

A CLB MEDIA INC. PUBLICATION • VOLUME 46 • ISSUE 7

Electrical Business

AUGUST 2010

Walking the UPI talk!



Look for the logo.

Also in this issue...

- A tale of four Joes (page 8)
- Energy programs/rebates revisited (page 23)
- Large single or small parallel? (Page 30)

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The bravest voice
can live in the
smallest body

Generosity abounds in Canada's electrical industry

At the recent IED (Independent Electrical Distributors) annual general meeting, we were introduced to Craig Kielburger, who spoke about Free the Children and building schools. You might remember Craig when he first made news back in the 1990s: when he was 12, Craig was flipping through the paper in search of comics, and stumbled upon a story of Iqbal Masih—a boy his age.

Iqbal Masih was born in South Asia and sold into slavery at the age of four. In his short life, Iqbal had spent six years chained to a carpet-weaving loom. Iqbal captured the world's attention by speaking out for children's rights.

Eventually Iqbal's media coverage caught the attention of those who wished to silence him and, at 12, Iqbal was murdered—shot in the back with a 12-gauge.

Through Iqbal, Kielburger learned that the bravest voice can live in the smallest body—and he knew he had to help.

Remember the story now?

Craig gathered a small group of his Grade 7 classmates and Free The Children (from poverty, exploitation, helplessness and hopelessness) was born. These were the messages that fuelled Craig's mission. Today, Free the Children is the world's largest network of children helping children through education, with more than one million youth involved in innovative education and development programs in 45 countries.

It was this message that Craig brought to the delegates of IED's meeting... and the notion that education provides the highest return of any social investment in the developing world. Through the education component of its Adopt-A-Village model, donors can help to build schools

and libraries, and purchase school furniture, uniforms and basic school supplies. They can also contribute to salaries, in-services, certification training and onsite living accommodations for overseas educators. This empowers children and entire communities to break the cycle of poverty for future generations.

Well, didn't Craig just get everyone's attention!

By the end of that annual general meeting, a number of IED members and supplier partners had stepped up to pay for over 20 schools in developing countries (likely more by the time you read this)... completely unbidden.

That's the generosity of our Canadian electrical industry!

Meantime, Hungry for Change is gearing up for its 2010 fundraising effort. Under the auspices of Canadian Feed the Children (CFTC), this effort by Canada's electrical industry has, over the past 18 months or so, generated the equivalent of more than two million meals for children around the world—including Canada!

You'll be seeing and hearing more about Free the Children and Hungry for Change, so I encourage you do what you can for these worthy causes. For example, Hungry for Change is busily putting together a cookbook with recipes from Canada's electrical leaders. Look for it later this year.

If you have any questions or want to get involved, email me. **EB**

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Most of today's transformers are by no means ready for the smart grid because they were placed into service years before the age of interactive information transfer. They'll need remote monitoring capability across a range of system parameters.

20 Avoiding EMI noise and improper grounding to assure accurate LAN testing

Cable installers need to understand the various sources of noise that can interfere with legitimate signals and degrade data transmission over a local area network (LAN), such as electromagnetic interference.

23 Energy programs/rebates revisited

Last September, EBMag catalogued the various energy efficiency programs offered by government and utilities across the country that you could use as part of your marketing/sales efforts. This year, we're doing it again. Happy hunting!



On the cover
and page 12

"The Nature of Transformation": A tour of Panduit's new World HQ

EPMag was recently invited to the official opening of Panduit's new world headquarters—a facility that walks the Unified Physical Infrastructure talk.

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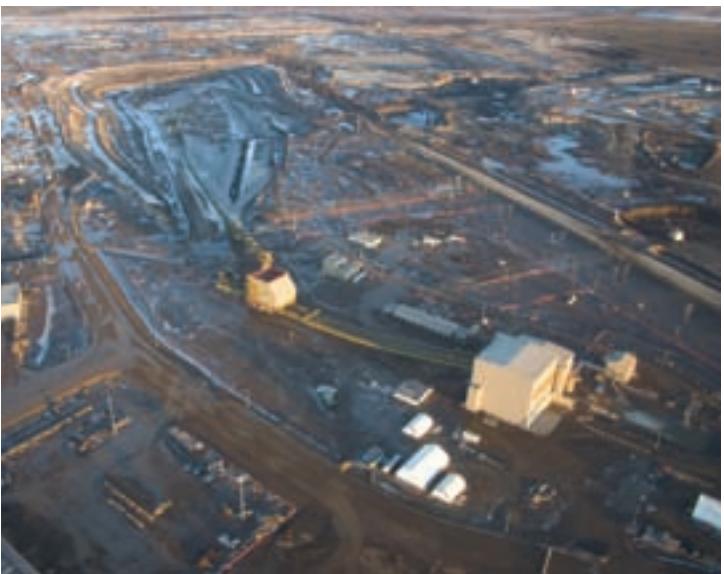
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Large single or small parallel?

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Have your say in Canada's energy future

The Standing Senate Committee on Energy, the Environment and Natural Resources invites all Canadians to have a say in the country's energy future (<http://bit.ly/bp19hZ>).

This request for a national discussion on energy came from the committee's interim report entitled "Attention Canada!", followed by nearly nine months of testimony from Canadian

energy thinkers, research institutions and other stakeholders. The press release explains that "Canada requires a comprehensive Canadian Sustainable Energy Strategy now".

"The future of energy in Canada is something that affects us all. From turning on a light, driving our cars to work, and picking up our groceries at the local supermarket, we are consuming the outputs of Canada's renewable and non-renewable energy sectors," said committee chair senator W. David Angus. "One of our main goals with this report is to increase the energy literacy of Canadians, with the intent of working together to build a secure, competitive, sustainable and innovative strategy for Canada."

The committee will consult Canadians in all spectrums throughout the country to build on the interim report. Its goal is to increase the energy discussion and develop a road map for Canada's energy future. The final report from the committee is expected to be complete in June 2011.

Infrastructure Health & Safety Assoc.'s new board aims to keep you safe

At its annual general meeting this month, the Infrastructure Health & Safety Association (IHSA) announced the membership of its new board of directors, whose members come from industries serving the association.

IHSA's seven sector-specific advisory councils nominated those board members. The members of the councils, meantime, were chosen by members and stakeholders of industries served by IHSA. Both have equal representation from employers and workers.

The board members' industry experience will help ensure each sector has resources and service tailored to its unique or specific needs, explains IHSA. They will begin work this month by electing co-chairs and officers, followed by focusing on eliminating injuries and illnesses in IHSA's industries.

The advisory councils begin work in early September, where they will provide advice to the association on how to best respond to specific industry needs. In addition, they will provide counsel and feedback to IHSA on its programs, products and services.

In autumn 2010, IHSA will host sessions to update all members and stakeholders on its

work, and will also send out a member satisfaction survey at the end of 2010.

Visit EBMag.com (<http://bit.ly/aJZHf3>) for the list of members on the advisory councils and the safety board.

AITF research project includes

The Rock's PowerCost Monitor

An 18-month research project operated by Alberta Innovates—Technology Futures (AITF) is currently underway, targeting consumer electricity consumption dynamics with Blue Line Innovations' (www.bluelineinnovations.com) PowerCost Monitor (St. John's, Nfld.). The project is scheduled to be complete in August 2011.

AITF will gather research data from 300 Alberta homeowners who use the PowerCost Monitor to view their electricity consumption on an ongoing basis. The project is funded by the government of Alberta and sponsored by departments of Environment and Energy with assistance from ENMAX and EPCOR.

The monitor shows homeowners where electricity is being spent and provides tools for measuring the cost of certain appliances or actions. Also included is an estimating feature that predicts the next 30-day usage and cost.



There is a ton of news and updates at **EBMag.com**.
And be sure to follow our Tweets on Twitter (twitter.com/ebmag)
to find out whenever there's something new on our website. 

Looking for a new career opportunity?

Look no further than **EBMag.com**. Visit our online "News" section to find the latest postings.

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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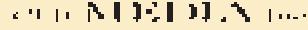
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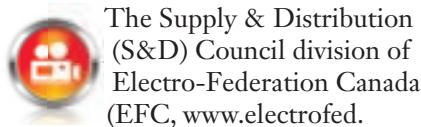
"The name change reflects our history and, more importantly, our

Ferraz Shawmut—the North American headquarters for the global company by the same name—has changed its name to Mersen (www.mersen.com), which reflects the initials of the words "Mate-

strategic direction," said Daniel Beaudron, vice-president and general manager for Mersen USA Newburyport-MA LLC.

Ferraz Shawmut has provided circuit protection solutions for over 12 years and, since 1999, has been a part of Carbone Lorraine, an international group based in Paris, France. Carbone Lorraine specializes in providing materials for extreme environments and solutions for electrical systems' reliability and safety. It and all its divisions have changed their name to Mersen.

As a mid-sized contractor, what do YOU want?



The Supply & Distribution (S&D) Council division of Electro-Federation Canada (EFC, www.electrofed.com/councils/SD_CEMRA)

released a market research study on mid-size electrical contractors in Canada. The study examines the purchasing criteria of electrical contractors to provide an analysis on trends and needs of the market. It also identifies opportunities for distributors, suppliers and manufacturers aligned in this market.

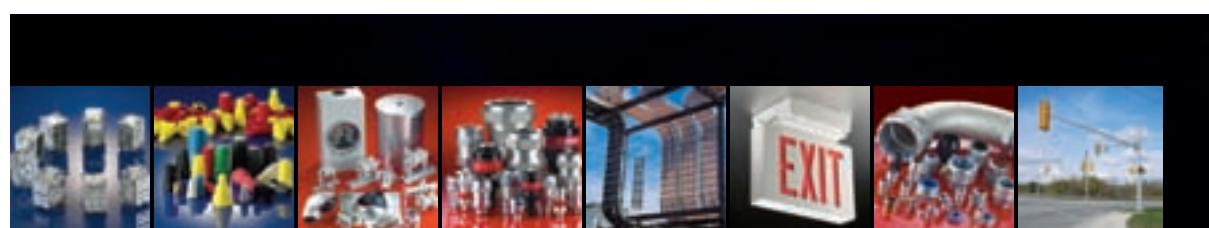
The S&D Council worked with Coherent B2B to conduct this research by interviewing over 300 electrical contractor companies across Canada. Those individuals interviewed were senior executives responsible for making, influencing and purchasing decisions.

The report explores:

- How economic conditions have changed electrical contractors' purchasing behaviours
- Identifies which business pressures are most prevalent among electrical contractors
- Determines electrical contractors' current and planned involvement in various construction practices
- Assesses contractors' reliance on web/internet services for business purposes by measuring frequency of usage
- Identifies the most critical criteria for selecting a distributor in relation to general stores items purchases and construction projects
- Determines which distributor value-added services are of most interest to electrical contractors

Mid-sized electrical contractor purchases account for about 65% of total contractor purchases of electrical products in Canada—that's a sector worth about \$2 billion.

To purchase a copy of the report, email Susan Adler at sadler@electrofed.com.



The Canadian electrical industry's best-kept secret is in this logo. Look for it and win!



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That's why Thomas & Betts has launched a nationwide campaign to celebrate its "Made in Canada" products and, as part of the celebration, is offering you the chance to participate in monthly drawings for official NHL hockey jerseys as well as a grand prize drawing for a trip to a major sporting event.

The secret is out! Let the celebration and the winning begin!

Look for the logo online at www.tnb.ca and at your participating electrical distributor.

Thomas & Betts

LOOK for the logo



Not sure about your thermostat's Energy Aware-ness?

The National Electrical Manufacturers Association (NEMA, www.nema.org) launched its Energy Aware (www.getenergyaware.com) certification and labelling program, which is intended for high-performance, programmable thermostats for residential use while assisting distributors, contractors, installers and homeowners in choosing the right programmable thermostat model.

