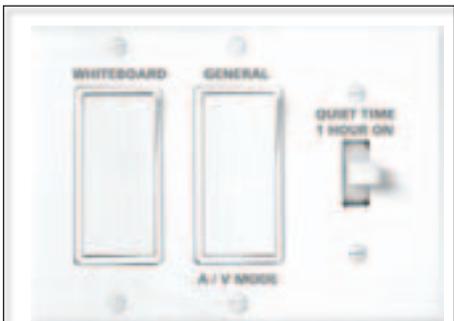
Because all three lamps cannot be On at the same time, the maximum lighting power density is capped at about 0.8W/sf. The switching controls reduced average lighting power density to 0.73W/sf, about half of ASHRAE 2004/2007 and about 40% less than Title 24. The LRC found that teachers generally preferred ICLS to the previous lighting system, and that students also rated it favourably.

The system was installed for \$1.83-\$2.29/sf (options such as daylight switching and a third fixture row to increase uniformity add to the cost). The LRC found that installers generally characterized the system as "easy to install", and the design was deemed suitable for both new construction and retrofit.

(Many of the research findings of this study are being incorporated into best practice developed by the Collaborative as well as the U.S. Green Building Council's LEED for Schools Green Building Rating System, according to LRC.)

Direct/indirect lighting and separately controlled fixtures for general and main teaching board lighting are considered best practices by the Collaborative for High Performance Schools. Optimizing this approach as a system with integrated controls maximizes its utility for A/V functions while minimizing energy consumption. **EB**

Craig DiLouie is principal of ZING Communications Inc. and education director for the Lighting Controls Association (LCA). He is also a regular contributor to Electrical Business.



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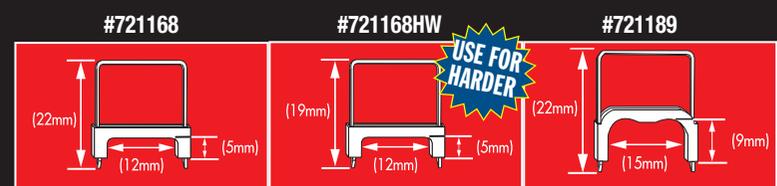


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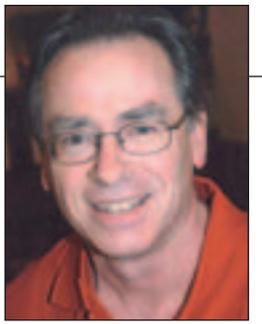
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# Say a prayer for our linemen



By Dave Smith

*This month's column started off entirely differently a couple of weeks ago, but then a friend of mine was burned in an accident and I felt compelled to tell a new story.*

**C**urt had just left his local lineman job for a dream job in a small mountain city. He and Danielle, his wife, love the mountains, and it looked like a great place to raise two young boys. He was there three weeks when the accident happened.

Here is Danielle's Facebook posting:

Curt and another gentleman were changing out a line when everything went funny. The two men were electrocuted with 14.4kV and are a miracle to be here with us today. They were blessed to have a third co-worker who did

all the right things and freed them from the bucket truck and got help on the way. He will never know how important he is to both families.

I received a call that Curt had been electrocuted and taken to the hospital. When I visited him, he was terribly scared and in incredible pain. His gloves were burned onto his hands and his cell phone burned into his leg. There are also severe burns on his back where it made contact with the harness. While I was with him, hospital staff struggled to find a vein for an IV. They removed his clothing and delicately cut off the gloves. Once he was stable, he and the other man were flown to a burn centre.

Thankfully, the company arranged a driver for me so I could be with Curt at the burn centre. When I arrived, Curt had just gotten his central IV line and was being prepped for surgery.

I was able to see him briefly, but he was very medicated; his hands were so badly burned that they had swollen to an inhuman size.

Afterward, the surgeon met with the family to explain the procedure and concerns regarding his injury. During the procedure, doctors made incisions on the insides of Curt's arms (from his fingers to his elbows), two smaller ones on the backs of his arms, and two incisions on the backs of his hands—all of which were left open to relieve the pressure from swelling. They treated all the burns as best they could at the time, and it was now a waiting game for whatever came next.

Remember, electricity burns you from the inside out, so ongoing internal deterioration is expected. Electricity breaks down muscle in your body, which the kidneys will have to process. This is an onerous task for them, which is why Curt was pumped full with an IV fluid (plus catheter) to remove the toxins. The kidneys can be damaged—they could even fail—raising the possibility of dialysis in Curt's future.

I was able to see Curt again after his surgery in the middle of the night and, all things considered, he looked well. He had colour back in his face and was resting peacefully. And so begins his long journey of recovery.

The danger is so enormous in electrical utility work that FR PPE provides little protection. Instead, protection comes from insulating covers and live line techniques, procedures and work methods—which every utility has in abundance.

Curt would have been wearing 25-cal clothing, rubber and leather gloves, but these are completely overwhelmed by a 100+cal flash, which can easily develop in a high-voltage line.

This was a terrible occurrence, making this a difficult column to write. Curt is unlikely to die, but it will take a miracle for him to keep both his hands. He's such a good guy: friend, father, husband, worker, co-worker, athlete, community volunteer... just the kind of guy you want in your life.

When you hear "Every accident can be prevented", it is said as a reminder, not a reality. And reality tells us that the best we can do is try to eliminate as many accident-causing variables that we possibly can.

But when you work with your hands, things can happen.

There are slips, mistakes, errors in judgement, etc. When we start in the electrical trades, no one says, "Welcome to the bomb squad", even though we're often one slip away from an explosive disaster. High voltages and high currents are brutal, lethal substances that are just one slip away from detonation.

I write these columns to help people avoid accidents. Carry this story into your safety discussions and think about the dangers to which you expose your own hands, and consider how you protect them.

As you plan your work, remember Curt's plea to his rescuers: "I have a wife and two kids... *tell me I'm okay!*".

And every time you see linemen working live, say a silent prayer, as they're risking their lives so the rest of us can watch TV.

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

Dave Smith is president of Canada Training Group and has been providing consulting services to industry since 1980. At [www.canada-training-group.ca](http://www.canada-training-group.ca) you'll find stories like this one; feel free to use this information to support your own safety program. Dave can be reached at [davesmith@canada-training-group.ca](mailto:davesmith@canada-training-group.ca).

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# Keeping the streetlights on in New Brunswick

The NB Power Group (NB Power) of New Brunswick is an electrical utility with 2500 employees, 290,000 direct and indirect customers, 17 generating stations, 20,284 km of distribution lines and more than 6700 km of transmission lines. NB Power's transmission company has connections for energy supply to Prince Edward Island, Nova Scotia and Maine, along with interconnections to Quebec. Comprising four operating companies, NB Power—through its distribution company, Disco—is responsible for serving the street and area lighting needs of residential and commercial customers throughout the province.

Disco is in charge of provisioning and maintaining the 67,500 streetlights rented to 23,000 commercial customers and 38,100 dusk-to-dawn lights to some of its 267,000 residential customers across New Brunswick. 86% of the company-owned street and area lights are 100W high-pressure sodium (HPS).

Serving the needs of residential customers distributed throughout the 71,450 km<sup>2</sup> area of New Brunswick is a challenge; doing so in a cost-effective and reliable way is NB Power's commitment.

Last year, NB Power embarked on changing its lamps from HPS cycling lamps with five-year life spans to non-cycling lamps with an extended lamp life of 30,000 hours (representing a 25% increase over standard high-pressure sodium lamp life). This move would eliminate one year from Disco's maintenance cycle while making it easier to identify lamps requiring replacement. With this change, NB Power expected to save half a million dollars, lower its inventory requirements and improve service to New Brunswickers.

Charged with overall responsibility for procuring, installing and maintaining these lights, Tim Gillies, manager, area lighting for NB Power, is always looking for ways to optimize the lighting solution and reduce costs. He realized that moving to a 30,000-hour non-cycling lamp would extend the maintenance cycle and improve Disco's overall ability to service the street lamps.

## The past and current situation

Disco's group re-lamping and refurbishment program manages the maintenance program for the 105,600 HPS lamps, with a goal of replacing lamps before they reach end of life. Disco also maintains a refurbishment program to keep costs down, as the cost of refurbishment is less than 65% of the cost of new lights. Through its Planned Maintenance Program, Disco refurbishes about 2000 lights per year, with a trained employee completing an average of 8-10 lights per day.

Through Planned Maintenance, Disco is able to prevent damage to other expensive lamp components and minimize the necessity of removing the fixture from the pole, as this increases maintenance costs. According to Gillies, "Approximately 15% to 20% of fixture removals result in irreparable damage caused by improper handling and storage. Our goal is to keep this kind of high-touch maintenance to a minimum".

Prior to the relamping initiative, Disco had been using a cycling lamp with a shorter maintenance cycle (24,000 hours). Not only were the lamps shorter lived, they were also problematic to maintain. When the lamps neared their typical end-of-life, cycling sometimes occurred; they can continue to do this until the electronics are damaged. This On/Off flashing can make it more difficult for maintenance crews to identify lamps needing replacement.

Through a tendering process, GE was selected to supply the street lighting solution for NB Power for 2007. In January 2007, Disco began implementing Ecolux non-cycling HPS lamps, which promise to operate up to one year longer than the previous lighting solution.

"With non-cycling lamps, we can identify when a lamp goes out," explains Gillies. "Having this clear visual indicator that service is required may reduce our unplanned maintenance budget significantly," adding that the move to the non-cycling lamps has extended a heretofore five-year maintenance plan to a six years. "We now have a very detailed six-year plan, broken down by city, town, village and street. Being able to extend our maintenance cycle by one year means we have an extra year to execute our maintenance, which means our level of service can be that much higher." **EB**

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# Lights up, music on

## A look at lighting a music megastore

By Jack Kohane

Photos by Sandra Strangemore

When it comes to recommending the best instrument for musicians, these 'Cosmonauts' have the right stuff. That's the nickname, by the way, given to the staff of the gargantuan new guitar wonderland, Cosmo Music Superstore, located in Richmond Hill, Ont. In fact, there are more than 700 guitars to choose from (electric and acoustic), bass guitars and banjos—all draping the 20-ft high walls—as well as thousands of other instruments on display, including grand pianos, drum kits, brass and woodwinds. There's also a recording studio, 39 lesson studios, and a 250-seat, 3000-sf theatre auditorium in what is arguably one of the world's largest musical retail spaces.

Cosmo Music has struck a long chord with a customer base that's grown steadily ever since its founding in 1968 as a small, family-run music shop by the Heberts, who still conduct and orchestrate the business today (more plays on words follow).

"More space to supply people with the tools and the means to make music... that is what drives us at Cosmo to be a leader in the music industry," says Cosmo's vice-president (and guitarist extraordinaire), Rudi Brouwers. "What we have here is something for everybody in the music community, and we hope a facility like this will inspire people to take up an instrument."

Moving into their new home last May, the Cosmo concept was to combine what had previously been divided between two locations. "The floor plan of the superstore was in the planning stages for the past 10 years, and the decision was made five years ago to purchase this four-acre location and do something different from what any other music retailer has done," Brouwers remarks, his voice a rhythmic bounce. "We wanted to make a big impact. We had a wish list of ideas if we were able to accomplish something like this, and now we are doing it."

### Getting professionals in on the lighting

Though the Cosmonauts—which comprise a regular staff of about 100 people and nearly 60 instructors—know all the licks and chops of their trade, they preferred not to fret over the facility's complex lighting requirements. The Cosmo team used its own experience in sketching out the new store's optimum traffic flow patterns, but decided to enlist the expertise of retail store designer Peter Tillmann of Spinning Wheel Design (who also worked on the Hockey Hall of Fame and the Canadian Music Hall of Fame) to map out an innovative look and lighting blueprint to complement the store's avant-garde décor and ambiance.

