

# PLANT

ADVANCING CANADIAN MANUFACTURING

Volume 74, No. 06 September 2015

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## Autonomous AUTOMATION

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finds power in its people

**SPECIAL REPORT**  
Maximizing energy efficiency  
for savings and sustainability

NEW TECHNOLOGY SECTION

### CIEN

CANADIAN INDUSTRIAL EQUIPMENT NEWS

#### HIGHLIGHTS

- Deep analysis of component failure
- ORPP: What you need to know
- Find your ideal lean future state
- Toth designs an elevator to space
- October is Manufacturing Month

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# Lower the beer barrier

**H**ow ironic that as Canada haggles with other global economies for a Trans Pacific Partnership free trade deal, some provinces are still clinging to parochial, protectionist barriers.

The provincial booze trade impediment was brought into the light with the announcement that New Brunswicker Gerald Comeau, 62, is mounting a constitutional challenge over the right to buy lots of beer from Quebec for his personal use without being charged and fined for committing an importing violation.

Comeau was caught up in an October 2012 sting during which the RCMP, apparently enjoying some free time from dealing with real criminals and serious crime, rounded up 16 drinkers who violated the New Brunswick Liquor Control Act.

Their crime?

Venturing into Quebec, buying more than the allowed 12 bottles of beer, and importing the contraband into their home province, the only jurisdiction in the country that makes this a crime.

New Brunswick adds an almost 90% mark-up to the base price of beer. In Quebec, where beverage producers deal directly with retailers, the price is roughly \$19 cheaper.

Little wonder the felons were making the trip to La belle province.

Comeau, caught with 12 cases of 12 and three bottles of alcohol, was fined \$292, which he is declining to pay, and good for him!

Why shouldn't he be free to buy his libations of choice, or anything else, in any province he chooses? His case is based on what the Fathers of Confederation had to say on the matter with Section 121 of the Constitution Act, which specifies "goods, produce and manufacture should be free into all other provinces."

The CFO of Moosehead Breweries, the province's oldest brewer speaking for the prosecution, offered some lame reasoning for maintaining a legislated cross-border limit. Dropping it might lead to increased bootlegging.

New Brunswick's concern in this case is purely dollars and cents. Alcool NB Liquor (ANBL) makes about \$165 million a year from its distribution monopoly. A senior vice-president testified if Comeau wins his case based on a constitutional challenge, it would take no time at all for producers to set up their own distribution, which would eventually put ANBL out of business.

What speculative nonsense.

Prime Minister Stephen Harper, on the campaign trail, called the provincial restrictions ridiculous, and noted the federal government brought in legislation to make the movement of beverages easier. But the provinces need to adopt the legislation too. And herein lies the problem. Provincial inertia is preventing all trade barriers from coming down. For example, marketing boards (a hot topic in the TPP discussions) continue to dictate where you get your eggs and dairy, and it's still easier to get a French Merlot in Ontario than some BC vintages. By the way, let's not overlook how restrictions on alcoholic beverages stifle the development of craft brewers and vintners who could be expanding their markets across Canada.

Karen Selick, litigation director for the Canadian Constitution Foundation, which is supporting Comeau's case, says a favourable ruling would have implications beyond the trade of alcohol. Good. Protectionist barriers and the red tape they create are of no value. They sap productivity, stifle investment and they're of no benefit to consumers.

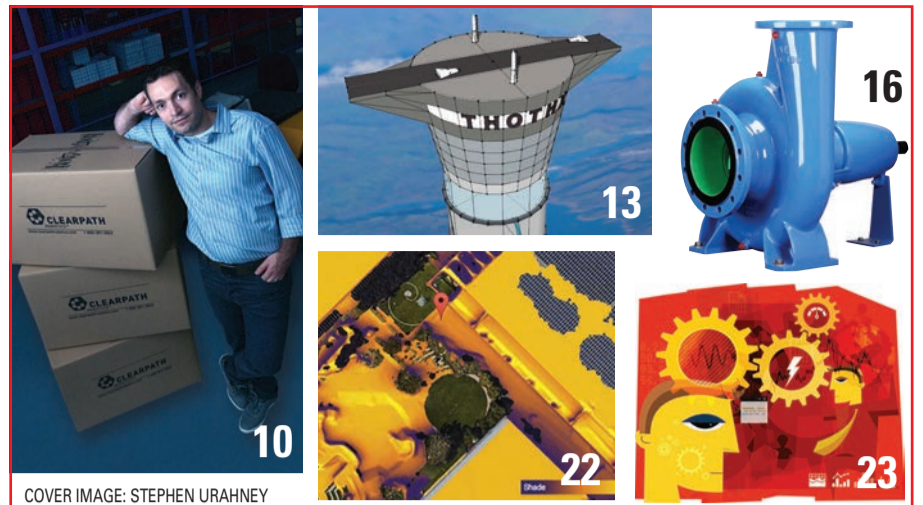
Indeed, Selick suggests revenues might increase if the tax was reduced. That's what happened when Manitoba opened its borders in 2012.