NEMA president and CEO, Evan R. Gaddis, says customers can save \$180 in annual energy costs with the proper use of a programmable thermostat's pre-programmed settings.

considered by electric utilities for their commercial and industrial efficiency rebate programs.

Seven NEMA member manufacturers have committed to providing the program: Eaton Electrical, Federal Pacific, GE Energy Industrial Solutions, Hammond Power Solutions, ONYX Power, Schneider Electric and Siemens.

GE Lighting and Rambus to create LED lighting solutions

GE Lighting (www.gelighting.com) and Rambus Inc. (www.rambus.com) have signed a broad licensing agreement for the use of Rambus' patented lighting innovations to accelerate light emitting diode (LED) product development for GE.

The initial focus for GE Lighting is to create a flat-panel LED lighting system for architectural and commercial lighting. "One of our objectives as a lighting innovator is to

quickly launch leading-edge products that can accelerate the adoption of quality LED lighting solutions [...] this agreement helps us get there faster," said president and CEO of GE Lighting Michael B. Petras Jr.

In 2009, Rambus launched its Lighting and Display Technology business, which resulted in the licensing of its patented inventions. With this licensing platform between GE Lighting and Rambus, GE will have access to Rambus' lighting technology for use in future LED-based projects.

Honeywell acquires demand-response, smart grid company Akuacom

Honeywell (www.honeywell.com) has acquired the San Rafael, Calif.-based company Akuacom for its demand-response projects in smart grid. Terms of the transaction were not disclosed.

Two-way communication with energy management systems at commercial and industrial sites is provided for utilities and independent system operators (ISOs) through Akuacom's Demand Response Automation Server. This gives them "the ability to automate the delivery of price and reliability signals to these facilities, and more effectively trim peak demand," says Honeywell.

"Utilities and ISOs use demand-response to reduce consumption when electricity is expensive and demand outpaces supply," continues the release. This is said to save utilities, ISOs and customers money by eliminating the need for additional peaking power plants, and by shifting consumption. Additionally, demand-response is said to help utilities avoid brownouts and blackouts.

Clean Energy: Clear Opportunity

The Electricity Sector Council and Natural Resources Canada have released a best practices and recommendations report entitled "Clean Energy: Clear Opportunity" through the Canada-U.S. Clean Energy Dialogue Forum. The report outlines strategies for addressing the challenges facing the electricity sector in achieving a more sustainable electricity system.

The report's development began after the Building the Power Workforce of Tomorrow conference on February 17 and 18 in Toronto. The participants recognized the need to address potential energy shortages, creating these recommendations in the report:

- Increase public education about the electricity profession
- Use social media to attract new talent
- Increase training and apprenticeship programs with colleges

The report presents guiding suggestions in addressing the issues facing the electricity sector in terms of hiring, training and equipping the workforce of the future. It also highlights the importance of the integrated nature of the North American grid for coping with changing technologies and infrastructures.

Prime Minister Stephen Harper and President Barack Obama launched the Canada-U.S. Clean Energy Dialogue in February 2009 to enhance collaboration on clean energy, reduce greenhouse gas emissions and address climate change.

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**3rd Annual Canadian Conference
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*Canadian Electrical Contractors Association
(CECA)/IBEW*
August 22, Saskatoon, Sask.
Visit www.ceca.org/conference.htm



**10th Annual Federation Cup
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Electro-Federation Canada (EFC)
August 23, Milton, Ont.
Visit www.electrofed.com



**CUEE (Canadian Utilities
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September 14-15, Mississauga, Ont.
Visit www.cuee.ca



**CANEW – Canadian Airports National
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Canadian Airports Electrical Association
September 20-24, Victoria, B.C.
Visit www.canew.ca

IIDEX/Neocon
September 22-25,
Toronto, Ont.
Visit www.iidexneocon.com



**Annual Street and
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IES (Illuminating Engineering Society)
September 26-29,
Huntington Beach, Calif.
Visit www.ies.org/salc

NECA Convention & Trade Show
*National Electrical
Contractors Association*
October 2-5, Boston, Mass.
Visit www.necaconvention.org



**SmartGridComm: 1st IEEE
Int'l Conference on Smart Grid
Communications**
*IEEE ComSoc (Communications
Society)*
October 4-6, Gaithersburg, Md.
Visit www.ieee-smartgridcomm.org

**CFAE Fire Alarm
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October 15-17, Toronto, Ont.
Visit www.ecao.org to find the
Registration form

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**IEC National Convention &
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Independent Electrical Contractors
October 26-29, Phoenix, Ariz.
Visit www.ici.org

Fall Technical Conference
*SMMA – The Motor
& Motion Association*
November 9-11, St. Louis, Mo.
Visit www.smma.org

APPrO 2010
*Association of Power
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November 16-17, Toronto, Ont.
Visit conference.apro.org/conference2010



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December 1-3, Toronto, Ont.
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The story of Poor Joe, Joe Average, Clever Joe and Joseph Wise

Poor Joe has been on his own—been his own boss—for 28 years. He services and replaces residential systems. He's always had at least one helper and, at one point, had two other journeymen working for him. He bills out around \$300,000 a

year, makes about \$60,000 in wages and puts a lot of expenses through the business.

These days, it's just Poor Joe and one apprentice; he's just turned 64 and is contemplating getting out of the electrical business. His back aches a lot, his enthusiasm

has waned and he's become very cynical. He worries he may not have saved enough for a comfortable retirement. He also laments the distant relationship he has with his kids. (His wife divorced him about 15 years ago, complaining he put all of his energy and time into the business instead of his family.)

Now that Poor Joe is thinking of retiring, he realizes there isn't much to sell. (His apprentice certainly wouldn't buy the business!) Poor Joe realizes that, after all these years, he didn't really own a business: he had bought himself a job! The independence he sought was simply not there: *he* was the one making all the decisions and *doing* most of the work. Each time he brought on other journeymen, he either couldn't keep them busy or they didn't do the work the way Poor Joe wanted it done.

Each week, Poor Joe worked 40 hours on the tools, and did his quoting and paperwork in the evening. Neither of his two sons wanted to follow in his footsteps.

Poor Joe is thinking of contacting one of his former employees to see whether he would like to buy him out.

Joe Average

Joe Average worked for Poor Joe for seven years. He did his apprenticeship there. Shortly after getting his ticket, he started getting frustrated with his work environment, and decided he could do better on his own. He knew the mistakes that Poor Joe was making and was determined not to repeat them.

So he leased a truck and started on his own. He found a good apprentice, trained him well and developed a good working relationship with him. Joe Average made some decent money—not great, but okay. He worked fairly hard but rarely spent any time on the tools. He had four journeymen working for him. One of them stayed for 15 years, while the others tended to turn over every five years or so—except for one who stayed for 10.

Joe Average kept in contact with Poor Joe and knew he was doing better than his former boss, and that he would be able to retire with a reasonable lifestyle. Joe Average's wife worked part-time in the business, and they were able to put their kids through college. Joe Average had just turned 55 and felt life was pretty good.

He was quite surprised when Poor Joe approached him about buying him out. Joe Average liked the idea but, very reluctantly, passed on the offer. He didn't feel he had the cash

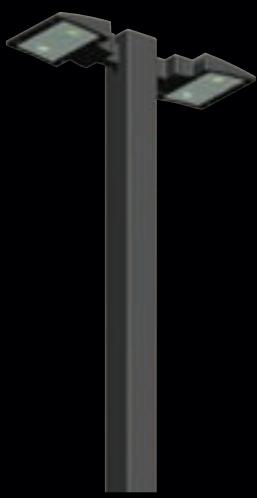
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to finance the deal, nor the stomach for the extra work... it's so easy to lose control and, besides, he was already *doing okay*. Why take the risk?

Clever Joe

Clever Joe was one of Joe Average's best apprentices, staying with him for 10 years before launching his own business (he felt he wasn't being fairly rewarded for all the effort he put in). When Joe Average passed on the deal with Poor Joe, Clever Joe snapped it up at a bar - gain price. At 48, he had enough money put away (he

was making an average of 10% pre-tax profit on sales) and had systems in place to manage the work.

Clever Joe had grown to a staff of eight, and was taking about six weeks of vacation a year. He felt he had established a very nice residential service business, and that Poor Joe's business would be a welcome addition. Clever Joe was great at troubleshooting: he knew there would be problems in Poor Joe's company, but felt he was clever enough to overcome them.

Clever Joe was about a year into the process when Poor Joe let it slip that, after approaching Joe

Average, he had gone to Joseph Wise about buying the business before coming to Clever Joe. He also mentioned that, after some deliberation, Joseph Wise had turned him down.

Clever Joe couldn't figure out why Joseph Wise had passed on the deal. In fact, he felt he had gotten one up on Joseph Wise! The new addition was working out *fairly well*. It was *way more work* than Clever Joe anticipated, but he would get through it...

Joseph Wise

Joseph Wise remembered back to when Poor Joe approached him about buying the business; he had looked at the opportunity and, after weighing all the variables, decided the acquisition would take *way more effort* than it was worth.

When Joseph heard that Joe Average had passed on the deal, he knew Joe Average's would be the next company coming up for sale. Clever Joe wouldn't be able to buy him out because he would be too busy digging himself out of Poor Joe's mess (which he still is). This meant Joseph could approach Joe Average with a fairly low offer.

This he did and, for a little more than Clever Joe paid for Poor Joe's business, Joseph Wise bought out Joe Average. At the same time, one of Joseph's best technicians was threatening to quit and start his own business, so Joseph offered him the opportunity to run the new acquisition. By combining the two operations, he got his pre-tax profit up to 14% of sales.

The moral?

A clever contractor will work his way out of a situation that a wise one wouldn't get into in the first place! EB

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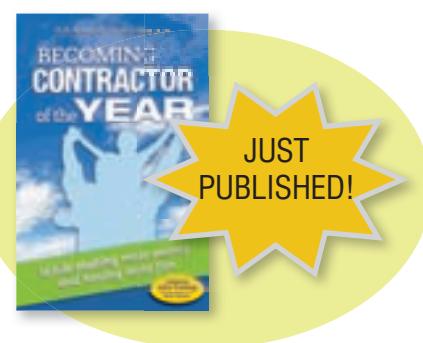
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Ron Coleman, a member of the Institute of Certified Management Consultants of British Columbia, just published his latest book, "**BECOMING CONTRACTOR of the YEAR**", which teaches you how to make more money while having more fun. A noted speaker, he has completed many interfirm financial comparisons of groups of construction companies in Canada and the United States. Ron's numerous published education programs include a 36-hour business management course specifically designed for ECABC. Visit www.ronaldcoleman.ca.



By Dave Smith |

mind your safety **EB**

A lot changes in 30 years

I am beginning this column on Canada Day, 2010. It was 30 years ago today that I decided to start a Calgary-based consulting firm teaching industrial electrical safety courses.

There was lots of interest and support; the previous year, one major company had two workers killed in separate electrical accidents. Once I was in with both feet, however, I discovered that interest and support were far different than securing a purchase order. Yes, it was pork and beans and cornflakes for a long time, which goes a considerable way toward explaining why I was the only Canadian firm specializing in electrical safety at the time.

I vividly recall the meeting with the field superintendent of the company with the two fatalities. After listening to the description and benefits of the training I offered, he leaned back in his chair and said, "You know, 20 years of operating and we've never had an electrocution... and now we have two within three months". He thought a little bit longer, then said, "You know, we should be good for another 20 years".

And with that, I was shown the door.

Companies refused to train their electricians, stating they only hired qualified journeymen; they also refused to train their operators, claiming they did no electrical work.

The electrical training landscape is dramatically different 30 years later; with NFPA 70E then CSA Z462—and the requirement that workers be proved qualified for the tasks they are doing and able to protect themselves—electrical safety training is now standard practice.