Understanding that a store's lighting can have as much to do with setting the stage for a retail environment as the wares on the shelves, Brouwers points out that, "Proper lighting can sell merchandise as effectively as any other store design element, so we wanted to partner with an installer with a keen eye for detail."

Ultimately, it was Dial One Wolfedale Electric Ltd.—a commercial/industrial electrical contractor with offices in Mississauga and London, Ontario—that was entrusted with the task of illuminating Cosmo.

"We were thrilled to have the opportunity to again work with Urbacon Buildings Group Corp. [the general contractor]," says Norm Bilous, Wolfedale's marketing director. "We've done other projects of a similar scale. We relish the opportunity to take on the architectural and structural challenges in this size of building."

Indeed, Cosmo's open-ceiling concept, two-storey architecture did offer up some tricky hurdles for Wolfedale's team. "There was to be no visible wiring, no cabling seen running along the ceiling, and the ballasts

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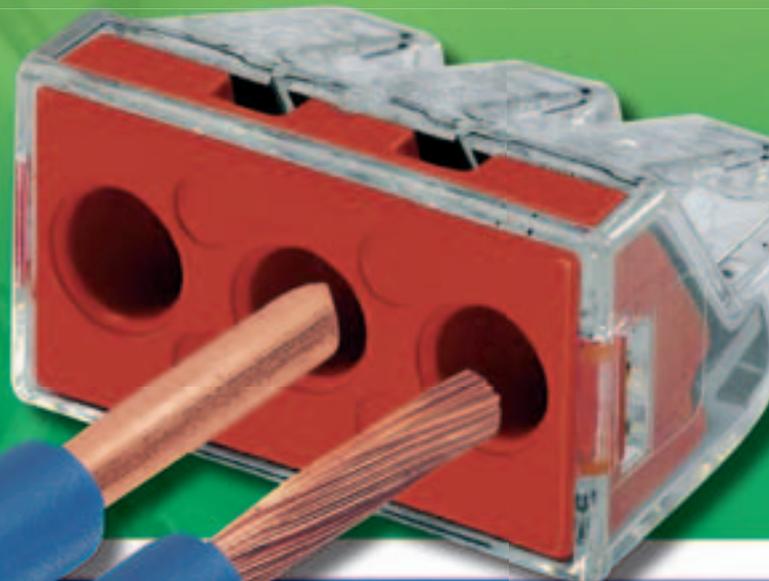




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had to be concealed, keeping all conduits to an absolute minimum," says Sergio Cappuccitti, Wolfedale's project manager. "Most of the 120V wiring was run under the slab and up through the walls to cut down on junction boxes." And laser levels were used to ensure proper and exact locations and electrical fastenings.

Critical to the superstore's 'eye candy' appeal is the ground-level atrium, bathed by the natural light penetrating through the floor-to-ceiling windows. Through this behemoth bank of glass walls, visitors can instantly get a full view of the store's departments on both the main and upper levels.

Without proper lighting, your customer will not be drawn to what your store sells, emphasizes Brouwers: "The key is not lots of lights but the effective usage of the correct ones that are most pleasing and comfortable for customers and staff".

Determining the right lighting for Cosmo's corporate offices, instrument instruction rooms, and the music departments (each housed in its own boutique store along a virtual street in the lobby) wasn't a quick and easy strum. According to Cappuccitti, it required five months of painstaking planning and preparation for the designers and Wolfedale to compose workable solutions unique to each space in the store.

Those lighting solutions included:

- Type A Visioneering P3GX2X4-3L-D1 3X6/18-NK-332IST8 2x4 parabolic fixtures, selected for their clean appearance (no exposed fasteners) and shallow profile (only 5-in. deep);
- Type H Acculite ALX400MH-TT-PR22-CL-HC6C high-bay fixtures, specifically designed for large spaces;
- Type LF10 series S124-DI theatre suspension fixtures from PMC Lighting Inc.;
- Type LF3 track lighting from W.A.C lighting single-circuit H track; and
- Type LF1A Juno lighting CV6-32 347V 800C-WH HB-26 8-in. compact fluorescent potlight.

"In addition, we installed flood lighting on the feature walls, wall sconces, an addressable fire alarm system, as well as exterior lighting that's controlled by two time zones—before 11 a.m. and after 11 p.m.—to comply with city by-laws," notes Cappuccitti.

'Big' is the theme of Cosmo's one-of-a-kind superstore. "The place is huge and, for music lovers, it's like walking into Santa's workshop... there are just *all these things* to play with," smiles Bilous. "It's also the store's sheer volume of space and inventory that are garnering much of the awestruck accolades by visitors."

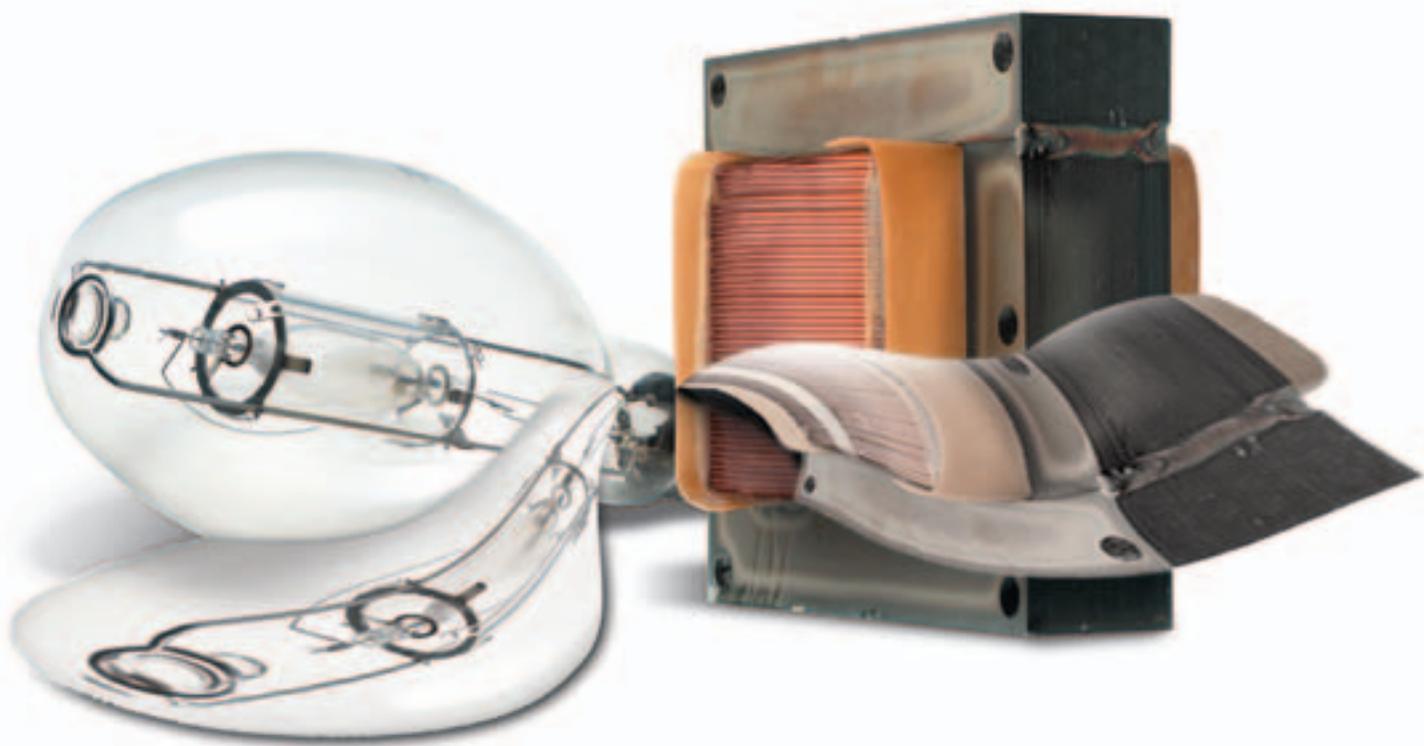
Brouwers says bringing the superstore through the rigors of conception to concrete reality proved a valuable learning experience for all involved. Despite all the ups and downs encountered through this lengthy process, he believes everyone is satisfied with the results. "There were some good times and some really hard times," he concedes. "But I think we all knew in the end it was going to be an extraordinary place." 

Jack Kohane is a freelance writer, and regularly contributes to Electrical Business.



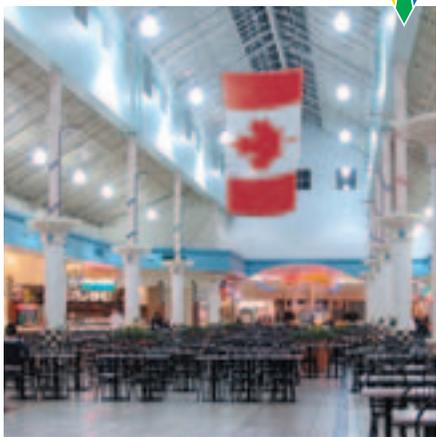
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■ **Ridgid's new X3 hammer drill/driver (D/D), R861150**, claims to be the ultimate in cordless power. With 18V and 565 in./lb of torque, the X3 boasts 0-450/0-1600 rpm (no load) and 0-7200/0-25,600 bpm (no load). Its compact design and lightweight size give it the best performance-to-size/weight ratio in the industry, boasts Ridgid. The 1/2-in. single-sleeve chuck holds bits secure, and a mode selector for toggling between driving, drilling or hammering allows for quick transitions without changing the clutch setting. Dual LED lights help illuminate your work. The X3 hammer D/D is covered by Ridgid's Lifetime Service Agreement that, according to the company, offers the industry's only free lifetime coverage (includes parts, batteries and service). Visit [www.ridgid.com](http://www.ridgid.com).



■ **Makita's 18V LXT Li-ion BTD141 cordless impact driver** is set to become, the company boasts, the future industry standard, with a four-pole maximum torque motor with variable speed delivering 1330 in./lb of torque, 3200 ipm (impacts per minute) and 2300 rpm. A one-touch chuck makes changing bits on the fly easy, and a length of 5-3/4 in. and weight of 3.4 lb (with battery) provides a good power-to-weight ratio. The 18V LXT technology and Rapid Optimum Charger system gives you two-and-a-half times more battery cycles than Ni-Cad batteries. Built-in LEDs illuminate your work, and charging is no problem: 30 minutes is all it takes with Makita's 3.0Ah battery. The driver comes with two 18V batteries, 30-minute Rapid Optimum Charger and case. Visit [www.makitatools.com](http://www.makitatools.com).



■ **Ryobi's 18V drill kit (P814)** includes a P250 AutoShift drill and bit, P113 dual chemistry charger, P104 Li-ion battery, P103 compact Li-ion battery, tool bag and operator manual. With AutoShift, the drill always starts in high speed, and the Speed indicator lights up; the drill will down-shift automatically when it senses a high-torque application, at which point the Power indicator lights up. When the application is complete, the drill resets to Speed mode. The 1/2-in. heavy-duty unit boasts 0-450/0-1450 rpm (no load speed) at a weight of 3.75 lb. The charger works on both 18V Li-ion or Ni-Cad batteries (dual chemistry charges all Ryobi One+ batteries in one hour or less), with a diagnostic readout providing battery charge status. The Li-ion battery sports an on-board gauge so you can 'Check your Charge'. Visit [www.ryobitools.com](http://www.ryobitools.com).

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Just for CLASS 2 LOW VOLTAGE WIRING

Use Arlington's non-metallic mounting brackets to install Class 2 wiring – and to seat wall plates flush with the mounting surface.

In addition to our single gang LV1 – We now have two, three and four-gang styles and the round LVR1!

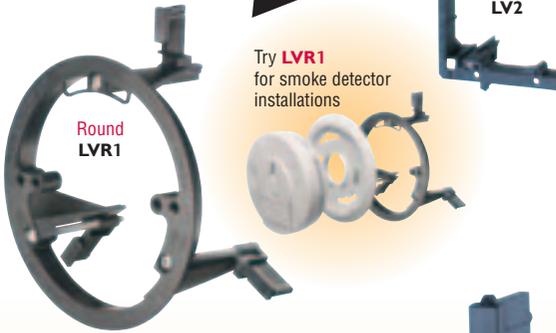
For existing construction, our low-voltage mounting brackets...

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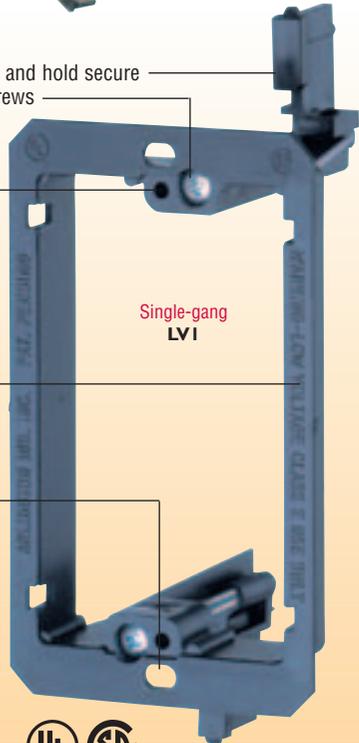


"Wings" flip up and hold secure when Mounting Screws are tightened

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NEW! Single and two-gang entrance plates with removable lower plates – Easy access to installed cable.



CER2

CER1 black not shown



CER2BL

Horizontal CEDH1

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- Best way to run cable where it's needed
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CED1BL



CE2BL

NEW! Horizontal single-gang hood delivers even more installation versatility.

Available in black and white.



CEDH1 black not shown



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■ **Bosch Power Tools and Accessories'** has unveiled its first mid-range **Li-ion-powered 18V and 14.4V** cordless drill/drivers (D/D) and hammer D/Ds. Combining the Brute Tough drill design and Litheon battery system, the new platforms yield unibody motor construction, all-metal geartrain and Durashield housing (which can withstand falls from 10 ft), and include a 25+1 clutch and 1/2-in. metal chuck. The Brute Tough line features high speed and run-time for spade bit drilling, hole saw cutting and large fastener driving, while the Compact Tough lineup (for users who desire comfort) features lightweight and maneuverable performance, and a 20-position clutch. The Flexible Power System's patented battery technology promises 35% more run-time than the competition, and two times more recharge cycles over the life of the battery; the FatPack option delivers maximum run-time, while the SlimPack option offers less weight. The Brute Tough lineup includes: 18V hammer D/D; 14.4V hammer D/D; 18V D/D; and 14.4V D/D. Meantime, the Compact Tough lineup includes the 18V D/D and 14.4V D/D. Visit [www.boschtools.com](http://www.boschtools.com).



■ **Hilti's WSR 36-A cordless reciprocating saw** can be used for tough applications commonly reserved for a corded recip, such as cutting pipe, strut, threaded rod, steel studs, other steel objects, plastics, composites, lumber, plywood, wood beams, and wood with nails. It features a Hilti 36V, 3.3Ah CPC Li-ion battery, which can be used interchangeably with other Hilti products and avoids the hassle of cords or generators. Hilti's AVR technology (active vibration reduction) is incorporated within the saw, reducing vibration by up to two thirds and improving comfort over long periods of use. Control when cutting overhead and in difficult-to-reach places is ideal, says Hilti, thanks to the ergonomically designed operating controls and comfortable handling. Visit [www.ca.hilti.com](http://www.ca.hilti.com).

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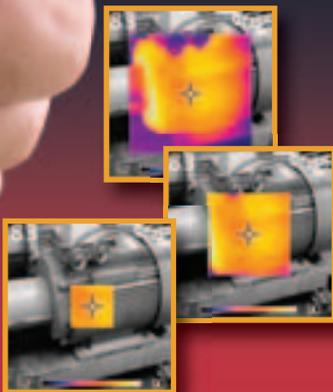
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FLIR i60



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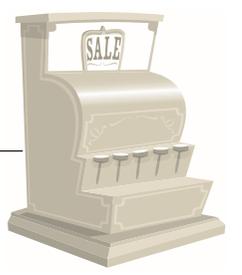


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■ **Milwaukee** has introduced the **2610 drill/driver (D/D)** to its M18 cordless family. Powered by an 18V XC Li-ion battery, the 2610 is driven by Milwaukee's four-pole frameless motor that generates 650 in./lb of torque and yields a high-speed rpm of 0-1800, a low-speed rpm of 0-450, and 0-28,000 bpm (blows per minute). At 9-1/4-in. long and weighing 5.3 lb, Milwaukee claims the 2610 is the most compact high-performance D/D available, which not only allows you to fit into tight spaces, but also minimizes fatigue. Incorporating a 12-in. single-sleeve ratcheting metal chuck with carbide jaws for grip, the 2610 also has a built-in LED that illuminates the work surface, a battery 'fuel' gauge displaying remaining run-time, variable speed trigger, and belt clip. The 2610 comes with two batteries, a charger and case, and is backed by a five-year, 2000-charge warranty. Visit [www.milwaukeetool.com](http://www.milwaukeetool.com).



By Oliver Post



# Training is not optional

Training is certainly on the minds of everyone in business these days. Every industry is changing just a bit faster than it used to, and the proliferation of products and technologies that are the result mean that everyone must pay special attention to the products they sell and use.

Of course, electrical distributors are no different. A successful distributor can no longer leave training as an afterthought. A well-trained staff is an important competitive advantage; organizations with a strong training culture are more successful, and are more pleasant to both work for and do business with.

But how much training is appropriate, and which training should you focus on? These are questions that dog the distribution organization manager.

## Copy success. Develop a plan.

Manufacturer reps can usually name the top training-focused organizations off the top of their heads, so ask them what those organizations do to make it work.

And while your organization may not have the resources to dedicate as much time or space to training as some of the larger outfits, it doesn't preclude you from doing many of the important things—albeit on a smaller scale.

Above all, you need a plan.

First, you need to decide what is important for your staff to learn and how that information should be delivered. You should balance product line training among the fastest-moving product categories and those you identify as emerging products.

You need to make it part of the regular work schedule. While it may seem tough to plan two to four hours every week for training, it is much more manageable when you think of it as a combination of self-study—taking the time to stay abreast of a suppliers' offerings—and ongoing online

training over lunch, breaks or maybe at home... and perhaps one product line clinic a month.

You never want the training plan (and it is a plan) to seem like it's getting in the way of core job functions. When the planned time commitment is too great or too inflexible, it will get sidelined in busy times and may never get back on track.

## Adapting to learning styles

In every organization you'll find avid learners, reluctant learners and outright resistant staff.

To develop a training culture, you need a plan for dealing with all three. The avid learners are easy to insert into training, but you still need to provide them a guide for learning that will reflect your company's strategies.

There is no point in them spending all their time learning about product lines or technologies that you don't offer simply because they think they're cool. And, in a clinic setting, it is also very important not to let them monopolize a trainer's time, as the less-confident members of your staff will not end up with the training experience they need.

Reluctant learners may be simply less confident about what they know, or they may actually not be motivated to learn. Regardless, when you provide them with the same strategy-based training plan and make them understand the role it plays in their success with the company—not to mention in their own personal growth—they will follow.

You can't expect them to join the avid learner group overnight (some never will), but when the training to which you subject them has value, it will eventually win them over.

Staff members that are overtly resistant to training can be a real problem; cynicism is contagious, especially when it comes for a veteran employee. You know the one: "I'm 30 years in the business. You can't teach me anything new. Why should I learn this stuff? I'm retiring in five years anyway".

As a manager or owner, it is unwise to leave this situation unchecked, as it can undo your entire training strategy. You need to understand the root of the attitude and do what you can to get these members of your team onside with the training plan. What you may find is that the cause of their attitude is they feel they are being subjected to the same training as the rookies on staff, and not being treated in accordance with their significant experience.

In a word, they do not feel that they are getting the respect they deserve. So give it to them.

Find out what they think the training strategy for them should employ. Maybe those suggestions should be rolled out to the entire team's training. When these reluctant learners do, in fact, have a great deal of experience, you would be a fool not to capitalize on it. In some cases, it may even be possible to have them work with you or a trainer to lead some clinics. You need to have realistic expectations on that front, but when you turn a resistant learner into a half-decent coach or trainer, it will do wonders for your entire organization.

Ultimately, an effective training plan should help your staff feel they are part of a team, that they are working toward a common goal, and are benefiting personally and professionally.

There are plenty of resources out there to make it happen and there is no reason any distributor—large or small—can't put a training plan together that accomplishes this goal. 

• **Feedback:** What was your most, or least, effective training initiative? Why did it succeed or fail? E-mail me at [oliver.post@hotmail.com](mailto:oliver.post@hotmail.com).

## The Rookie Roster: What should they know?

Developing an effective training culture starts at the ground level. For new staff members, or those new to the order desk or counter, there are some important places to start. Look for courses (online or clinics) or self-study, or use an internal mentoring method to get them up to speed.

### Job skills to focus on

- Verbal communication skills, effective letters and e-mails.
- Interpreting drawings, schematics and diagrams that relate to components and materials distributed by your organization.
- Understanding the supply chain and who does what at your organization, and those you deal with.
- Basic knowledge of inventory record-keeping, accounting, management and control.

### Basic electrical tech

- Understanding Ohm's Law.
- Identifying components and test equipment.
- Explaining the operation and use of motors, generators and transformers.
- Referring effectively to the CE Code Handbook.

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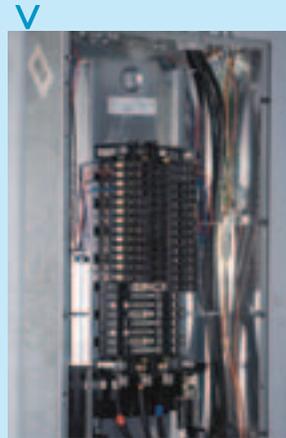


# Anatomy of a residential distribution system

By David Herres



This three-phase commercial distribution panel has no main breaker because there is a main disconnect upstream from the box. With bolt-on breakers and inner and out covers, it is a quality product. There are no knockouts; holes are made as needed.



The meter is usually placed outdoors in a location agreeable to the utility. It should be 1730 mm ( $\pm$  100 mm) above grade and well secured to the wall.



When you put your hand on the metal casing of an appliance or tool in the house, you are touching the secondary centre tap of this final transformer—another reason why grounding is so important.

Most North American residences receive electricity from a unified grid; 60Hz three-phase power at various voltages is stepped down at local substations and, again, at pole-mounted or ground-level transformers. Each transformer feeds single-phase nominal 240V or 230V to one or more dwellings.

Large estates occasionally receive three-phase power or higher voltage, in which case there is a customer-owned transformer, but a three-wire, two-voltage setup is the norm. The secondary provides two hot legs from a grounded neutral centre tap. The local utility determines the service point, which is the boundary between its equipment and that of the customer. For an aerial service, this change in venue is often where the aerial triplex is spliced to the customer-owned service entrance cable. The splice is made by the utility just upstream from the weatherhead.

In the case of an underground lateral, the service point is often at the input lugs of the meter socket, unless there is an upstream main disconnect. The reason is that the service lateral is usually a continuous set of conductors right from the transformer, so they are under utility control.