I have never experienced a time when so many senior executives understood the dangers we electrical workers face on a daily basis; even though live electrical work has always been bloody dangerous and every province had a General Duty clause, every sale was a struggle and we were starving to death on a dead run. (Live electrical work is going the way of the dodo, but most troubleshooting is still done live, so don't forget: it is as bloody dangerous as it ever was.)

From this meager beginning, we moved into technical training, developing analytical troubleshooting courses and high-voltage maintenance courses. At one time, we did most types of mechanical and fluid power training; we could train on anything that had wheels or tracks, and have conducted a number of

intensive petroleum engineering programs, with another 120 international drilling engineers on their way. We have now trained about 22,000 students.

For family reasons, I relocated our headquarters in 1995 to my Saskatchewan hometown of Turtleford—proud Prairie population of 503. I am surrounded now by family: both in the company and the community, and from here travel the continent.

This work has been immensely fulfilling. I love to teach and develop courses, so now I spend most of my time customizing courses and supporting our group of Canadian and American instructors.

So thank you folks, 22,000 times. We are now contemplating how to repay the privilege, as it has truly been a privilege; we first thought of celebrating our 30 years by planting 22,000 trees, but are now considering a Third World school and orphanage.

I'll keep you posted. Until next time, be ready, be careful and be safe. **EB**

Canada Training Group has been providing consulting services to industry since 1980; Dave Smith, the president, can be reached at davesmith@canada-training-group.ca. Visit www.canada-training-group.ca.

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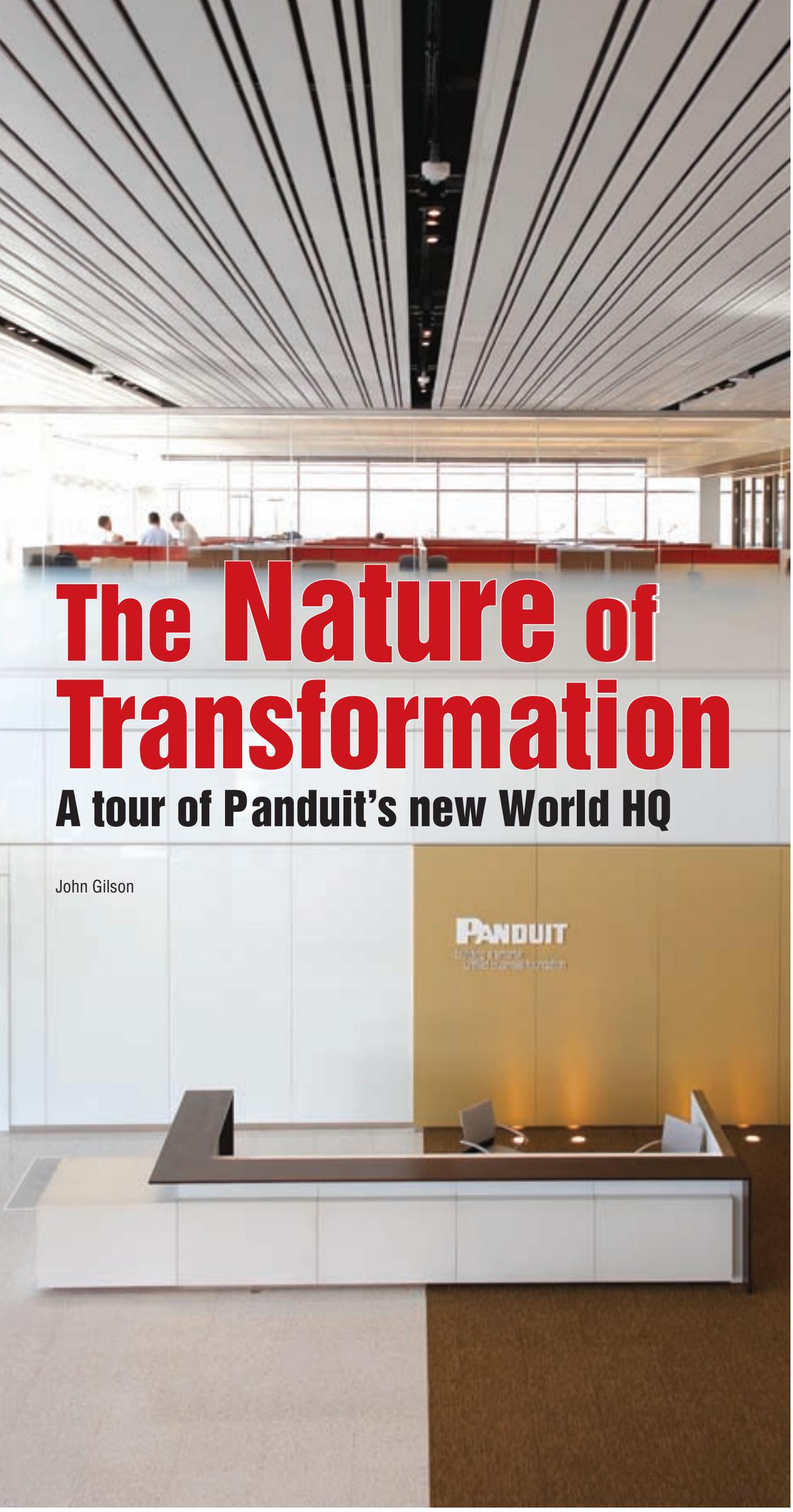
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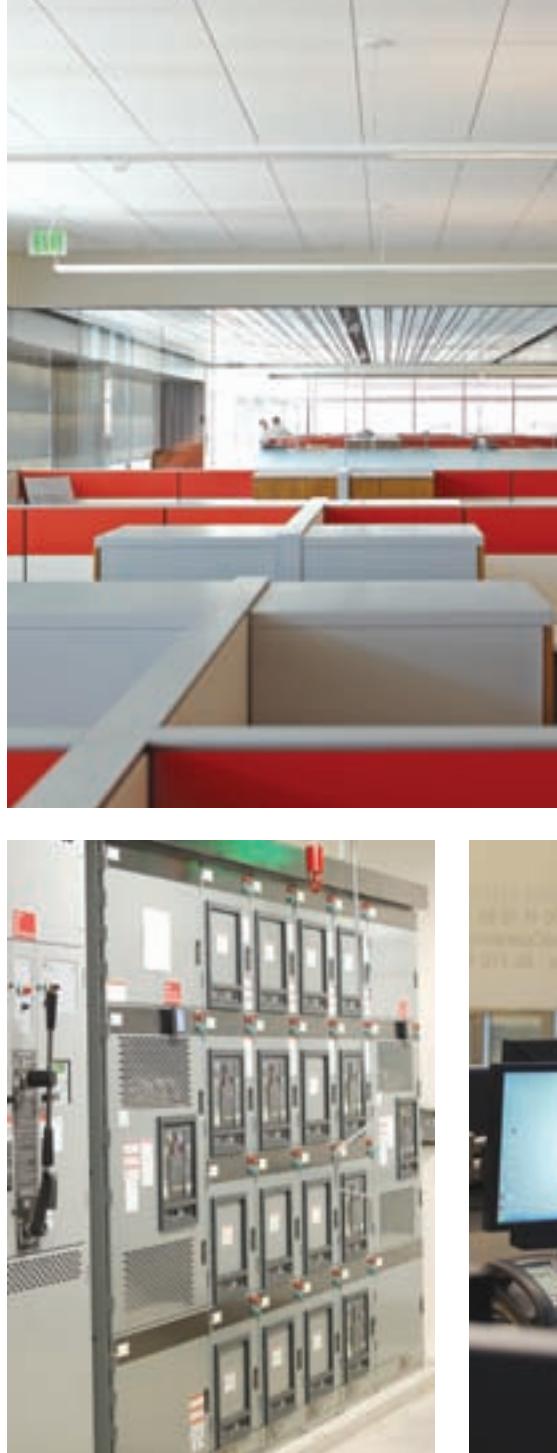
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The Nature of Transformation

A tour of Panduit's new World HQ

John Gilson

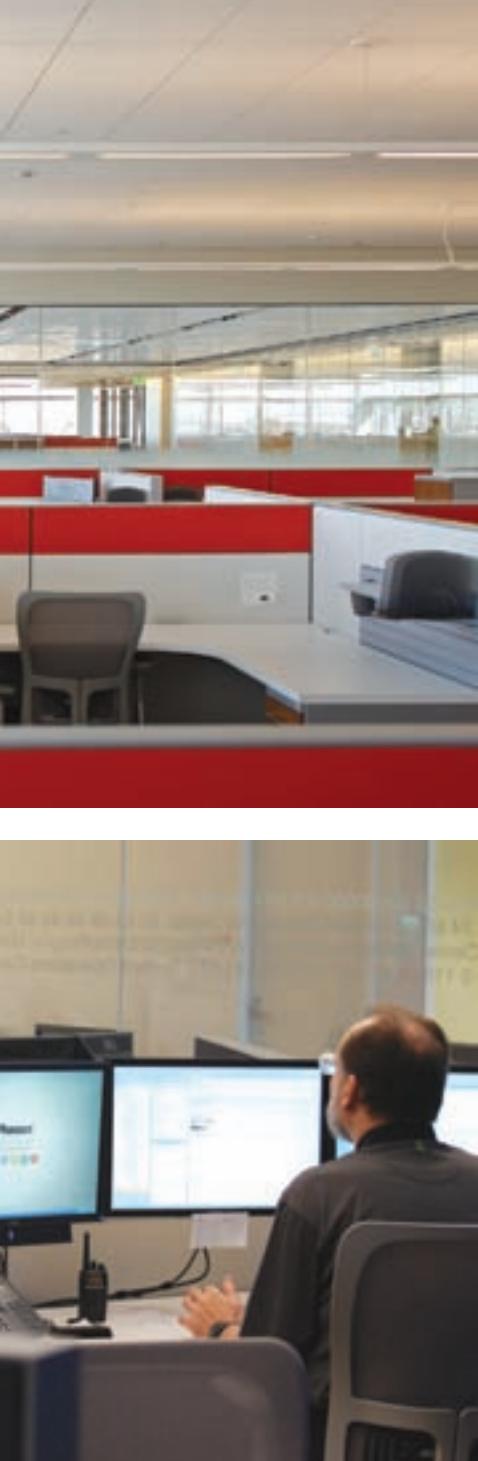


Panduit recently celebrated the completion of its new world headquarters in Tinley Park, Ill., with a special, grand opening event. Guests were invited from around the world (including Electrical Business magazine as part of the Canadian contingent) to tour the cutting-edge facility, as well as sit in on informing keynote speeches and breakout sessions—much of them centred around sustainability and Panduit's UPI (Unified Physical Infrastructure) approach.

The theme of the two-day event was, aptly, "The Nature of Transformation".

The yellow brick road to innovation

On the flat, Illinois plain, Panduit's new world HQ resembles something from the Land of Oz. With LEED (Leadership in Energy & Environmental Design) specs in mind, Panduit and architectural consulting firm Gensler teamed up to design a building with plenty of water- and energy-conserving features. Much of the surrounding landscape, for example, comprises indigenous prairie flora (which is pretty unique considering that virtually all of the original Midwestern grassland was



building. A water reclamation system collects rainwater for non-potable uses, and is projected to save the building 910,000 gallons of water annually.

Unified Physical Infrastructure (UPI)

Panduit's HQ was designed to serve as a living example of Unified Physical Infrastructure. Major attractions for guests were the UPI-based smart data centre, connected building architecture and unified operation centre (UOC), all of which make the building smarter and easier to operate.

At first glance, Panduit's UPI approach to design may seem complex, but it's really quite straightforward. In an effort to minimize risk, lower costs and heighten agility, UPI enables organizations—from hospitals to industrials—to connect, manage and automate critical systems (i.e. communication, computing, control, power and security). This approach differs markedly from traditional designs where critical systems operate independently from one another.