It's important to realize two facts about the service entrance conductors, the first of which is that they are unfused. The only overcurrent protection is in the primary, so that they are protected at many times their actual ampacity. Secondly, in the case of a line-to-line or line-to-ground short circuit, the available fault current is very high. The circuit obeys Ohm's law; as impedance approaches zero, current approaches infinity. A huge amount of energy may be applied to whatever mass of metal bridges the two hot legs or one leg and neutral. The result is an enormous arc blast that can seriously injure or kill anyone nearby.

Since these conductors are not protected by the usual overcurrent device, other means are required. Concentric cable, embodying a woven grounded neutral surrounding the two well-insulated conductors, provides fairly substantial protection. Even better is enclosing the service conductors in metal raceway screwed into a threaded hub at any enclosure, such as the meter socket.

The meter socket is usually mounted on the outside wall at eye level for ease of reading. There are a number of strategies for bringing the service entrance conductors into the residence. Generally, the best-looking job is also the safest. Any good solution involves limiting the length of this cable so that there is less exposure to damage. Where possible, metal raceway is the way to go, although approved PVC offers an acceptable level of protection and many electricians swear by it, as it's more economical.

Where conditions allow, the best solution for bringing the service entrance conductors into the house is to stub them through a back knockout in the meter socket. The metal raceway will be slightly longer than the thickness of the wall allowing for a grounding bushing. Often the service entrance panel can be placed in back-to-back configuration with the meter socket. Otherwise, we're looking at an LB and additional piping.

Codes call for the main disconnect to be located at the point of entry of the service entrance conductors. The purpose of this requirement is to minimize the amount of unfused and high available current wiring within the dwelling. When the distribution panel has to be some distance away, a separate main disconnect with a main bonding jumper should be located where the service entrance conductors come in. From there, run four wires to the distribution panel, including an equipment-grounding conductor.

Sometimes even this is not possible because of a variety of conditions, such as presence of a heating fuel tank. In that case, an outdoor main disconnect is a possibility; 12 ft has been mentioned as a rule of thumb for allowable unfused service entrance cable inside, but the best approach is to discuss the matter in advance with the local electrical inspector.

Options discussed under CEC 6-208 include putting a fused switch or circuit breaker where you enter the building, or keep the raceway or cables on the outside of the building and enter next to the panel—or enclose the raceway in 50 mm of concrete.

At the entrance panel a number of issues are critical. In residential applications, there must be a fused disconnect switch

or a circuit breaker. Assuming there is no separate upstream main disconnect, the panel must be approved as suitable for service equipment. The main breaker is the main disconnect and its rating, printed on the end of the switch handle, is the rating of the entire installation. Service entrance conductors and ground electrode conductors are sized accordingly, from tables in applicable codes.

## Aluminum runs

When the service entrance conductors run any appreciable distance, they are usually of aluminum, as the cost of copper, for most jobs, is prohibitive. The problem with aluminum is that its oxide is not conductive and, forming at terminations, it starts to make a little heat, which accelerates the formation of more oxide and soon you have a series arcing fault. With the amount of current usually seen at a service termination, this amount of heat is actually able to ignite combustible material, such as a wooden wall on the outside of the enclosure.

Thankfully, the problem is preventable. Simply apply corrosion inhibitor—a gray or black paste—to the stripped end of the conductor before inserting it into the lug. Follow directions on the corrosion inhibitor container. This involves preparing the conductor end by wire brushing it vigorously to remove any oxide, then torquing the lugs very tight. This serves to flatten the conductor ends making them conform to the lug geometry so as to acquire greater contact area. High amperage lugs have torque ratings included with manufacturer's instructions.

## Homeowner complaints

A frequent homeowner complaint is that lights are flickering. The electrician has to troubleshoot the system and make repairs. The procedure is to remove the distribution panel cover and gently wiggle each breaker, especially the main, to see whether the flickering occurs. This is usually the site of the problem. A frying sound will be heard and light seen from the active arc behind the breaker. Removing the breaker you will see the contacts burnt and eroded and so, obviously, the breaker has to be replaced. The replacement should be the exact make and model. Some other brands may appear to fit but the metal alloy could be different causing a similar problem to arise months or years later.

Besides damage to the breaker, the busbar can be oxidized or pitted. It may be possible to polish it up with Scotchpad. Here a small amount of corrosion inhibitor is good. Beware of using any kind of sandpaper lest abrasive particles embed in the metal and cause local hot spots.

When damage to the busbar is more than very superficial, most electricians will put in a new distribution panel. But if the box is not too old and appears in otherwise good shape, a much less costly alternative is to purchase a new busbar kit based on make and serial number of the distribution panel. This remedy is also a big labour saver, as you don't have to pull the branch circuits, feeders and service entrance conductors out through knockouts, which can nick the wires.

One of the main causes for the problem outlined above is running the box with the cover removed. Besides containing sparks and flame originating within, one of the functions of the cover is to hold the breakers tightly in place so that arcing doesn't get started in the first place.

When installing a distribution panel, every effort should be made to balance the loads between the two hot legs so that minimum current flows through the neutral and one main does not heat more than the other.

A residential distribution panel is the heart of the building's electrical system and, as such, should be configured and maintained correctly. It needs to be located in a secure and protected place, well-lighted, dry and easy to access, with plenty of dedicated space above and working space to either side and in front.

Proper grounding and bonding are essential so that there is a low impedance path from any normally non-current carrying conductive bodies (such as tool and appliance casings) straight back to the neutral centre tap of the transformer secondary. This current path should, in turn, be solidly connected to a low-resistance ground electrode system.

When these elements are in place, and connected to a distribution panel that has been properly installed and maintained, the branch circuits and connected loads will have their best shot at a long, trouble-free life, performing economically and efficiently. 



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# Automated lighting control fastest-growing home technology



Builders market lighting controls to remain competitive, differentiate themselves, satisfy specifications and increase potential profits

Six out of 10 homebuilders offer automated lighting controls, and the rate of builder installation of lighting controls in new homes has increased 500% since 2002. However, only about one in 10 builders are proactively marketing lighting controls to buyers, according to the Sixth Annual State of the Builder Technology Market Study conducted by the Consumer Electronic Association (CEA).

Based on survey results in previous years, builders appear to be committed to offering home technology in both the up-market of several years ago and today's down-market, as home technologies are an important selling feature and help maintain or increase builder revenues, according to the study.

The study confirmed automated lighting controls as the fastest-growing home technology next to energy management systems during the 2002-2007 period. About six out of 10 (58%) builders offered automated lighting controls to buyers in 2007—nearly double the number offering them five years earlier (31%).

In 2007, builders installed automated lighting controls in 5% of new homes, more than double the rate of installation reported in 2002 (1% of new homes). Builders offer automated lighting controls to be competitive (29%), satisfy specifications (35%), differentiate themselves (28%) and increase potential profits (32%).

"About nine out of 10 builders consider home technologies as important to market new homes, and more than half believe marketing home technologies is more important now than in 2005," says Gary Meshberg of Lightolier Controls and chair of the Home Lighting Control Alliance, an industry consortium. "But not enough builders are proactively marketing it and not enough consumers are demanding it."

That's why HLCA was recently formed, says Meshberg: to educate consumers, integrators, builders and other professionals about the lifestyle and green benefits of automated home lighting controls, such as convenience, ambience, security and energy savings. "We believe an educated builder is motivated to sell, and a consumer educated about what lighting controls can do for them will demand these controls in their homes."

To learn more about home lighting control, visit [www.homelightingcontrol.org](http://www.homelightingcontrol.org).

The Home Lighting Control Alliance is a consortium of lighting control manufacturers, systems integrators and industry support organizations. Its sole purpose is to promote the awareness, value and benefits of lighting control in residential applications. Members include AHA Design, CEA (Consumer Electronics Association), Centralite Systems, Control4, Echelon, EH Publishing, ETC, FulTech Solutions, HAI, Integrated Concepts, iLuxe innovation, Karen Proctor Electric, Lightolier Controls, LiteTouch, Pass & Seymour/Legrand, RL Johnson Construction, Savant Systems, S&S Electric, Somfy Systems, Square D/Clipsal, SST, Superna, Vantage Controls and Watt Stopper/Legrand. 

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Contractors and Electricians have been installing Square D® safety switches across Canada for the past 100 years. That means there are millions of Square D® safety switches out there for you to find – just spot them during the contest, enter on-line and you could win!



Contest runs from August 1, 2008 to November 30, 2008.

Contests are open only to validly licensed electricians, electrical or mechanical contractors. No purchase necessary. \$1 MILLION SCRATCH and WIN game cards available from participating distributors while supplies last (limit 5 per day per participant). Eligible game card winners must answer a mathematical skill testing question. There are 3,594 prizes available to be won ranging in value from \$50 to \$100,000. Notification of prize redemption must be made to Schneider Electric, 19 Waterman Ave, Toronto, by 5pm EST December- 15, 2008.

Visit our web-site to enter and for a full list of prizes, contest rules and more at [www.schneider-electric.ca](http://www.schneider-electric.ca)





# CMD has customer expectations in the bag

Some estimates put the world's annual consumption of plastic bags somewhere in the neighbourhood of half a trillion to a full trillion. With a market this large, the companies producing plastic bags are sprinting to keep pace with consumption. CMD Corp. makes a full line of machinery for the manufacture of plastic trash bags, and is committed to providing machines that will help its customers stay more competitive and profitable.

Three factors remain in constant tension when developing machines: cost, quality and time. CMD has taken on the difficult objective of improving and, ultimately, conquering all three. Furthermore, the company's customers desire machines that are simple to operate with minimal downtime, leading CMD to take on a fourth objective: ease of use.

"We strive to design the most intuitive equipment," says Paul Johnson, senior electrical engineer with CMD. "This improves the manufacturing process for our customers so they can get production up and running quickly, operate their machine at faster rates, and deliver a consistently high-quality end product. The challenge for us is to provide all of this value without increasing the machine's final selling price."

CMD met this challenge when it sought to improve its 5213ED Rotary Bag Machine, which converts plastic film from an extruder into rolls of perforated bags, including trash bin liners and grocery produce bags. The company worked with Rockwell Automation to find a solution that would improve performance quality and usability, reduce delivery time, and lower the total cost of the machine.

## Solution

CMD had previous success using the ControlLogix programmable automation controller (PAC), and wanted a similar platform that would be energy and cost efficient for the three-axis 5213ED. It selected the CompactLogix PAC, a controller designed for small- to mid-range applications. Its capabilities coupled with Ethernet/IP connectivity made the controller an attractive choice.

Because all controllers in the Logix control platform use Software RSLogix 5000 programming software, CMD quickly configured the machine's control sequence. The OEM took advantage of the software's latest feature—user-defined Add-On Instructions—to develop custom, reusable code modules that simplified the programming process for each axis and improved design consistency.

Additionally, the Inhibit features of RSLogix 5000 gave CMD the ability to create one version of the application program for all machine options, including options requiring the addition of I/O modules or servo axes. This helped eliminate the need to maintain multiple versions of the program. The software also provided CAM simulation and trending capabilities, which helped the machine-builder predict functionality and optimize performance before the machine ever reached the plant floor.

In addition to the controller, CMD implemented Kinetix Integrated Motion, which features the integration of Logix controllers, servo drives and motors, and actuators. Kinetix 6000 servo drives, MP-Series low-inertia servo motors and 1326AB medium-inertia servo motors are used to control the velocity, torque and positioning of the infeed, sealing and perforating mechanisms of the machine.

Because motion control is integrated into the platform over a SERCOS interface, the drives and motors require less wiring and supporting hardware, such as fuses, contactors, resistors, filters, wiring and I/O modules. Additionally, the servo motors use Smart Motor Technology, which provides automatic identification of correct motor-to-drive connectivity, helping to reduce commissioning time.

The servo drives and motors use high-resolution encoders to electronically monitor the position and velocity of the axes. For CMD, the encoders allow higher servo loop gains than lower-resolution encoders, helping improve accuracy and flexibility of the bagging machine's motion control.

Also improving the usability of the bagging machine, CMD implemented a PanelView Plus operator interface, allowing maintenance personnel to monitor the servo axes in real time, which helps them identify and diagnose any problem.

"Having a fully integrated and scalable automation solution was the primary enabler for us to address cost, time, quality and usability challenges," says Johnson.

## Results

With a single, integrated control platform, CMD reduced the amount of wiring on the 5213ED by 25% and the number of components by 20%. Overall, the company reduced the machine's assembly time by 10%. Commissioning time—from power-up to a complete first cycle—also improved, from about five days to less than two.

Because CMD customers have improved diagnostics through the control platform and the PanelView operator interface, the new 5213ED is easier to understand and operate, and helps reduce their need for field support. In fact, no installation or start-up support was required for these first-of-a-kind machines.

Since the first five installations of the redesigned machine, CMD engineers have received only one customer support call to simply clarify one of the machine's functions. This represents a reduction of 200% in support calls.

"In the end, it's about helping our customers' processes to be more reliable, and consistently meet production and quality targets," says Johnson. 

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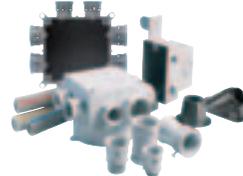
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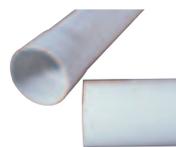
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# Transient surge voltage sources: external or internal?

By Brian Fleming

In our complex electrical world, increasingly more attention is being focused on the phenomenon of electrical surges and spikes, also known as transients. Here, we will concentrate on the surges produced from within, or 'internal' to, a facility.

Some electrical engineering experts argue that 60% to 80% of all damaging surges originate from within the facility, ranging from a few hundred volts to many thousands of volts. A sound surge protection system will protect against external as well as internal surges by employing TVSS (transient voltage surge suppressor)—now more commonly known as SPD (surge protection device)—protection at the service entrance, in conjunction with cascaded protection down to distribution/branch panels, and on through to point-of-use devices.

## What are surges?

IEEE defines a surge or transient over-voltage as "a short duration, highly damped, oscillatory or non-oscillatory over-voltage, having a duration of few milliseconds or less", classified in categories of lightning, switching and very fast-/short-duration events. Internal surges are often caused by events such as:

- motors cycling On/Off
- load dynamic changes on large and small production machines
- motor and control faults
- panel lighting load switching
- electronic ballasts
- switch mode power supplies
- HVAC systems
- energy management systems
- capacitor bank switching
- variable frequency drives
- portable electric tools, etc.

### Internal surges: a closer look

Momentary surges can originate from a number of events, and their magnitude depends on numerous variables, such as: energy associated with the system; impedance of the system; bonding of the conductors; number of restrikes; and inductor and capacitor



size. Under normal operation, surges range from a few volts to over six times the "system peak voltage" (IEEE 62.41.1-2002). They are categorized as follows:

- **MINOR SWITCHING:** Random turn-off of an appliance or other loads in the individual system.
- **VOLTAGE NOTCHING:** Produces surges each cycle during the commutation in electronic power converters.
- **MULTIPLE RESTRIKES:** Switch contacts that bounce or restrike when switching.
- **MAJOR POWER system switching:** Switching of components, such as capacitor banks, reactors, transformers, lines or cables.
- **COMBINATION OF MULTIPLE restrikes and major power system switching.**

Under abnormal operations, surges average from two to three times the peak line-to-ground voltage, but much higher levels may occur depending on system variables (IEEE 62.41.1-2002). They are categorized as follows:

- **ARCING FAULTS:** Result as insulation systems deteriorate and typically originate as a ground fault.
- **FAULT CLEARING:** Result from current-limiting fuses or fast-acting breakers, leaving inductive energy trapped in the circuit upstream. When no low-impedance path is offered to the current flowing in the inductance at the time of current interruption, high voltages are generated.

- **POWER SYSTEM recovery faults:** Occurs after a fault during system reset with phase-by-phase reclosing. Operation of a single fuse in a three-phase system produces single-phase in the remaining circuits.

## Surge frequency and resulting damage

Surge frequency depends on the number of systems set up (including machines/motors), quality of incoming power, amount of switching that occurs, etc., meaning there could be relatively few or several thousand surges per day. Their frequency is a key indicator of the overall degradation potential to electrical/electronic equipment.

Most surge damage does not occur in one single, smoking arc instant. This is known as 'destructive damage' and is very obvious. Instead, the constant bombardment of these short-duration surges on electronic components cause them to fatigue or wear prematurely and fail. This is known as 'dissipative damage' and is only somewhat obvious. Integrated circuits (ICs) transistors, diodes, solid-state voltage regulators, capacitors, and miniature relays, switches and transformers, etc., are quite susceptible to damage and operational upset caused by surges.

As we dig into complicated electronics, we find microprocessors are a big part of almost every electrical system. They are getting smaller, faster and more sensitive. Integrated circuits and chips are the most delicate of all electronic components and the most sensitive to surges.

Look closely at a chip and you will see a multilayered device with conductors, or pathways, as small as five-microns wide by one-micron thick. Normal current flow through a pathway is in the five milliamp range. Because of these small ranges, surges of only a few amps can destroy the circuitry. They can open pathways or break through the thin dielectric material to ruin adjacent layers and leave devices inoperable.

For their part, motors are not immune to the effects of surges, even though they can cause their fair share. Surges can cause motor insulation failure, which may lead to a complete system failure.

## Benefits of surge protective devices

Power-related problems cost North American companies more than \$80 billion a year, says Lawrence Berkeley National Laboratory; the drain is felt through higher maintenance and production costs, production delays, lost sales, late deliveries, idle workforce, and increased spoilage and scrap. A sound SPD system is designed to divert harmful surges—be they external or internal—and protect electrical equipment, thereby reducing costs and improving business profitability.

So while most people might think surges come from external sources, such as lightning or local utility company capacitor bank switching, the fact of the matter is the majority of surges are caused from within a facility. It's no longer acceptable to simply provide SPD protection at the service entrance or in areas prone to lightning. A sound surge protection system will protect against these as well as internal surges by employing SPD protection, not only at the service entrance, but down to distribution/branch panels and point-of-use devices—also known as the Zone Approach to Transient Protection (IEEE C62.41).<sup>®</sup>

Brian Fleming is Phoenix Contact's Trabtech product manager, and has over 21 years of experience with the company.

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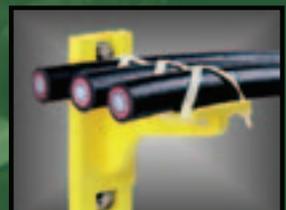
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### Rise in Sask apprentices leads to more government funding

As the number of apprentices in Saskatchewan grows with the province's economy, the government announced an additional \$3.5 million investment in the Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) to train and certify skilled tradespeople.

Due to an increasing demand for skilled workers, the number of registered apprentices in the province has increased by about 2800 in three years, bringing the total to more than 8100.

"We have seen more than 3000 skilled tradespeople achieve journeyperson status in Saskatchewan in the last three years," said Rob Norris, advanced education, employment and labour minister. "Our government is working hard to sustain our economic momentum, and recognizes we must support the SATCC and our apprentices as the demand for skilled trades workers increases."

The SATCC will use the new funding to purchase an additional 900 technical training seats, bringing the number of seats in the province to 4700. This translates into an additional 76 apprenticeship technical training classes in 2008-09.

"We are registering an average of 237 new apprentices every month," said SATCC board chair Paul McLellan. "This funding will help us as we work with the province to develop a skilled labour force that will meet the demands of a rapidly expanding economy."

The SATCC continues to work toward increasing the number of skilled workers in the province in a number of ways, including raising awareness of career opportunities among high school students, First Nations and Métis people, visible minorities and people with disabilities.

"It is important to our future that we engage our entire population in this province's growth," Norris said. "I am pleased that our residents, including First Nations and Métis people, are recognizing that a career in the trades is a great opportunity for a secure and prosperous future."

Minister Rob Norris noted that the number of First Nations and Métis workers registered as apprentices has increased from less than 500 in June 2002 to more than 1200 in June 2008.

### New 'College of Trades' to be developed in Ontario

Ontario is one vote away from creating a professional College of Trades that would rival that of teachers, nurses and doctors (who already have their own professional colleges). The government plans on introducing new legislation in Spring 2009 that, if passed, would implement the creation of the trade college and modernize the apprenticeship system in Ontario, promoting careers in skilled trades and ensuring the economy's need for those skilled professionals is met.

"A College of Trades is a balanced approach that embraces the diversity of our skilled trades—both traditional and emerging—as well as the needs of employers, employees, apprentices, labour, the public and the economy," said John Milloy, minister of training, colleges and universities.

Apprenticeships in skilled trades have grown over 25% in the past four years, with over 110,000 apprentices currently learning one of more than 150 skilled trades.

### Keir congratulates NB Power for award win

New Brunswick's energy minister, Jack Keir, congratulated NB Power for receiving the 2008 Healthy Workplace Silver Award.

"NB Power is not only the first electric utility to receive this acknowledgment, but is also the first company in Atlantic Canada to be recognized this year through the Canada Awards for Excellence," said Keir. The Healthy Workplace Silver Award is developed by Health Canada and the National Quality Institute, and recognizes "outstanding achievements in the area of a healthy workplace".

Keir also congratulated NB Power employees for "recognizing the importance of health and well-being in leading a balanced lifestyle".

### Ontario government creates 500MW green energy competition

A competition is underway in Ontario whereby renewable energy developers can bid on more than 500-megawatts worth of green energy contracts.

According to the ministry of energy and infrastructure, the 500MW RES III Request For Proposals (RFP) process will allow "world-class renewable energy developers to bring renewable capacity to the province in areas where it is most needed".

"Proposals will be evaluated for technical capability, financial strength, previous experience, management skills and a variety of other criteria to ensure the successful bidders will complete their projects on time and on budget," reads the release.

George Smitherman, the deputy premier and minister of energy and infrastructure, said "these projects will not only increase Ontario's supply of clean, sustainable energy sources, they will help boost local economies and create jobs".

The deadline for bids is October 28, and the successful projects are expected to be announced in December. With this competition, Ontario hopes to double its amount renewable energy by the year 2025.

### Sunny skies for B.C.'s solar energy program

Six 'Solar Communities' in British Columbia have been selected for a \$20,000 award to help them conserve and promote green energy through the development of solar hot water systems and other solar initiatives.

Receiving the award are: the districts of Saanich, Tofino and North Vancouver; the City of Kelowna; and a partnership between the City of Dawson Creek and West Moberly First Nations. The award stems from SolarBC's \$5-million dollar investment in solar energy initiatives.

"These communities are demonstrating how solar technology can be a viable part of a community's energy solution," said Premier Gordon Campbell. "British Columbians embrace innovative and sustainable energy solutions, and with programs like SolarBC, the province is demonstrating its commitment to becoming energy self-sufficient while tackling climate change."

The solar hot water systems should help a single home using natural gas curb its greenhouse gas emissions by about one tonne per year.

### Alberta spending several million to send students to WorldSkills

To promote careers and education in trades and technology, the Government of Alberta is investing \$4 million to send Grade 9 through 10 students to the 40th annual WorldSkills competition next September in Calgary.

"Alberta's new economy will require a workforce with sound technical training, so we need to start inspiring students now to pursue advanced studies and careers in the trades and technical professions," said Dave Hancock, minister of education. "An exciting and international event like WorldSkills does just that."