"We have really taken up the opportunity to bring all the networks together very early in the design




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process," said Darryl Benson, global solutions development manager for Panduit's Connected Building Solutions. "We refined a lot of our strategy around converged networking so that it allowed us to take all the different pathways that cabling takes—all the pieces of the infrastructure from the device to the user, to the telecom infrastructure, and all the way back to the data centre."

"We looked at a lot different technologies to make the building smarter," continued Benson, "giving us a 35% energy savings over a regular building. We're able to save \$0.63 per square foot just by making the building smarter."

"The Nature of Transformation"

During the opening evening of keynote speeches, Panduit CEO John Caveney said businesses must transform if they are to survive in a rapidly changing environment. Using the hometown favourite Chicago Blackhawks—recent winners of the Stanley Cup—as an example, he said, "Everything starts with a vision... but in order for this to work, you need plenty of execution".

The following day, Jim Young, co-founder of Realcomm, spoke about his exploration of high-tech buildings in Asia (an exhausting journey of seven cities and 38 projects) and the pressing need—especially in North America—for buildings that are smarter, more integrated and more efficient.

Panduit and its many business partners—including Cisco, Rockwell Automation, IBM/Tivoli and Fluke Networks—believe that buildings such as Panduit's HQ will be the norm in the future, not the exception. According to Panduit CTO Jack Tison, UPI is the perfect solution.

"Sustainability and environmental responsibility are good things: Panduit has always been in that operating mode," said Tison. "But what's important now is that being energy-efficient and sustainable are also green in terms of dollar savings. Facilities that deploy these technologies are saving a lot of money... In today's environment, with energy costs continuing to rise, these things can help your business survive by becoming more sustainable and lowering your costs."

To learn more about UPI, visit www.panduit.com. EB

John Gilson is a regular contributor to—and correspondent for—Electrical Business. He is also the new editor of Energy ManagementCanada.com, an online resource geared specifically to professionals who are working to make a difference in their plant and building portfolios through the introduction of energy-efficient technologies and management practices. You can reach him at jgilson@clbmedia.ca.

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Are your transformers ready for the smart grid?

Mike Dickinson

National challenges like the aging power grid, increasing energy demands, the spiraling cost of generating electricity (and its cost on the environment) are all pointing toward the need for a grid that can produce and distribute energy more efficiently and reliably.

For years, technologists have been toying with the idea of a “smart” grid—an electricity distribution system that uses digital technology to eliminate waste and improve reliability. Adoption of the smart grid is expected to enhance every facet of the electricity delivery system, including: generation, transmission, distribution and consumption. Advocates of the smart grid also say that, by decentralizing generation, it will open up new markets for large- and small-scale alternative energy producers.

Transformers serve as a hub for collecting and distributing energy, and are a key component of a successful transition to a smart grid. Some transformers are located where grid communication is mature enough to allow or require

interaction, while others are not. Transformers used in the transmission of power are immediate candidates for integration into smart grid technology, and will immediately benefit from improvements to reliability and efficiency that result from some of the new online monitoring technologies. Transformers used mainly for distribution circuits will probably be affected more as the smart grid matures.

Most of today’s transformers are by no means ready for the smart grid because they were placed into service years before the age of interactive information transfer. Building the next generation of transformers will require incorporating remote monitoring of a range of transformer and system parameters.

What is a smart grid?

Everyone is talking about the concept of the smart grid, but the actual definition is still fluid. The U.S. Department of Energy notes that the smart grid will be an automated, widely distributed energy delivery network,

characterized by a two-way flow of electricity and information that is able to monitor everything from power plants to customer preferences to individual appliances.¹

Figure 1 illustrates the fact that the smart grid concept ties together all aspects of the power system: from the plug in the wall at a house or office, to a factory, to the distribution system, to power plants of all kinds.

Distributed computing and communications technology will be incorporated to deliver real-time information and enable the near-instantaneous balance of supply and demand down to the device level. In short, the smart grid will deliver electricity from suppliers to consumers using digital technology to save energy, reduce cost and increase reliability and transparency.

Table 1 compares key features of today’s power distribution grid with that of a smart one. Adoption of the smart grid is expected to enhance every facet of the electricity delivery system.²

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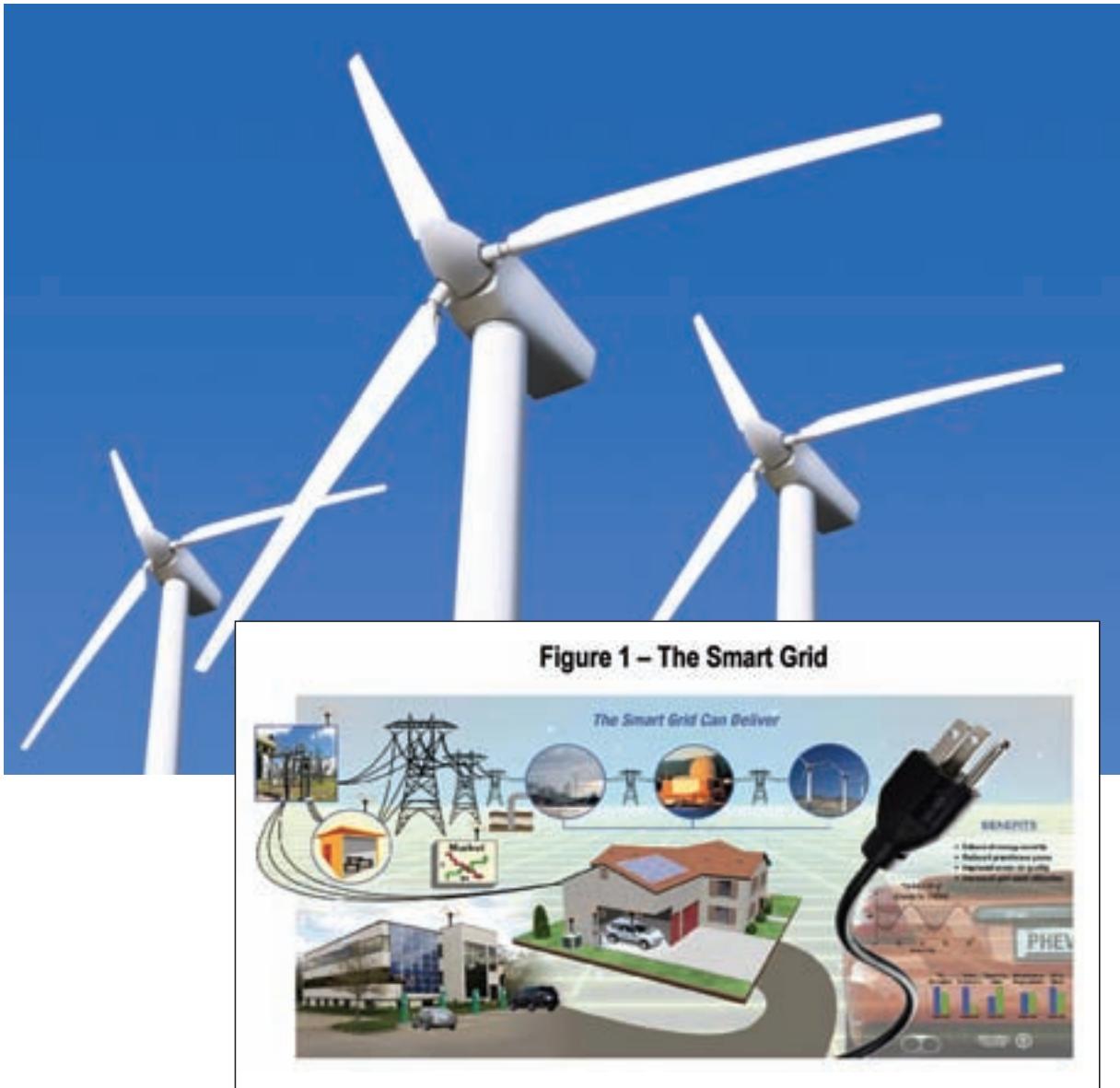


Figure 1 – The Smart Grid



Table 1 – Features of Current Grid Compared to Smart Grid

	Current Grid	Smart Grid
Communications	None or one-way; typically not real-time	Two-way, real-time
Customer interaction	Limited	Extensive
Metering	Electromechanical	Digital
Operation and maintenance	Manual equipment checks, time-based maintenance	Remote monitoring, predictive, condition-based maintenance
Generation	Centralized	Centralized and distributed
Power flow control	Limited	Comprehensive
Reliability	Prone to failures and cascading outages	Pro-active, real-time protection and islanding
Restoration	Manual	Self-healing
Topology	Radial	Network

Table 2 - Technologies Necessary for Smart Grid Evolution

- Integrated communication that connects grid components to open architecture
- Software that can be upgraded and enhanced for real-time information
- Control, allowing every part of the grid to 'talk' and 'listen'
- Sensing and measurement technologies that support remote monitoring
- Time-of-use pricing (pricing determined as the power is used, rather than weeks later when a meter is read) for companies and consumers

successful transition to a smart grid is a colossal understatement. The smart grid is expected to ensure the reliability of the power system, maintain its affordability, fully accommodate both renewable and traditional energy sources, potentially reduce our carbon footprint, and be structured to facilitate the introduction of new advancements and efficiencies on the horizon.

Table 2 lists the key component technologies that are expected to be available to facilitate transition to the smart grid.

Today's transformers are not ready

As part of the distribution network, there are millions of transformers in North America; unfortunately, very few of them have any intelligence or communication capabilities that meet advanced metering infrastructure (AMI) standards or are parts of an advanced sensor infrastructure (ASI) network.

Transformer manufacturers are seeing an increasing emphasis on online transformer monitoring, but the fact of the matter is that today's transformers are, for the most part, not ready for tomorrow's smart grid.

The first reason for this state of affairs is that transformers have a long useful life expectancy—generally 20 to 30 years of service. Most were installed before the age of interactive information transfer, which is the foundation of a smart grid.

As they are replaced with contemporary technology, communication capability can be included as an upgrade. However, a product with such a long projected useful life span changes only very gradually over time. When we consider that all transformers have about a 25-year life span, only 1/25th of those installed would likely need to be replaced each year. Optimistically, that's only 4% per year for the next 25 years; that's a long time to wait for a smart grid (were typical replacement patterns to apply).

A second reason is that the wide range of transformer applications means some transformers are in a position/location/application where grid communication is mature enough to allow/require interaction, while others are not. Transformers used in the transmission of power are immediate candidates for integration into

Table 3 - Typical monitoring parameters for smart grid integration

	Communication			
	Units	Alarm	Local	Remote
Transformer Parameters				
Tank pressure	psi	Y	Y	Y
Tank vacuum	psi	Y	Y	Y
Oil temperature	°	Y	Y	Y
Winding temperature	°	Y	Y	Y
Pressure relief device operation	on/off	Y	Y	Y
Sudden pressure relay operation	on/off	Y	Y	Y
Liquid level	on/off	Y	Y	Y
Hydrogen gas %	%	N	N	Y
Water content in oil	%	N	N	Y
System Parameters				
Fans on	on/off	Y	Y	Y
Loss of control power	on/off	Y	Y	Y
Ambient temperature	°			Y
Input current	amps	N	N	Y
Input voltage	volts	N	N	Y
Output current	amps	N	N	Y
Output voltage	volts	N	N	Y

smart grid technology, while transformers used mainly for distribution circuits will be affected by a smart grid only after it matures to a greater degree.

Another key factor is the need for a change in how the industrial sector sees transformers. Their concern has traditionally focused on power continuity; heavy industrial users have typically not paid a great deal of attention to how their transformer can be used to affect power flow or load switching on a regional or even national scale. The danger with this mindset is that industrial transformers being purchased today—which will be in service for the next 20 to 30 years—may not contain the systems necessary for monitoring the communications likely required over the next five years. Transitioning to the smart grid will require a degree of re-education in the industrial sector.