Students at WorldSkills will have the opportunity to view competitions, learn about potential careers, and test some of their own trade skills in sample demonstrations. The event is expected to attract over 1000 competitors and 150,000 attendants, making it the largest event held in Calgary since the 1988 Winter Olympics.

### Nova Scotia offers nearly \$10K in rebates for energy-efficiency upgrades

Nova Scotia has unveiled a \$650,000 EnerGuide program "to provide funding for energy-efficient upgrades to multi-unit residential buildings".

Terry Watters, president of Sustainable Housing and Education Consultants, says the new program is good for building owners, tenants and the environment, providing owners "with a cost-effective way to reduce their buildings' energy consumption and provide their tenants with more comfortable living spaces".

The EnerGuide program will also help shield homeowners from rising fuel costs, and allow landlords to achieve annual energy savings of up to 30% while cutting greenhouse gas emissions by five tonnes per multi-unit building.

Under the current structure, the potential \$9500 rebate is divided into two parts: the federal ecoEnergy program offers a rebate of up to \$5000 for eligible energy-efficient upgrades while the provincial EnerGuide program offers \$4500.

To participate in the program, an owner must have his multi-unit residential building evaluated by an EnerGuide-certified company.



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**Province invests \$300 million in SAIT**

The Government of Alberta is investing close to \$425 million to help three Calgary post-secondary institutions expand their campuses. The funding will increase capacity in Calgary by creating 5400 more spaces for Alberta's post-secondary students to access a range of certificate, diploma, degree and apprenticeship programs.

"By investing in these three post-secondary projects today, we are creating opportunities long into the future for thousands of Alberta students," said Premier Ed Stelmach. "We continue to act on government's priorities and those laid out in our 20-year strategic capital plan."

Of particular interest is the government's commitment of \$300 million to SAIT, which will help build the Trades and Technology Complex, adding 3600 student spaces. This will more than double SAIT's capacity in certain sectors of trades and technology.

The Trades and Technology Complex will help to meet government's mandate to increase post-secondary spaces in high-demand trades and technology programs, and will play a major role in meeting the labour market needs of the energy, manufacturing and construction sectors, says the release.

**B.C. to invest millions in public sector energy efficiency**

In an effort to make its public buildings energy efficient, British Columbia is investing \$21.8 million in 74 retrofit projects. It is estimated that 8500 tonnes of greenhouse gas emissions and 21.4GW hours of electricity will be saved per year.

The project is being run under the Public Sector Energy Conservation Agreement (PSECA), and aims to retrofit buildings such as schools, colleges, hospitals, social housing, Crown and other government buildings.

According to Richard Neufeld, the province's energy, mines and petroleum resources minister, British Columbia is "leading the way to meeting our goals for a carbon-neutral government by 2010, and reducing greenhouse gas emissions by a third by 2020".

In May 2008, the Energy Efficient Buildings Strategy (EEBS) pledged \$75 million in funding to retrofit existing public sector buildings. This \$21.8-million initiative will be the first section of the project to be undertaken.

**Alberta and States to create international power line**

The Alberta Energy and Utilities Board (EUB) has given approval to Montana Alberta Tie Ltd. (MATL) to construct and operate a 230kV power line to import/export electricity between Lethbridge and Great Falls, Mon.

MATL's application for the line had only been conditionally approved by the EUB in January 2008, with approval hinging on MATL's establishment of a dispute resolution process for affected landowners on the line's proposed route. MATL recently fulfilled this obligation, giving the project application the green light.

The Canadian section of the power line, which was approved by the National Energy Board (NEB) in 2007, will stretch over 130 kilometres from the U.S. border into Lethbridge. Once the approval has been finalized, the power line will become the responsibility of the province's new Alberta Utilities Commission.

**B.C. building standards for energy and water efficiency**

Rich Coleman, B.C.'s housing and social development minister, said that as of September 5, "every new building in B.C. will meet progressive standards for energy and water efficiency" in hopes of lowering home utility fees and reducing environmental damage.

Builders must ensure that new homes, residential buildings under five storeys and small commercial and industrial buildings achieve an EnerGuide rating of 77. (Larger residential and commercial buildings must also meet ASHRAE 90.1.)

The standards will apply to several building components, including: the envelope; HVAC systems; water heating; power; and lighting. They should help the province meet its target of reducing greenhouse gas emissions by at least 33% below 2007 levels by 2020.

**Ontario a hotbed of alternative energy research**

Ontario is investing an additional \$5 million into its 'clean tech' sector. The funding is part of a \$37-million Ontario Research Fund investment that supports more than 1800 researchers working on over 200 projects at 17 institutions. Current projects being funded include the pioneering of new hydrogen-based energy sources, and the development of workable fuel cells that can be run on renewable fuel sources, such as ethanol, hydrogen and biogas. 



**CANLYTE ORGANIZATIONAL ANNOUNCEMENT**

**Michael Gentile, President of Canlyte Inc.**, is pleased to announce the following organizational changes.



**Carol McGlogan**, has been appointed **Vice President, Sales and Marketing**. In her new role, Carol will be responsible for the overall sales activities for Canlyte across Canada. She will continue to lead our Corporate Marketing and Channel Distribution activities as well as our Lighting Concept Centre.

Carol has been with Canlyte for over 23 years, beginning her career in product marketing for Keene-Widelite and later promoted to VP Marketing and Distribution Channels for Canlyte. Carol has been actively involved with Electro-Federation for several years including her positions as Chair of the Supply and Distribution Council in 2002 and Chair of Electro-Federation Canada in 2006.



**Gilles Leblanc**, has been appointed **Vice President, Operations** and will now have overall responsibility for all Canlyte Manufacturing and Operations across Canada including the Customer Service Group.

Gilles has been with Canlyte for over 35 years, progressing from Operations Manager to Director of Manufacturing. Gilles has a keen interest in connecting the customer to operations and as a result he is currently a member of the National Council for the Supply and Distribution Council of Electro-Federation.



**Howard Yaphe** has been appointed **Senior Vice President, Product Development**. In this role, Howard will assume full responsibility for the Product Marketing functions within Canlyte and will continue to lead the Canlyte Product Development Program. In combining both Product Development and Product Marketing, we firmly believe that our New Product Development Cycle will accelerate at a time where lighting is approaching a re-gensis with the advent of LED and smart building technology, enabling us to continue to grow market share.

Howard has been with Canlyte for 19 years. His unique background includes product marketing, general management for the Cornwall location as well as responsibilities for product development and manufacturing for Canlyte. Howard is active on several Philips North American and Global product development teams.

**Canlyte Inc. is the largest luminaries company in Canada and is a Philips group brand, the global leader in lighting.**

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# Taking a closer look at the DLRO

By Mike Nightingale

A digital low-resistance ohmmeter (DLRO) is a high-precision portable test set that typically measures resistance from  $1\mu\Omega$  to  $60\Omega$ . It's basically the same test machine as 'the Ducter', only it generally provides a wider range of readings. (A Ducter usually has a range of  $1\mu\Omega$  to  $1\Omega$ , and while these two words are commonly used interchangeably throughout our industry, they are not the same thing).

Both the DLRO and Ducter are trademarked names belonging to AVO Biddle Instruments. Another device worth mentioning is the Kelvin Bridge, which is only another type of resistance meter. This has a wider range of measurement than those mentioned above—normally  $0.01\mu\Omega$  to  $1000\Omega$ —with an accuracy of  $\pm 0.03\%$ . In the electrical supply and reconditioning industry, we generally don't need this degree of accuracy, but I wanted to mention it because it can be used for the same testing as the Ducter and DLRO. For the examples below, I will be using the DLRO, which is very common in rebuild shops and maintenance facilities, and referring to reconditioning and maintenance standards from PEARL, the Professional Electrical Apparatus Recyclers League.

## The mathematics of DLROs

Before I get into some common procedures and examples, let's briefly go through the mathematics of the type of readings we're taking. There has been confusion with decimal point location when taking measurements with a DLRO. For example, confusion sometimes takes place when one person takes a reading of  $45\mu\Omega$  from line to load on a circuit breaker (which is actually a reading I took when I did a DLRO test on a Westinghouse 150VCPW-500 breaker).

Someone else will then say that they got  $0.045m\Omega$  on the same breaker at a different location, and will want to know why I had such horrible readings. It is obvious that what occurred is that the other person did not know that they got the 0.045 reading using a different scale setting. When converting to ohms, this value would be  $0.000045$  ohms, which—when you think about it—points out the accuracy of these meters. Mathematically, all of these are the same reading.

The quick moral of this story is that one should be very careful with decimal point placement. Were someone not careful, he could interpret a test reading to be either unusually exceptional or bad enough that the breaker or device gets thrown away.

One way to make sure your technicians are doing this properly is to have them measure a resistor with a known value, or have them read the instruction manual carefully. Another idea is to record historical trends for different makes and amperages of breakers. When you have a Westinghouse DB-25 with historical data that tells you that the last 20 times you performed a DLRO test on this breaker you had an average of  $97\mu\Omega$ , and a technician writes down a reading of  $0.097\mu\Omega$ , you know there's something wrong.

## Detecting high-resistance connections

Now let's get to some practical uses of the DLRO and detect high-resistance connections. For the first example, we'll measure the contact resistance for a GE TKJ636400 moulded-case circuit breaker. Before starting, make sure the contact surfaces are cleaned and free of debris, oil, dirt, etc. This should be done regardless of whether you are testing the breaker or just finished reconditioning it based on PEARL standard 1211, Low Voltage Molded Case Circuit Breakers with Thermal Magnetic Trip Unit. Failure to do so will possibly alter the accuracy of the measurement.

After either cleaning or reconditioning the breaker, take the two probes from the DLRO and firmly press them to the line and load connections of each phase and record the results. Make sure you apply enough pressure with the probes. When done properly, you'll actually impress the points of the DLRO test leads into the copper or aluminum. Fail to do so and you won't get true circuit resistance results.

Another point to keep in mind—especially with moulded-case breakers—is the placement of the test probes, which need to be on the lug landing pads, not through the lug itself. In some instances, you may actually have to remove a breaker lug to test properly. This is the same for air breakers, in that you do not test through the primary disconnect, or finger cluster. With these larger breakers, there is usually enough room to get proper connection points.

The testing of Phase A can be shown in Figure 1. When employing the test leads, it is important to keep the P1 and P2 leads on the inside, closest to each other in the circuit, and the C1 and C2 leads on the outside. This is due to the way the DLRO calculates the resistance of the circuit.

FIGURE 1

Phase A	Phase B	Phase C
( $\mu\Omega$ )	( $\mu\Omega$ )	( $\mu\Omega$ )
65	67	223

Here's another example: taking measurements on a Westinghouse DB-50 air breaker. In this case, we do the same basic test as with the TJK. The nice thing with the DB breaker



is that, since it is larger, it is easier to troubleshoot problems. For example, when we take measurements and get the values shown in Figure 1, we know there is a problem with the C phase, since Phase C is at least three times larger than the other readings. With a DLRO, you need to have some type of uniformity across readings.

(I have heard of different standards to try and meet or exceed; one of them says the readings between poles should be within 20% of each other.)

We now need to find out where the problem is located. Generally, it can be two different types of areas: either the contacts or the bolted and/or soldered connections. To try and locate the problem, the contacts are isolated and measured from the movable contacts to the stationary contacts, and the results recorded in accordance with PEARL standard 1236, Low Voltage Power Circuit Breakers with Solid State Trip Unit. When the reading seems normal—which will be a very low value when the contacts are fine—we then need to determine whether the problem exists between the movable contacts and the bottom breaker stabs, or between the stationary contacts and the top breaker stabs.

One of the readings will probably be higher than the others. If so, you have now isolated the area in which a problem exists. Were it in the contact area, you would need to replace or check the tightness of the connections.