Of course, legislation may play a part in accelerating the change and transition to transformers that are compatible with smart grid concepts. We saw that when DoE mandated higher efficiency ratings for all distribution transformers in 2010, and we saw it in the late 1980s when

legislation mandated that PCB-contaminated transformers be replaced.

There is already an increased use of digital monitoring in transformers. Vital statistics like temperature, pressure and vacuum levels are being collected and transmitted in real time to a central clearinghouse. Many transformer manufacturers are recognizing this growing demand for online transformer monitoring products and diagnostic services, and investing in building them, especially for step-up transmission high-voltage transformers.

These technologies will be critical for improving grid reliability and helping utilities avoid transformer failures and resultant blackouts. They will also reduce maintenance costs and defer capital expenditures by extending a transformer's useful life.

For example, in the past few years, there has been a burgeoning interest in conducting dissolved gas analysis (DGA) on the oil in transformers. With DGA, samples are taken of the oil's exhaust gases to determine whether any events have occurred that might be detrimental to the transformer and reduce its life. Both industrial transformer users and utilities are setting up these planned

sampling programs, using online devices that can monitor the oil for quality. This can greatly improve reliability, because users will know in advance when something has to be replaced, rather than risk enduring an unscheduled outage. For food processing plants and mills—which can lose millions of dollars when their power is interrupted—this type of sampling program is being undertaken to ensure reliable power.

Transformers in place now are already using various smart devices for load switching. In the 21st Century, the move will be toward monitoring systems that promote transformer reliability. Ensuring reliability on the grid by replacing equipment before it fails and anticipating upcoming problems is what transformer manufacturers will be focusing on.

Table 3 shows typical monitoring parameters necessary for smart grid integration. Though laudable, it must be said that the concept of using these smart grid concepts to ensure system reliability is definitely still in its infancy. All parts of the system must work together to develop a system that monitors the transformer and other parts of the grid at all times. There is still a bit of an island mentality among those building system components, including switches, cabling and capacitors, to name just a few.

So when asked whether your transformer is ready for the smart grid, you can see the answer is complicated. Depending upon where the particular transformer is used in the power generation and distribution system, the answer is either Yes, No or Maybe. Strive to work with partners who understand these issues, and try to anticipate the needs of the smart grid: today and tomorrow. **EB**

Mike Dickinson is director, new business development, for Pacific Crest Transformers.

Sources

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2. Research Reports International (2008).

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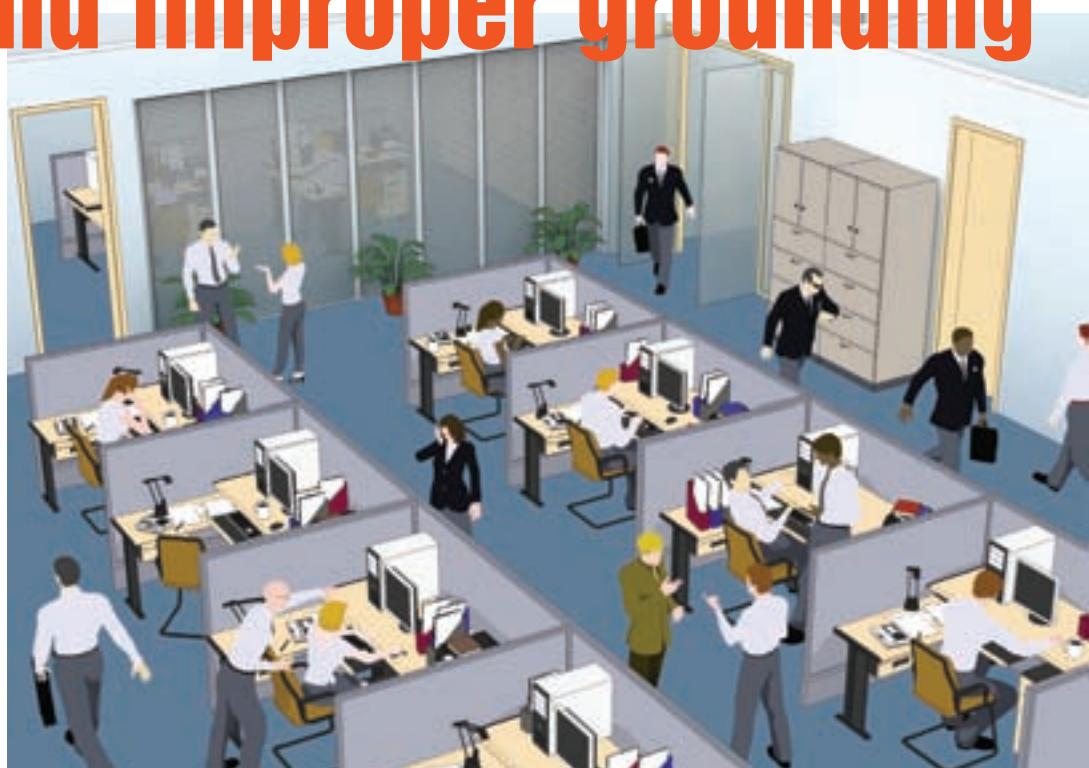
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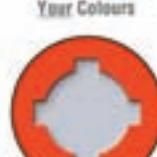
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The identification and elimination of noise has always been a major concern in the installation, testing and certification of LAN networks, as well as a key part of ongoing network maintenance and troubleshooting. Cable installers need to understand the various sources of noise that can interfere with legitimate signals and degrade data transmission over the network. Noise can come from external sources, like electromagnetic interference (EMI) from nearby equipment, transmission lines, etc., and/or from internally generated noise on the cabling due to workmanship issues.

As network performance levels and bandwidths continue to escalate, managing noise becomes an increasingly important issue. Higher speed means packing more data into shorter time cycles, and shorter signal pulses mean greater susceptibility to interference. Unfortunately, the negative effects of noise can sometimes take the form of subtle performance degradation rather than a "hard failure" of the network. Data that is not properly received due to noise interference must be retransmitted, thus slowing down the completion of that transmission while also contributing to overall network congestion.

LAN test equipment plays a critical role in the management of noise in today's network environments. Without the ability to precisely measure, diagnose and eliminate noise, network installations that are specified as high speed may actually be operating at much lower performance levels. On the other hand, testers that are not able to clearly distinguish between different types and sources of noise can lead technicians to spend excessive amounts of time chasing down extraneous noise that may or may not have a significant impact on real-world network performance.

Types and sources of noise

Noise in the network can consist of a variety of types, including Common Mode Noise and Normal Mode Noise. Noise at its basic level represents a disturbance to the waveform, which bears no relationship to the fundamental frequency and which, therefore, can interfere with the waveform's signal-carrying capabilities.

FIGURE 1: Effects of noise on signal quality

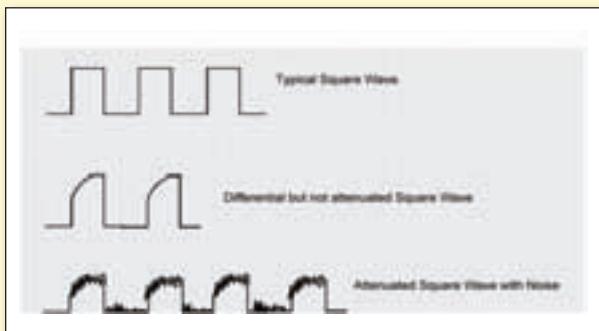


FIGURE 2: Energy spikes from a nearby copy machine



Common Mode noise is particularly important in twisted-pair networks because signal integrity depends upon the maintaining the differential relationship or "common mode" between the wiring pairs.

Common Mode noise is created from the difference in potential between two physically remote grounds. A poorly grounded system or ungrounded shielded cable can act as an antenna, which gathers the induced voltage and applies it to the input. This type of noise can be hard to eliminate and becomes increasingly problematic as the frequency of the noise increases, especially for today's high-frequency networks.

As shown in Figure 1, when a data signal is 1) attenuated through natural capacitance, 2) is severely differentiated and 3) contains a lot of noise, the individual signal pulses become much less distinct and the data less likely to be correctly received at the far end.

With network speeds constantly increasing and circuit logic voltage levels simultaneously decreasing, the ability to maintain precise waveforms is becoming more difficult. When transmitting signals using 3V logic at 350 MHz rates, the presence of even less than 1V noise levels can have a major impact on the link's data-carrying capability.

Workmanship is a key factor that can impact noise levels. Over the past few years, there have been great strides in the quality of cabling, connectors and other materials that make up the network, thereby assuring a highly consistent level of impedance matching within any particular length of cabling or specific connector component; but the real challenges come into play when they are installed in real-world environments. Even using the best materials, critical workmanship issues such as improper grounding, untwisting too much wiring at the termination point or impedance mis-matches between cabling and connectors can easily create unacceptable noise levels.

When two adjacent lines in a twisted-pair circuit carry a signal, there is an intentional capacitive coupling between the lines. To the extent that the signal is distributed as two equal and opposite phases, any transitions along the cabling length will disturb the differential phases by equal amounts, and leave the difference intact. Good layout practice is vital for maintaining proper coupling between the differential traces, thus ensuring that any noise introduced into the application environment is seen as common. Proper grounding is also a critical issue to keep the circuit from inappropriately collecting and accumulating radiated energy from surrounding sources.

External noise, such as electromagnetic interference (EMI) sources, can also be a major contributing factor in LAN link test failures. EMI can be radiated from a variety of devices that emit unintentional RF signals, such as computers, factory floor production equipment, television and stereo sets, fluorescent lights, power tools, power lines, and office equipment such as printers, copiers, fax machines, etc. Patch panels and wiring closets can present particularly difficult environments, with many different signals trying to find routes to ground by cross-coupling across nearby cable links.

When the surrounding building has poor grounding, the prevailing neutral-to-ground voltage conditions will be high, and the radiated effects can impose themselves on any data cable in the area. One side issue to consider here is the use of shielded cabling. While there are instances in which shielded cabling can be helpful in reducing external radiated energy, it is important to remember that the shielding is typically tied into the building ground. When the building has poor grounding, the cable shielding can actually become a contributor to noise on the cable rather than a benefit.

Noise detection and analysis

Distinguishing between different types and sources of noise is a critical first step in troubleshooting noise-related failures. Unfortunately, different types of noise can "look" the same to some test instruments. Radiated energy between pairs in the form of crosstalk can look a lot like radiated noise from external sources to some testers. For instance, proximity to external noise radiation sources can result in "false failure" modes that may consume

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FREE Samples Available

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East Coast
Rod Blake
1.800.565.8771

Manufacturers Representatives for Meltric Corporation



CHESS
E L E C T R I C

significant amounts of technician time—wasted by trying to chase down non-existent problems within the cabling installation.

Measurements such as NEXT (Near End Crosstalk) and ELFEXT (Equal Level Far End Crosstalk) can be useful tools for identifying noise within twisted-pair copper networks. Both of these techniques operate by putting signals on a wiring pair and then measuring the coupled energy of the field effect on adjacent pairs.

However, NEXT measurements typically are not as useful for distinguishing noise sources because externally generated noise may be arithmetically summed into the total noise equation, thereby indicating a failure but not the reason for it. In contrast, PowerSum ELFEXT is particularly useful in noise analysis. By selectively testing signals on the far end of the cable link, this test can provide a more detailed picture that helps sort out crosstalk from external noise. When failure indications are only on outside pairs, such as Pairs 7 and 8 or 1 and 2, it is a good indication of external energy.

For example, the image shown in Figure 2 demonstrates a specific situation in which significant spikes were observed between Ground and Neutral on a single-phase circuit. The spikes were first seen as an ELFEXT failure, which led to a search for external sources for the high energy spikes that were being induced on to the cable. Further investigation revealed that the data cable passed closely by an AC power line powering a copy machine. The spikes occurred whenever the heater in the copy machine was energized.

Designing LAN test equipment for optimal noise management

LAN cable testers are designed to precisely measure and certify to industry-standard cable performance specifications, established by a series of industry committees. (North America's TIA [Telecommunications Industry Association] works with its European counterpart, ISO). The specs established by these standards committees give cable installers and network administration staff a solid and reliable framework for

testing and certifying that installed cable and accompanying connectivity components will allow the transmission of data packets at the specified throughput rate.

Tester architectures and design approaches can play a critical role in the ability to detect and analyze differences in noise sources. Among the key issues that must be considered are the fundamental differences between digital and frequency (analogue) domain testing. Because all signal waveforms and noise patterns are inherently analogue in nature, it can be difficult for DSP-based testers (which acquire information digitally) to precisely distinguish between noise types and sources.

Depending on the digital sampling methods and frequencies, DSP-based testers can unintentionally mask out subtle differences between noise types. Therefore, some digital testers actually start with a “noise check” that essentially detects voltage on the line prior to conducting any other testing. Because the tester would not be able to “see” and separate the external noise during live signal testing, the initial “noise check” acts as a preliminary screening mechanism to characterize and filter out the external noise from subsequent testing. Unfortunately, because the external noise is part of the surrounding environment, it may be a critical issue impacting the actual operation of the network and, therefore, should not be arbitrarily filtered out of the test and certification processes.

In comparison, high-performance analogue testers are able to simultaneously see and display all of the relevant signal and noise waveforms on the line, thereby enabling installers to more clearly distinguish between different energy types, identify various noise sources and determine which ones represent potential real-world problems.

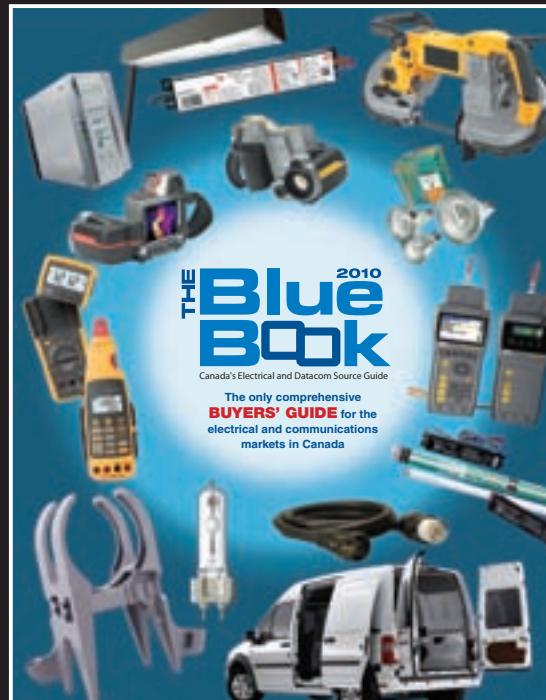
In the final analysis, it is critical that the field test instrumentation not only be able to conduct all of the tests specified by TIA, ISO, etc., but also be able to precisely identify, measure, isolate and analyze noise throughout the network environment. ■

Ed Pivonka is Ideal Industries' datacom standards liaison.

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Energy programs/rebates revisited

By Gillian Marsh

Last September, EBMag catalogued the various energy efficiency programs/rebates offered by government and utilities across the country that you could use as part of your marketing/sales efforts. This year, we're doing it again. Happy hunting!

NATIONAL

■ ecoEnergy for Renewable Heat/Power

Offered by: Federal Government
Time frame: Last date for application: October 1, 2010.
Description: Offered to industrial/commercial/institutional sectors that have installed active energy-efficient solar air and/or water heating systems or renewable power sources.

■ ecoEnergy for Industry Assessment Incentives

Offered by: Natural Resources Canada
Description: Helps industrial companies perform assessments of their operations to optimize their processes, reduce operating costs, become more competitive and reduce greenhouse gases (GHGs) and air pollution—all by using energy more efficiently.
More info: Visit www.ecoaction.gc.ca.

■ ecoEnergy Retrofit - Small and Medium Organizations

Offered by: Natural Resources Canada
Time frame: Program ends March 31, 2011.
Description: Provides a financial incentive of up to 25% of project costs to a maximum of \$50,000 to help small- and medium-sized commercial and institutional buildings and industrial facilities implement energy saving projects.
More info: Visit www.ecoaction.gc.ca.

■ ecoEnergy for Aboriginal and Northern Communities

Offered by: Natural Resources Canada
Description: Supports the development of clean energy projects and encourages communities to adopt alternative energy sources to reduce dependence on diesel fuel.
More info: Visit www.ecoaction.gc.ca.

■ ecoEnergy for Biofuels

Offered by: Natural Resources Canada
Description: Provides operating incentives to producers of renewable alternatives to gasoline and diesel based on production levels and other factors.
More info: Visit www.ecoaction.gc.ca.

ALBERTA

■ Home Energy Evaluation Rebate

Offered by: Government of Alberta (administered by Climate Change Central) and ecoEnergy Retrofit Program

Time frame: Program ends March 31, 2011.

Description: All Albertans who participate in the federal government's ecoEnergy Retrofit Program are eligible for a provincial rebate.
More info: Visit www.climatechangecentral.com.

■ Commercial Vehicles Rebate

Offered by: Government of Alberta (administered by Climate Change Central)

Description: As part of the program, 25 companies will receive a comprehensive fleet analysis, and four fuel-efficiency workshops will be offered throughout Alberta.

More info: Visit www.climatechangecentral.com.

■ EnVest Environmental Stewardship Program

Offered by: EPCOR Merchant and Capital LP

Description: Program is made up of EnVest Renewable Energy and EnVest Energy Efficiency. EnVest Renewable Energy is a recognition and awareness program that allows your business to purchase green tags from renewable energy sources. The EnVest Energy Efficiency Program delivers electricity, natural gas, and water consumption reductions through a multi-staged energy efficiency process involving an initial assessment, detailed audit, project management, metering solutions and financing options.
More info: Visit www.epcor.ca.

■ Consumer Energy Efficiency Rebates

Offered by: Government of Alberta, Ministry of the Environment

Description: Offers energy efficiency rebates for Energy Star-qualified appliances to help Albertans reduce their greenhouse gas emissions.

More info: Visit www.climatechangecentral.com.

BRITISH COLUMBIA

■ Energy Conservation Assistance Program (ECAP)

Offered by: BC Hydro

Description: Program provides qualified low-income residential account holders with a home energy evaluation, and the installation of energy-saving products for free.

More info: Visit www.bchydro.com.

■ Power Smart Product Incentive Program

Offered by: BC Hydro Power Smart

Description: Must be a BC Hydro business customer who spends less than \$200,000 annually on electricity and who does not have a key account manager, or a residential strata customer (applying for projects in common areas only).

More info: www.bchydro.com.

■ PowerSense Partners in Energy Efficiency (PIE) Program

Offered by: FortisBC

Description: An agreement is signed between the customer and FortisBC, which works with the customer to determine the economics for energy-efficient upgrades to the project.

More info: Visit www.fortisbc.com.

■ CFL Bulb Rebate

Offered by: FortisBC

Description: Residential customers receive 50% back (up to \$5 per bulb) for every CFL bulb they purchase.

More info: Visit www.fortisbc.com.

■ Commercial Sector - High-Bay Lighting Initiative

Offered by: BC Hydro Power Smart

Description: Offers financial incentives and tools to help commercial customers identify, design and install more effective and energy-efficient lighting in high-bay facilities.

More info: Visit www.bchydro.com.

■ Efficiency Incentive Program

Offered by: LiveSmart BC in partnership with Terasen Gas, BC Hydro and FortisBC

Time frame: Before starting renovations, a Certified Energy Advisor will visit a home and give it an EnerGuide for Houses rating. The improvements and a second assessment

must occur before March 31, 2011.

Description: Provides financial support to households for energy assessments and energy efficiency building retrofits.

More info: Visit www.livesmartbc.ca.

MANITOBA

■ Power Smart ecoEnergy In-Home Energy Evaluation

Offered by: Manitoba Hydro

Time frame: After registration, evaluation must be completed before March 31, 2011.

Description: Evaluates how much energy a customer's home uses and how it can be made more efficient. Specific energy improvements may qualify for a federal ecoEnergy grant.

More info: Visit www.hydro.mb.ca.

■ Home Comfort & Energy Savings Program

Offered by: Manitoba Hydro

Description: Program includes Power Smart Residential Loan, Home Energy Evaluation Services and Home Comfort Information Initiative.

More info: Visit www.hydro.mb.ca.

■ Lower-Income Energy Efficiency Program

Offered by: Manitoba Hydro

Description: Lower-income households may qualify for an in-home energy evaluation and basic energy savings items, such as CFLs.

More info: Visit www.hydro.mb.ca.

■ Solar Water Heating Program

Offered by: Manitoba Hydro

Time frame: Customers must have an active residential solar water heating system installed and operational by October 2010.

Description: In partnership with Natural Resources Canada, the program offers a \$1200 rebate to homeowners who purchase and install a solar water heating system. Additionally, a \$12,500 rebate may be available when the customer participates in the ecoEnergy In-Home Energy Evaluation Program.

More info: Visit www.hydro.mb.ca.

■ Customer Contribution Time

Payment Plan

Offered by: Manitoba Hydro
Description: Customer with approved credit rating can apply for financing for an individual service extension, plant relocation or conversion from overhead to underground wiring facilities.
More info: Visit www.hydro.mb.ca.

■ Energy Finance Plan

Offered by: Manitoba Hydro
Description: Offers customers financing to improve their electrical or natural gas services.
More info: Visit www.hydro.mb.ca.

■ Power Smart Residential Loan

Offered by: Manitoba Hydro
Description: Among others, the loan covers things like lighting, electrical service and wiring. Loans range from

\$500 to \$7500 per residence with a minimum monthly payment of \$15 and an annual interest rate fixed at 4.9%.

More info: Visit www.hydro.mb.ca.

reduced energy costs (up to 15%).

More info: Visit www.hydro.mb.ca.

■ Commercial Lighting Program

Offered by: Manitoba Hydro

Description: Program offers guidance and financial assistance to commercial, industrial and agricultural customers when installing energy-efficient lighting in new construction and renovation projects.
More info: Visit www.hydro.mb.ca.

■ Commercial Parking Lot

Controllers Program

Offered by: Manitoba Hydro
Description: Upgrade from standard plugs to energy efficient parking lot controllers and receive \$50 per controlled circuit.
More info: Visit www.hydro.mb.ca.

NEW BRUNSWICK

■ Energy Advisor

Offered by: NB Power
Description: NB Power's advisors are spread throughout the province to help consumers explore energy options and provide advice.
More info: Visit www.nbpower.com.

■ Energy Advising

Offered by: Saint John Energy
Description: In 30- or 60-minute sessions, customers will receive free, basic energy use and conservation advice.
More info: Visit www.sjenergy.com.

■ Energy Loan Program

Offered by: Saint John Energy
Description: Provides loans up to a maximum of \$3500 for electrical upgrades such as panels, wiring, baseboard, etc. Payment terms are one to 5 years with a 5.75% interest rate.
More info: Visit www.sjenergy.com.

■ Existing Commercial Buildings Retrofit Program

Offered by: Efficiency NB
Description: Provides financial incentives of up to \$3000 toward an evaluation to determine the potential for energy efficiency upgrades in a commercial building and a maximum of \$50,000 toward the energy retrofitting project costs.
More info: Visit www.efficiencynb.ca.

■ Energy Efficiency Retrofit Program for Low-Income Households

Offered by: Department of Family and Community Services (FCS) in partnership with Efficiency NB
Description: Provides financial assistance to improve the energy efficiency of housing occupied by low-income households.
More info: Visit www.gnb.ca.