A DLRO, as demonstrated in the above cases and many others commonly encountered in the electrical industry, is an invaluable tool. This piece of test equipment will tell you whether the circuit resistance of a device falls within acceptable levels. Where it is worth its weight is gold is in those cases in which it can help tell the technician where to look for problems. This fact alone has saved me hours of troubleshooting time. <sup>EB</sup>

Mike Nightingale is president of Voyten Electric (Franklin, Pa.) and past president of PEARL, the Professional Electrical Apparatus Recyclers League. PEARL is a trade association and technical standards development organization for companies that supply surplus and reconditioned electrical equipment and apparatus to commercial and industrial electrical markets.



# Election musings: for country *and* corporation

Vote early. Vote often. That was the slogan in Ireland in the good ol' days. You would go up to your local politician after the polls had closed and tell him (it was all men in those days) "I voted for you... six times".

After leaving Ireland, I lived in the Middle East and Africa for eight years. I had no voting entitlement. After getting my Canadian citizenship in the mid 1980s, I have voted in every municipal, provincial and federal election (albeit, only once each time).

It is great having the right to vote. So many people don't. You should also be aware that with rights come responsibilities. You not only have the right to vote—you are obligated to do so.

And even though the federal election has passed by the time you read this, I nonetheless wanted to share with you some of my musings on voting.

According to Elections Canada only 25% of 18- to 24-year olds voted in the last election. From 1993 to 2006, the number of registered voters dropped from 70% to 65%. One-third of our voters don't bother exercising their right to vote. (For some people, *that's the only exercise they get!*... but I digress.)

As an employer or senior manager, you should be encouraging everyone with whom you come into contact to vote, and you should be setting the right example. Don't let election dates go by unnoticed.

## What government is right for you?

There are so many conflicting issues facing us. We would all like better healthcare and lower taxes, but can you have one without the other? We want a greener society, but we also want to develop our industries—even though they create pollution. Many of us want better daycare (or *some form of daycare*) and better care for the elderly, while some of us just want one or the other.

While no one will ever satisfactorily cover all the issues, we should pick a couple we feel are critical to our view of the world, and make our decisions based on that. (Considering the results from election night, it appears that—at least for the time being—Canadians want just a few more years of the status quo.)

While at work, initiate a discussion about this, with questions such as:

Do our party leaders have a vision for Canada? Can they realize that vision with measurable, realistic goals? Have they put the right team together? What do you think of your local candidates? Would you vote according to candidate rather than party when you felt it was better for your constituency? What kind of a track record do the different parties, leaders and local candidates have?

Just imagine the discussions that would ensue over coffee break.

## What about elections in your company?

And because these are just some of my political musings, indulge me further by wondering along with me what would happen were elections to be conducted *in your company*. You heard me: imagine the positions in your company—including your own—were decided by voters (i.e. your employees).

Would they vote to keep the current prime minister (i.e. you)? How would you stack up in their eyes? Like any of the parties vying for seats in Ottawa, do you have a vision for your company? Can you realize that vision with measurable, realistic goals? Have you put the right team together? Would all of your team members be reelected?

Have you one or two key issues *that everyone buys into*?

When you actually review how your company communicates all of the above items that are relevant to your business, you'll realize just how complex a process it really is. (It's no wonder we struggle with politics.) For both nation and business to succeed, then, they need to be run effectively: with solid accountability at every level and everyone's buy in.

Do your part toward ensuring we all see Canada, and our own businesses, "with glowing hearts".<sup>®</sup>

Ron Coleman, B. Comm., FCCA CMC, is a member of the Institute of Certified Management Consultants of British Columbia. 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 ECABC. He is also author of the book, "Your Million Dollar System: How to Increase the Value of Your Construction Business by One Million Dollars in Three Years". Visit [www.ronaldcoleman.ca](http://www.ronaldcoleman.ca).

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Designed and tested with commercial and industrial contractor input, Square D 240V NQ lighting panelboards offer ready-to-install sub-assembly kits to outfit the interior and help you meet virtually any power distribution requirement, including: feed-through and sub-feed lugs; sub-feed circuit breakers; TVSS (transient voltage surge suppressor) interiors; 200% neutrals; copper neutrals and grounds; and

6-in., 12-in. and 18-in. box extension kits. NQ panelboards also accept Square D QO plug-in and QOB bolt-in circuit breakers to facilitate seamless migration from NQOD to RTI NQ panelboards. Additional conveniences include 11 standard enclosures and the ability to use the same trims as Square D NF panelboards. For situations requiring a factory-assembled panel in a short lead time, Schneider is enhancing its Quick Delivery Centre (QDC) to include five- and 10-day onsite delivery. (This program is also available for NF and I-Line panelboards.)

**Schneider Electric**  
[www.schneider-electric.ca](http://www.schneider-electric.ca)

**Standard Safety Max coated lighting**

Safety Max by Standard is a complete line of safety coated lighting products, which are particularly useful when suspended over exposed food or packaging materials—at any stage of production—to prevent food contamination in case of breakage.



With Safety Max fluorescent lamps, you protect product and production without sacrificing lumen output. Check out the T5HO and T8 lamps, which have just been added to offering.

**Standard Products**  
[www.standardpro.com](http://www.standardpro.com)

**Universal DemandFlex ballasts and DCL controls**

Universal has unveiled the DemandFlex ballast family and DCL (demand control lighting) controls. The ballasts feature wireless control technology to receive commands without requiring extra control wires. DCL controls allow for local control with energy management systems and external control via the Internet with network-managed systems. DCL controls can reduce power

levels by as much as 50%, says Universal, for significant demand level and usage reductions. The initial DemandFlex ballast offering includes a two-lamp F54T5HO ballast and two-, three-, and four-lamp ballasts for F32T8 lamps. This ballast incorporates programmed-start technology, making it suitable for use with occupancy sensors, and universal input voltage.

**Universal Lighting Technologies**  
[www.universalballast.com](http://www.universalballast.com)



**Cooper 6-in. Air-Tite housings and downlights**



Cooper has expanded its line of sloped ceiling CFL housings and recessed downlights. The new construction 6-in. aperture Air-Tite housings are designed for ceilings with 2/12 to 6/12 pitches, providing illumination by aiming the lamp straight down. The H247ICAT and H248ICAT1D downlights offer high light output and dimming down to 15%. Both housings accept 26W, 32W or 42W CFL lamp options and feature an electronic residential-rated ballast for quicker starts and flicker-free operation. Installation features include Halo Got-Nail bar hangers and Slide-N-Side junction boxes.

**Cooper Lighting**  
[www.cooperlighting.com](http://www.cooperlighting.com)

**GE G8.5 and G12 lamps**



GE's ConstantColor Ultra 70W G8.5 lamp and G12 ConstantColor ceramic metal halide (cMH) lamps offer 90% mean lumen maintenance and an 88 CRI (colour rendering index). Most currently available ceramic metal halide lamps cannot provide this level of lumen maintenance and CRI, says GE. These next-generation lighting solutions for retail, accent and general display lighting feature a colour temperature of 3000K and a rated life of 12,000 hours.

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**Ledtronics flame-tip LED chandelier bulbs**



Ledtronics' DEC01-B10E12 series LED chandelier bulbs come in a flame-tip shape. The UV-protected, plastic lens covering allows the LEDs to shine in multiple directions (three dimensions), and the bulbs can put out 23 lumens while consuming just 1.2W of power. They require no retrofitting kits and install like a normal bulb for quick replacement of incandescent bulbs. The screw-base LED chandelier bulbs come in Warm White (3000K) and Filament White (2200K) colours.

**LEDtronics**  
www.ledtronics.com

**Bodine BSL23C emergency LED driver**



Bodine's BSL23C emergency LED driver operates an LED load up to 3.1W at full rated current (200mA) during loss of normal AC power. It works in conjunction with the existing LED driver to convert the luminaire into emergency lighting. The BSL23C supports emergency lighting for a minimum of 90 minutes, and can be used for downlight applications.

**Bodine Co.**  
www.bodine.com

**Standard extends CFL Professional Series**



Standard added more variety to its CFL Professional Series, with new technologies promising higher energy savings. Included is a new line of cold-cathode lamps that have an average life of 25,000 hours and are suitable for flashing and dimming applications. Also included are T2 spiral lamps with a truly miniature size that fit most fixtures, and high power factor spirals, A-shape and GU24 base spiral lamps—all of which are offered in different wattages, finish and colour temperatures.

**Standard Products**  
www.standardpro.com

**Alkco Little Inch T5/T5HO undercabinet**



Alkco's Little Inch Fluorescent undercabinet task light with T5/T5HOs addresses interior lighting requirements in both commercial and residential environments. Features include a fully framed stippled acrylic lens that covers the aperture of the luminaire, and an

electronic dimming ballast that allows light levels to be adjusted from 100% to 10%. Installation is made easier with captive mounting screws hidden under the lens frame. Available in 1-ft, 2-ft, 3-ft and 4-ft lengths, the housings are made of heavy-duty extruded aluminum with die-cast endcaps for enhanced durability. Interconnect cords allow modular connection of additional luminaires through ports located on either endcap.

**Alkco Lighting**  
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**Alera Microlyne fluorescent fixtures**

Alera has launched Microlyne, a line of narrow aperture fluorescent fixtures. It includes three linear styles in eight mounting types, providing you with increased latitude when preparing lighting specs for various applications. You can choose from among four distribution methods, three lamp sources, two light modules and three corner selections. In addition, five shielding options allow for visual consistency across all three sequentially graduated rectilinear shapes. Cable-mount units allow you to attach aircraft cable from the back of the housing.



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**Siemens residential, generator-ready load centre**

Siemens introduced a residential, generator-ready load centre that will minimize future rewiring and expense should a standby generator get added to a home's electrical system. This



new unit has two interiors instead of one; during normal utility operating conditions, both interiors are powered. During generator back-up conditions, only the lower interior (which contains critical circuits) is powered. The generator-ready load centre has a total of 30 spaces that can hold 42 circuits. All 42 are powered by utility power, but 18 spaces (which can hold 30 circuits) are backed up by the generator.

**Siemens Energy & Automation**  
www.sea.siemens.com

**PV Powered PVP30kW commercial inverter**

PV Powered's PVP30kW commercial inverter has an expanded module compatibility and an increased total system energy harvest feature. The units come with built-in data monitoring, allowing commercial customers and their installers to track current and historical system performance over the Internet, enabling fast access to service and support when needed. The



inverters have an expanded DC input voltage range, with the low end now reduced to 295vDC. This ensures the units work with all PV modules on the market today, including thin film modules.

**PV Powered**  
www.pvpowered.com

**Rittal RiLine60 busbar systems**

Rittal's RiLine60 busbar systems are available for ratings up to 1600A and offer rapid assembly, says the company, as well as enhanced safety and individual modularity. Profile or PLS busbars are simply inserted into the respective support. The integral slide then adapts automatically to the respective bar width of 15mm, 20mm, 25mm or 30mm. No other accessory parts are needed. Free positioning of the support makes planning easier, offers greater stability and, where necessary, utilizes space more effectively. Control gear is assembled and wired up onto the RiLine60 support frame, and can be mounted directly onto the busbar in one operation.



**Rittal Corp.**  
www.rittal.ca

**Radiodetection RD1000 portable GPR**

The RD1000 portable GPR (ground penetrating radar) system from Radiodetection weighs just 23kg and promises an accurate snapshot of underground conditions, using a cursor to indicate the depth and location of a buried utility. The advantage over a traditional, electromagnetic locator is that the RD1000 can see non-conductive materials, too, such as plastic pipes. The product features integrated digital colour and gain enhancements that let you maximize locate quality and performance.