■ New Commercial Buildings Incentive Program

Offered by: Efficiency NB
Description: Provides financial incentives of up to \$60,000 to offset the costs associated with designing

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* **Small, Medium or Large Industrial Programs** are also available at www.efficiencynb.ca

NEWFOUNDLAND & LABRADOR

■ Thermostat Rebate Program

Offered by: Newfoundland & Labrador Hydro and Newfoundland Power
Description: Customers can get \$5 cash on electronic thermostats, or a \$10 rebate on Energy Star programmable thermostats. More incentives after signing up for additional takeCharge rebates.
More info: Visit www.takechargenl.ca.

■ EnerGuide For Houses Program

Offered by: Newfoundland & Labrador Hydro and Newfoundland Power
Description: Provides \$300 toward the cost of a home energy efficiency audit, and tops Natural Resources Canada's ecoEnergy Retrofit Home Program grant to a maximum of an additional \$1500 toward energy efficiency improvements.
More info: Visit www.takechargenl.ca.

NORTHWEST TERRITORIES

■ Renewable Doable

Offered by: Department of Energy and Natural Resources
Description: Programs are available for residential customers, businesses and lodges, communities and aboriginal governments. Funding is available for projects that reduce energy consumption and result in environmental benefits. The Community Renewable Energy Fund provides up to 50% to a maximum of \$50,000 annually for alternative energy technology projects. The Medium Renewable Energy Fund provides up to \$15,000 or one-third of the cost of a qualified alternative energy project for businesses and off-grid commercial lodges and camps. The Small Renewable Energy Fund provides up to \$5000 for qualified residential projects.
More info: Visit www.ntpc.com.

■ Energy Efficiency Incentive Program (EEIP)

Offered by: Government of the Northwest Territories
Description: Helps homeowners and consumers purchase energy-efficient models of products they use every day. Rebates are only available on products purchased from participating NWT vendors.
More info: Visit www.enr.gov.nt.ca.

NOVA SCOTIA

■ EnerGuide for Multi-Unit Residential Buildings (MURBs)

Offered by: Government of Nova Scotia
Description: Eligible MURBs may include a family home containing a separate apartment, or an apartment building with up to 20 units. Rebate amounts depend on the number of units

and the energy efficiency upgrades made to the building, with a maximum rebate of \$4500 per building.

More info: Visit www.conservens.ca.

■ Zero Interest Loans
Offered by: Government of Nova Scotia
Description: Customers who have had an EnerGuide energy home evaluation are eligible for a zero interest loan up to \$5000 for energy efficiency upgrades that must be

repaid within five years.
More info: Visit www.conservens.ca.

■ Residential Energy

Affordability Program (REAP)
Offered by: Government of Nova Scotia
Description: Provides low-income homeowners with energy efficiency upgrades, such as programmable thermostats, at no charge.
More info: Visit www.conservens.ca.

■ Eco-Efficiency Business Assistance Program

Offered by: Government of Nova Scotia
Description: The program is available to eligible small- and medium-sized companies to assist them in identifying cost-effective opportunities for improving their environmental performance.
More info: Visit www.gov.ns.ca.

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■ Small Business Lighting Solutions

Offered by: Nova Scotia Power Inc.
Description: Program begins with a free onsite assessment to determine how you can save, and ends with electrical contractors installing new, energy efficient lighting. NS Power covers 80% of the total costs.

More info: Visit www.nspower.ca.

NUNAVUT

We checked the Nunavut Power Corp. website and could not find any programs. If you know of any, please drop us a line.

ONTARIO

■ Power Savings Blitz Program

Offered by: Ontario Power Authority with local distributors (LCDs)
Description: Up to \$1000 in energy-efficient lighting and equipment upgrades to small businesses. Customers must have an account with a participating utility and an average monthly demand of 50kW or less.

More info: Visit www.powersavingsblitz.ca.

■ Electricity Retrofit Incentive Program (ERIP)

Offered by: Several Ontario local distribution companies
Description: Offers businesses a financial incentive to adopt more energy-efficient technologies and improve their bottom line. Applicants must be served by one of the listed distribution companies.

More info: Visit www.erip.ca.

■ Peaksaver Free Thermostat Offer

Offered by: Enersource Corp., Horizon Utilities, Hydro Ottawa, Power Stream, Toronto Hydro-Electric Systems, Veridian Corp.
Description: A small device is installed near the central air-conditioner to reduce its energy use during times of peak electricity demand (typically hot summer days).

More info: Visit www.peaksaver.com.

■ Residential New Construction Lighting

Offered by: Toronto Hydro
Description: Install Energy Star-qualified lighting fixtures in new residential construction projects and Toronto Hydro will pay you \$15 per fixture.

More info: Visit www.torontoenergy.com.

■ Business Incentive Program (BIP)

Offered by: Toronto Hydro
Description: Offers incentives to owners and operators of commercial buildings 25,000 sf or less.

More info: Visit www.torontoenergy.com.

■ Intelligent Parking Lot Controls

Offered by: Thunder Bay Hydro
Description: Commercial customers can purchase a unit that will cycle on/off based on the temperature outside, saving between 40% to 65% on electricity.

More info: Visit www.tbhydro.on.ca.

■ Industrial Energy Efficiency Program

Offered by: Ontario Power Authority
Description: The program is designed to assist eligible transmission-connected companies to fast-track capital investment in major energy efficiency projects.

More info: Visit business.everykilowattcounts.com.

■ Load Management Demand Response Programs

Offered by: Ontario Power Authority
Description: Helps organizations who are looking to manage their electricity consumption and costs through three demand-response programs.

More info: Visit business.everykilowattcounts.com.

PRINCE EDWARD ISLAND

■ ecoEnergy Audit Assistance Program

Offered by: Government of Prince Edward Island
Description: Provides financial assistance for an energy audit, performed through Natural Resources Canada's ecoEnergy Retrofit Program.

More info: Visit www.gov.pe.ca/oee.

■ Energy Efficiency Loan/Grant Program

Offered by: Government of Prince Edward Island
Description: Provides financing and direct subsidies for the implementation of recommended upgrades identified in the ecoEnergy Energy Efficiency Evaluation Report.

More info: Visit www.gov.pe.ca/oee.

■ Commercial Sector and Institutional Buildings Program for Energy Incentives (CSIPEI)

Offered by: Government of Prince Edward Island
Description: Provides financial incentives of up to \$3000 toward an energy evaluation and \$25,000 toward energy retrofitting project costs to help retrofit an existing commercial building to its maximum energy efficiency potential.

More info: Visit www.gov.pe.ca/oee.

■ Multi-Unit Residential Building (MURB) Upgrades Program

Offered by: Government of Prince Edward Island
Description: Provides financial assistance to owners of residential buildings (having two or more units and not more than three-storeys high) who want to make their buildings more energy efficient. The OEE will subsidize up to 50% of the cost of an energy audit

(the subsidy or grant will be based on the number of units in the MURB).

More info: Visit www.gov.pe.ca/oee.

QUEBEC

■ EnergyWISE Home Diagnostic

Offered by: Hydro-Quebec

Description: A personalized report that includes: energy-saving measures; a breakdown of home energy costs; an estimate of savings the customer could expect; and an estimate of cost of any work required and the time it would take for the customer's investment to pay for itself.

More info: Visit www.hydroquebec.com.

■ Residential Lighting

Mail-In Rebate

Offered by: Hydro-Quebec

Time frame: Offer is valid until December 31, 2010 only.

Description: Customers can receive a maximum of \$25 in rebates with the purchase of Energy Star lighting products (\$5 mail-in rebate on every \$10 spent before taxes).

More info: Visit www.hydroquebec.com.

■ Electronic Thermostats Mail-In and Instant Rebates

Offered by: Hydro-Quebec

Description: Customers can receive up to \$65 in rebates with the purchase or installation of electronic thermostats. With both the purchase and installation of electronic thermostats, a rebate of \$90 or more can be received.

More info: Visit www.hydroquebec.com.

■ Pool Filter Times Instant Rebate

Offered by: Hydro-Quebec

Description: Customers can get a \$10 instant rebate on the purchase of a pool pump timer at certain retailers.

More info: Visit www.hydroquebec.com.

■ Programmable Electronic Thermostat

Offered by: Gaz Métropolitain

Description: Program offers an incentive of \$30 when you install a programmable electronic Energy Star-certified thermostat.

More info: Visit www.gazmetro.com.

■ Empower Program for Building Optimization

Offered by: Hydro-Quebec

Description: Enables eligible customers to obtain financial assistance to implement electricity-saving measures in their buildings and do associated work.

More info: Visit www.hydroquebec.com.

■ Energy Innovation Assistance Program (PAIE) (formerly Program to Promote Energy Efficiency)

Offered by: Agence de l'efficacité énergétique

Description: The program aims to encourage the development of new technologies or innovative processes focusing on energy efficiency or

emerging energy sources by financially supporting project developers who actively contribute to the various stages of the innovation process. Financial assistance depends on the project but cannot exceed \$1 million.

More info: Visit www.aee.gouv.qc.ca.

** For more Programs and Rebates for Quebec, visit www.aee.gouv.qc.ca and click on Programs and Financial Aid.*

SASKATCHEWAN

Net Metering

Offered by: Saskatchewan Research Council

Description: Program will pay a fee equivalent to 35% of eligible costs up to a maximum of \$100,000 for projects with generating capacities of up to 100kW that comply with the local net metering policies.

More info: Visit www.ssrc.ca/ec.

Commercial Lighting Program

Offered by: SaskPower

Description: Earn instant savings when purchasing premium fluorescent T8 lighting at standard T8 lighting costs.

More info: Visit www.saskpower.com.

Demand Response Program

Offered by: SaskPower

Description: Provides industrial customers with financial compensation for reducing or shifting their electricity use.

More info: Visit www.saskpower.com.

Energy-Efficient Lighting Program

Offered by: Saskatchewan Research Council

Description: Reimbursement is established at 25% of the total project costs (equipment and labour) and any additional costs incurred by the municipality related to the lighting retrofits that are above this amount.

More info: Visit municipalities.ssrc.ca.

YUKON TERRITORY

Rural Electrification and Telecommunications Program

Offered by: Yukon Energy

Description: Program offers rural Yukoners with no access to electricity the means to hook up to a power source. It funds up to 25% of the assessed property value.

More info: Visit www.yukonenergy.ca.

Secondary Sales Program

Offered by: Yukon Energy

Description: Program gives eligible businesses the option of using hydro power to heat their facilities instead of diesel fuel or propane.

More info: Visit www.yukonenergy.ca.

Know of any other programs we should have here? Email the editor at acapkun@clbmedia.ca.

Standard Products T5HO fluorescent lamps

Standard's T5 high-output (HO) fluorescent lamps promise long life and high system efficacy, delivering energy savings and low maintenance. Available in a range of colour temperatures (3000 K to 5700 K), the TCLP-compliant lamps operate on programmed-start electronic ballasts. The T5HO lamp/ballast combo is a suitable replacement for metal halide systems; the company says replacing a typical 400W MH system with six F54T5HO lamps and two electronic ballasts instantly saves 100 watts. These lamps are also eligible for an extended warranty under the One System lamp/ballast warranty program.

STANDARD PRODUCTS

www.standardpro.com

Appleton Areamaster outdoor floodlight

Appleton's Areamaster 250/400V floodlight can be used with high-pressure sodium (HPS) or metal halide (MH) lamps. This integrally ballasted fixture promises easy installation, with a choice of either pole or yoke mounting. Its one-piece, pressure-clad housing is machined from copper-free

aluminum and, for added protection against adverse environments, the lens is made of thermal-shock, impact-resistant glass. Accessories available with the package include a 180° crossarm mounting bracket, aluminum top visor, and polycarbonate vandal shield.

APPLETON

www.appletonlec.com

Universal Lighting offers Vossloh-Schwabe electronic HID ballasts

Universal Lighting Technologies has partnered with Vossloh-Schwabe to bring electronic high-intensity discharge (eHID) ballasts into the Universal family of products. These ballasts can significantly reduce energy use and monthly operating costs in a range of applications, says Universal, including warehouses, big box stores, factories, parking lots, etc. The Vossloh-Schwabe line of eHID ballasts from Universal are suitable for metal halide lamps ranging from 20W to 400W, with energy savings up to 17% compared to magnetic HID ballasts, adds Universal. Vossloh-Schwabe eHID ballasts have a microprocessor that continuously monitors lamp characteristics during operation and adjusts lamp current to optimize lamp performance.

UNIVERSAL LIGHTING

www.unvl.com

Milwaukee unveils 6519-31 and 6509-31 Sawzalls

Milwaukee Electric Tool introduced new Sawzall reciprocating saws. Available in a 1 1/8-in. stroke length (6519-31) and 3/4-in. stroke length (6509-31), Milwaukee says the new saws cut up to two times faster and last up to two times longer. Both are powered by a 12A motor; a patented gear-protecting clutch extends gear and motor life by absorbing high-impact forces. The Quik-Lok blade clamp offers fast tool-free blade changes. To provide greater user comfort, a counter-weighted mechanism reduces vibration for smoother operation, and a redesigned front grip area provides better ergonomics. The tools have a five-year warranty.

MILWAUKEE

www.milwaukeetool.com

Extech RC200 tweezers multimeter

Extech's RC200 is a small, hand-held tool with selectable auto-/manual-ranging for measuring AC/DC voltage, capacitance, resistance, continuity and diode function in a circuit. For one-handed operation, squeeze the tweezers around a surface-mount component or test point for automatic component identification and testing. For ease of use, says Extech, the RC200 comes with an adjustment dial that allows you to optimize the tweezers' spacing. The RC200 has tips that can be removed and swapped with a test leads adaptor for voltage readings up to 600V.

EXTECH

www.extech.com

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Reed BS-150 video inspection camera

Reed Instruments has recently released its BS-150 video inspection camera, which you can use to get a glimpse into tight spots. The camera is capable of providing 2GB of memory for video or JPEG capture. The camera has a pistol-grip design and forward-facing controls; the colour TFT LCD screen measures 3.2 in. with 320x240 resolution, and the IP67-rated gooseneck imager head retains its configured shape. The BS-150 provides a viewing distance

of 15-25 cm and a viewing angle of 0° to 180°.

ITM INSTRUMENTS

www.itm.com

Ideal launches site to support HeatSeeker thermal imager

Ideal has launched a new micro-site dedicated to its HeatSeeker thermal imager. The site promises to help visitors educate themselves on troubleshooting applications for the HeatSeeker, from identifying

overloaded circuits and inefficient heating/cooling transfer, to locating overheated pumps, motors and transformers. Visitors can also view video demonstrations, an FAQ and white papers, plus sign up for Ideal Infrared Level I certification training courses.

IDEAL INDUSTRIES

www.idealindustries.ca

Eaton Power Xpert meter 2000 series

Eaton's Power Xpert meter 2000 series has measurement capabilities and integrated data analysis to identify power quality problems and trends, monitor circuit loading and manage energy utilization to identify excessive consumption. The meters have an embedded web server that enables users to view demand comparisons, trends and harmonics in real-time. There are three options available from the series: the Power Xpert 2250 meter, Power Xpert 2260 meter and Power Xpert 2270, each with its own focused characteristics.

EATON

www.eaton.com

Siemens 3M SWT-3.0-101 direct drive wind turbine

Siemens' 3M SWT-3.0-101 DD is a gearless machine that has a rotor diameter of 101 m. The prototype was installed close to the Danish town of Brande, where Siemens Wind Power headquarters is located and will be thoroughly tested before it is officially launched for sale in 2010. The company says that with fewer moving parts, the direct drive technology has the potential to significantly reduce maintenance time, which could result in even higher turbine availability. The turbine features a compact generator that requires no excitation power or control systems, nor slip rings.

SIEMENS

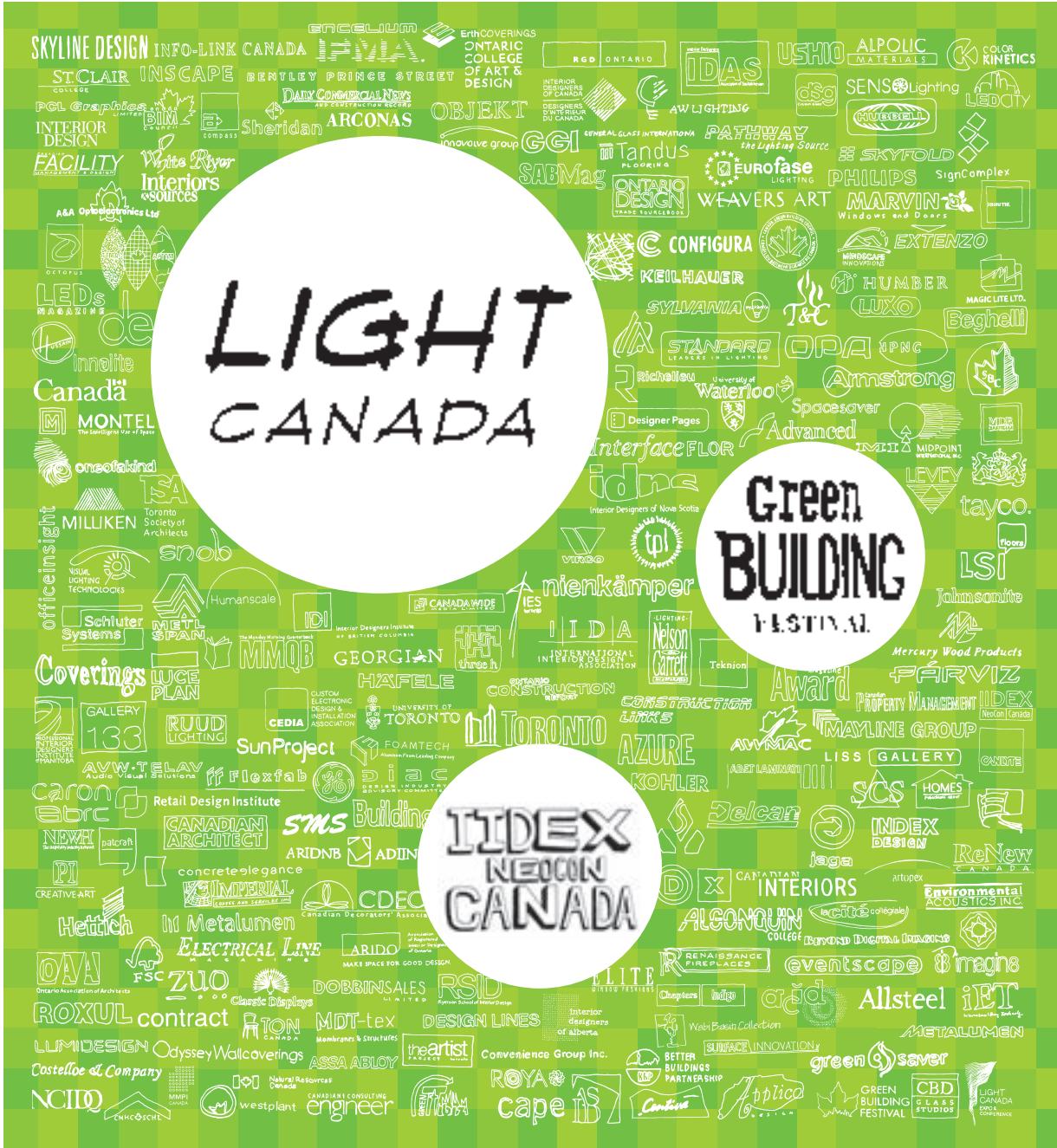
www.siemens.ca

Bodine upgrades its high-torque CG gearmotor

Bodine Electric Co. has upgraded and expanded its Type-CG variable-speed AC inverter-duty and permanent magnet DC gearmotors, which are designed for applications such as heavy-duty conveyor systems, medical equipment, and food processing and factory automation. The CG gearhead is paired with Bodine's variable speed electric motors: the 48R6, AC inverter-duty, and 42A7 permanent magnet DC motors. This integral gearmotor design allows the CG to deliver up to 1000 lb-in of torque—nearly twice the torque of any previous Bodine product, says the company.

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Large single or small parallel?

You have some choices before you when deciding on the best wiring method for large power circuits: large single conductors (such as 600 kcmil RW90) can be difficult to handle, while smaller conductors run in parallel can make conductor termination work a lot easier and make the whole job more cost effective. In fact, the installation of two conductors per phase in a parallel run consisting of No. 3/0 AWG RW90 copper would have a lower total cross-sectional area than the single conductor above (see Table 10 in the Canadian Electrical Code [CEC]).

CEC Rule 12-108 "Conductors in parallel" allows paralleling of copper or aluminum conductors provided they are at least No. 1/0 AWG larger in size. In addition, the circuit must be free of splices throughout its total length while the conductors must be the same size, length and insulation type, and terminated in the same manner.

Complying with a few of these conditions can be problematic. For example, satisfying the *same length* condition seems fairly easy... unless you are in the field looking a complicated cable routing layout. A duct bank with multiple turns presents an increased risk of mismatching conductor lengths. When one of the conductors is shorter, it will have lower impedance and, consequently, carry more current. This can lead to overheating at the conductor terminals.

Complying with the *no splices* requirement can be very expansive for little or no benefit other than satisfying the code's rule. In situations where it is necessary to move an existing supply service to a new building addition, extend an existing feeder, or repair a failed underground conductor, the best solution may be a splice.

When conductors are installed in parallel, the fundamental principle is to ensure the load current is equally shared.

One solution might be to ask the authority having jurisdiction (AHJ) for a special permission by means of CEC Rule 2-030 "Deviation or postponement" based on the following:

The circuit impedance and maximum load shall be measured after installation; the cable manufacturer shall be consulted and the post-installation analysis shall ensure the parallel conductors are terminated in an approved connector using an approved method to ensure equal division of current. The approved connectors are readily available in the marketplace. They are insulated multi-tap connectors, suitable for both copper and aluminum conductors, and are certified by recognized certification organizations.

This is a much better solution than, say, introducing a splitter at the end of a parallel run of cable, then starting another parallel run *off the same splitter*. Where deviations were allowed, past practice shows that using approved connectors can be a safe and cost-efficient solution. EB

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

Tackle The Code Conundrum... if you dare

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

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

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

Question 1

A dry-type transformer suitable for installation in an ordinary location shall be permitted to be installed within a spray booth for connection to the high-voltage leads of fixed electrostatic spraying equipment.

- a) True
- b) False

Question 2

High-voltage type TC cables shall not be installed in the same cable tray with low-voltage conductors, except where they are separated by ____.

Question 3

Plug fuses and fuse holders shall not be used in circuits exceeding 125 V between conductors.

- a) True
- b) False

Answers to Code Conundrum Electrical Business June/July 2010

Q-1: Where an extension ring is installed on a junction box, the useable space in the assembly shall be 1.5 times the volume of the junction box.

b) False. Subrule 12-3034(6).

Q-2: Where exit signs are connected to an electrical circuit, that circuit shall be used for no other purpose.

b) False. Subrule 46-400(2) provides an exception.

Q-3: In Class 1 circuits, the overcurrent devices shall be located...

a) at the point where the conductor to be protected receives its supply. Subrule 16-106(1).

Kris Paszkowiak is principal of CodeSafety Associates, a consulting firm serving the needs of the electrical industry. He holds a Master Electrician licence and has served numerous organizations over the years, including the Canadian Advisory Council on Electrical Safety, Committee on CE Code Part I and UL Electrical Council. E-mail CodeSafety Associates at kris.paszkowiak@codesafety.ca.

Always consult the electrical inspection authority in your province/territory for more specific interpretations.



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