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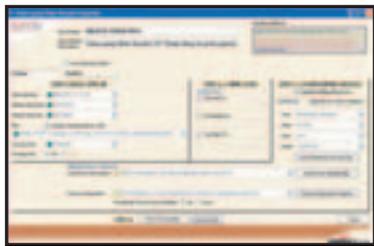
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and the program takes over, creating 'smart' part numbers on the fly while giving you several online options, like viewing 3-D rotatable images, compiling and organizing Project BOMs, and submitting the BOM online while requesting a quotation.

To download or order your free copy, visit [www.cooperblines.com](http://www.cooperblines.com).



**Watt Stopper/Legrand guide for warehouse lighting**

Watt Stopper/Legrand has released its 96-page "Best Practice Guide for Warehouse Buildings" to show you how to best incorporate lighting controls into new and existing warehouses. It covers energy conservation and building code compliance, as well as application-specific design, and provides guidance on specification and installation. Energy code summaries and thumbnail code compliance tables are present for each design, with major reference standards addressed. The guide also comes in an e-Book format that allows you to read or download it online.

To access the guide, visit [www.wattstopper.com](http://www.wattstopper.com)



**Gexpro energy-saving products guide**

Gexpro has created a brochure to help you develop greener and more cost-effective operations by choosing performance and energy savings in four major electrical product groups: lighting, occupancy sensors, motors and drives, and metering. Switching to energy-saving devices can deliver up to 30% energy consumption savings, especially in lighting, says Gexpro. The brochure also features the company's "green know-how" that helps you tailor energy solutions to your particular industry and business.

To obtain a copy or learn more, call (888) 4-GEXPRO, or visit [www.gexpro.com](http://www.gexpro.com).

**Ideal Industries "How to VPM" online video**

Ideal has released a 16-minute online video detailing its new voltage performance monitor (VPM). It describes each feature of the simple, cost-effective VPM, showing how it can identify voltage events and harmonics that cause equipment damage and failures. The video shows how to pinpoint the source of intermittent power problems that are otherwise undetectable, and how the device can determine whether equipment failure is related to a voltage event by logging only those events that exceed designed tolerances.

Visit [www.idealindustries.com](http://www.idealindustries.com) (Choose U.S. English option, as Canada's site is still down).

**Quick Cable battery selection videos**

Quick Cable Corp., a manufacturer of battery connectors, cables, accessories and safety products, has released five informational videos that will help you both select products, and install them properly and safely. Among the topics included are: selecting the right cable; introduction to battery cable; and introduction to marine battery cable. Complete product overviews are also provided in the two- to three-minute long videos, including gauge size, colour availability, temperature rating, flexibility, performance and recommended applications.

To watch the videos, visit [www.quickhowto.com](http://www.quickhowto.com).

**Updated Chloride Power website**

Chloride has updated its website to highlight the merging of the company's two product lines: Oneac single-phase and Chloride three-phase UPS brands. All Chloride products, such as their power conditioners, communication line protectors, and service and consulting capabilities, are now available from the new platform, which provides product and corporate information, technical white papers, and more.

Visit [www.chloridepower.com/USA](http://www.chloridepower.com/USA).

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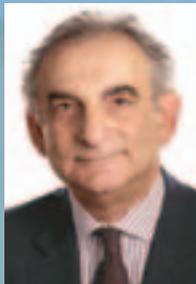
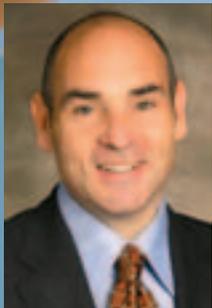
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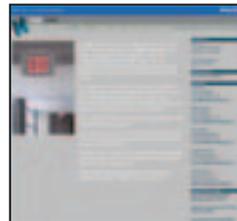
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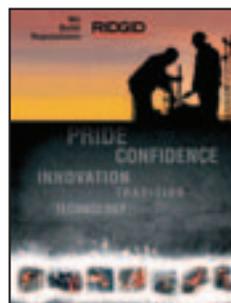
For additional information, visit [www.waclighting.com](http://www.waclighting.com).



**High-Lites Lighting emergency lighting website**

High-Lites, a manufacturer of exit signs, emergency lighting products and backup power systems, has developed an interactive website offering information on the company's range of products and capabilities. You can skim through product catalogues, download PDF files of spec sheets, and learn about the management team. You can also use the site to locate your local High-Lites sales rep.

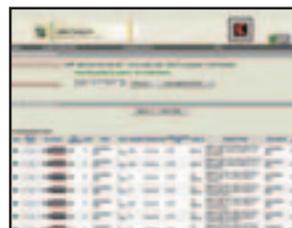
To see what's new, visit [www.highliteslighting.com](http://www.highliteslighting.com).



**Ridgid product catalogue**

Ridgid has published a 234-page colour product catalogue. The product index divides the catalogue into 13 categories for enhanced navigation, while selection charts help you choose the products best meeting your needs. Helpful tool tips are located throughout on topics such as tool maintenance and product selection. For additional convenience, you can download the full line catalogue as a PDF.

Visit [www.ridgid.com/catalog](http://www.ridgid.com/catalog).



**Hendrix Wire and Cable prospector website**

Hendrix has introduced a cable 'prospector' website that allows you to purchase overhead and underground power distribution products, as well as general utility products, any time you wish. All orders are placed immediately, and you can also create a personal account to access customized lists that help you place orders faster. Hendrix's product line also includes spacer cables, tree wires, insulators, and more.

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# Section 32: Fire Pumps

BY LES STOCH, P.ENG.



Fire pumps are a special motor drive application and critical components of life safety systems in buildings. The National Building Code of Canada and provincial building codes specify when they are required. Section 32 of the CE Code specifies electrical equipment and wiring requirements for these pumps, so let's go over a few things, such as wiring methods, disconnection means, overcurrent protection and transfer switching.

Conductors for fire pump motors are sized the same way as other motors. Rule 32-200(a) specifies minimum wire sizes: 125% motor full load amperes for a single motor and 125% full load amperes for the motor and any auxiliary motor loads. But there are some differences. Rule 32-200(b) requires the motor supply conductors to be "protected against fire exposure" in compliance with the National Building Code of Canada. The obvious reason: we don't want our fire pump to quit when it's needed during a fire.

Conductors from the emergency power supplies to the fire pumps must be dependable in an emergency and, as such, very well protected from damage. Rule 32-200(b) directs us to Appendix B for acceptable wiring methods between fire pumps and the emergency power supplies to satisfy building code requirements for protection against exposure to damage and fire:

- mineral insulated cable
- raceways embedded in minimum 50 mm of concrete
- raceways installed within shaft enclosures or service spaces having a minimum one-hour fire-resistance rating.

Fire pumps must operate without failure under the most difficult conditions, so Rule 32-202 provides a list of the suitable fire pump wiring methods:

- totally-enclosed metal raceways
- armoured or metallic-sheathed cables
- non-metallic conduit or tubing embedded in minimum 50 mm concrete or masonry.

Rule 32-202 also directs us to Appendix B, which specifies that fire pump wiring must be routed so as to avoid any adverse conditions such as explosion, floods, fires, vandalism or icing that might interfere with, or lead to, the fire pump's failure to operate.

Rules 6-102(1)(a) and 32-204 are exceptions to the general rule for a single service box, permitting a separate fire pump service box located away from other service equipment. Without doubt everyone is aware that Rule 14-102 requires ground fault protection for large, low-voltage, grounded electrical systems. This exception is often required so as to comply with Rule 32-212, which prohibits ground fault protection for fire pump circuits, since leakage currents might cause the fire pump to trip during a fire.

Rule 32-206 specifies that a fire pump's disconnect must be circuit-breaker approved for fire pump service, and permanently labelled to identify the pump's electrical supply. Rule 32-206 also provides other requirements for the disconnect:

- When installed between the emergency power supply and the fire pump transfer switch, the circuit-breaker must comply with Rule 28-200 for motor overcurrent protection.
- When installed in the normal power supply, the circuit-breaker setting must coordinate with the downstream protection in the motor controller.

Appendix B identifies that the NFPA No. 20 standard permits the fire pump controller to have a trip setting up to

20 times the motor full load current and the fire pump must be capable of operation at locked rotor current for 8 to 20 seconds. The reason, again, is to minimize the risk of failure during operation.

When an emergency power supply is required, a transfer switch is necessary for switching to an emergency power supply on failure of the regular power supply. Rule 32-208 specifies that the transfer switch may be located either inside the fire pump controller or adjacent to it. The transfer switch must be approved for fire pump service and labelled. To enhance reliability, a separate transfer switch is required for each fire pump when more than one is installed.

During an emergency, fire pump operation takes priority over the electrical protection of wiring and equipment. For this reason, Rules 32-210 and 32-212 stipulate that the fire pump—along with its supply and control wiring—does not require overload or overheating protection, nor are its circuits permitted to have ground fault protection. **EB**

Les Stoch, P.Eng., is president of L. Stoch & Associates, specialists in quality management/engineering services. He is a member of PEO, OEL and IAEI, 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 him online at [www.lstoch.com](http://www.lstoch.com).

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Questions and answers compiled by the Electrical Safety Authority



## Tackle the Code Conundrum... if you dare

So, you think you know the electrical code, eh? Well, we'll soon find out if you're an electrical code junkie or downright code-clueless. Take a look at the following questions and check your answers in November/December's *Electrical Business*.

### How did you do?

- 3 of 3** — Not only are you smart, you love to show off.
- 2 of 3** — You're pretty smart, but you still missed one.
- 1 of 3** — Your understanding of these questions is not up to code.
- 0 of 3** — Did you come up with your answers by playing Eenie, Meenie, Minie, Moe?

### Question 1

Flexible metal conduit shall be permitted to be installed as a general purpose raceway in or on buildings or portions of buildings of either combustible or non-combustible construction.

- a) True
- b) False

### Question 2

Electrical non-metallic tubing shall be securely fastened in place within 300 mm of every box or fitting, and at intervals of not more than 1.5 m throughout the run.

- a) True
- b) False

### Question 3

Where electrical equipment is, or is likely to be, splashed by water, it shall be of a weatherproof or watertight type of construction.

- a) True
- b) False

### Answers to Code Conundrum

Electrical Business September 2008

**Q-1:** Where a surface extension is made from an existing outlet of concealed wiring, a box or extension ring shall be mounted over the original box and mechanically secured to the wall surface.

**b) False. Rule 12-3028(1)** tells us that where a surface extension is made from an existing outlet of concealed wiring, a box or extension ring shall be mounted over the original box, and mechanically and electrically secured to it.

**Q-2:** The radius of the curve on the inner edge of bends made on corrugated aluminum-sheathed cable shall be not less than \_\_\_ times the external diameter of the sheath.

**b) 9. Rule 12-712(3).**

**Q-3:** A Class 2 low-energy power circuit that is within the scope of Section 16 does not need to comply with Section 18 rules when installed in a hazardous location.

**b) False. Rule 16-008** tells us that where the circuits or apparatus within the scope of this Section are installed in hazardous locations, they shall also comply with the applicable Rules of Section 18.




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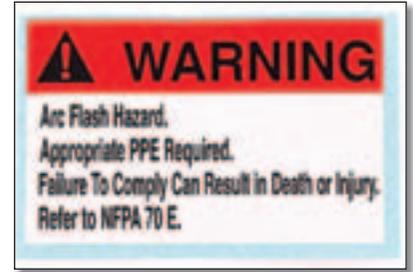
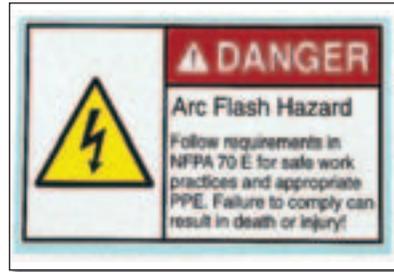
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