Last word goes to Comeau who questions why he should have to pay such a hefty surtax just to fill the government's pocket. "If the province wants people to buy beer here it can put the price down."

That's how it's supposed to work in a free market.

Joe Terrett, Editor

Comments? E-mail [jterrett@plant.ca](mailto:jterrett@plant.ca).



COVER IMAGE: STEPHEN URAHNEY

## Features

### » INNOVATION

**10 AUTONOMOUS VEHICLES** Clearpath's robotic revolution automates dull, dirty and dangerous jobs.

**13 PATENTS** Thoth Technology designs an elevator to space.

### » OPERATIONS

**14 THINK LEAN** Uncover your ideal future state with Deming's PCDA.

**BOOK REVIEW** The Lean CEO: Executives share their lean journeys.

**LEAN ALERT** Picking value streams that matter.

**15 CCOHS SAFETY TIPS** How to move heavy materials safely.

**RETROFIT** NRCan leads by example with an energy-efficient chiller installation.

**ANNIVERSARY** PEMAC celebrates 25 years.

**16 STRATEGY** Ten tips to achieve operational excellence.

**MAINTENANCE** Keys to peak pump performance.

### » MANAGEMENT

**17 EXPORTING** Indonesia, a prime export destination for Canadian companies.

**TRAINING** Ensure workers understand the importance of individual tasks.

**18 MANUFACTURING MONTH** CME wants you to share your story.

### » TRENDS

**19 RETIREMENT** What you need to know about Ontario's pension plan.

**22 RENEWABLE ENERGY** A plan to maximize solar power potential.

**NUCLEAR** Isowater's heavy water production process cuts emissions by 95%.

**23 SPECIAL REPORT** Roundtable discusses how manufacturers can be more energy efficient.

## CIEN

### » TECHNOLOGY

**27 CASE STUDY** Understand why components fail.

**SUPPLY LINES** Supplier news.

**28 PRODUCT FOCUS** Power transmission.

**30 PRODUCTS AND EQUIPMENT** What's new in industrial products and machinery.

**36 SHOW TIME** A preview of the Canadian Manufacturing and Technology Show.

**37 PLANTWARE** Hardware and software for managing plant operations.

## Departments

4 Industry View

5 Careers

6 Events

8 Labour Relations

9 PLANT Pulse

31 Trending...

38 Postscript

# PLANT

ADVANCING CANADIAN MANUFACTURING

Vol. 74, No. 06, September 2015

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We acknowledge the financial support of the Government of Canada through the Canada Periodical Fund of the Department of Canadian Heritage.



Printed in Canada

ISSN: 1929-6606 (Print), 1929-6614 (Online)

» Bulletins

**TransCanada Corp.** has reached distribution agreements with **Gaz Metro Limited Partnership**, **Enbridge Gas Distribution Inc.** and **Union Gas Ltd.** for its Energy East pipeline project to supply natural gas customers in Ontario and Quebec. The proposed 4,600-kilometre oil pipeline will have the capacity to transport 1.1-million barrels of crude per day from Alberta and Saskatchewan to refineries and ports in Eastern Canada.

Montreal's **WSP Global Inc.** is acquiring engineering consulting firm **MMM Group Ltd.** for \$425 million. The company has approximately 2,000 employees at 18 offices in seven provinces. WSP noted MMM is also known for its success procuring and delivering public private partnerships.

The **Altitude-JOGMEC Joint Venture** has received Alberta Energy Regulator approval for a two-year drill program at its Palisades property near Hinton, Alta. This year's drilling program will consist of 3,240 metres, including 15 reverse circulation and three core drill holes.

**Stantec Inc.** will expand its presence in the northeastern US with the acquisition of **Fay, Spofford & Thorndike**, or FST, a 280-person Burlington, Mass.-based engineering and environmental firm. The acquisition will close in October. FTS has nine offices in Massachusetts, New Hampshire, Maine, Connecticut and New York.

**Ontario Power Generation** and **Coral Rapids Power** have begun work on a new 28 megawatt hydroelectric generating station 90 kilometers north of Smooth Rock Falls, Ont. The \$300 million project, employing 220 workers, is to be completed in 2018. It will provide hydroelectric power to up to 25,000 homes.

**Canam-Bridges**, a division of the largest fabricator of steel components in North America, has signed a \$225 million contract with **Signature on the St. Lawrence Construction G.P.** to supply the steel superstructure for the approaches of the new Champlain Bridge in Montreal. The contract includes the fabrication of steel components for the new Île-des-Sœurs Bridge, but excludes the cable-stayed section of the Champlain Bridge. Fabrication will begin in the fall and deliveries will continue until the spring of 2018.

## Canada scores five WorkSkills medals

Team also takes home 10 medallions of excellence.

**OTTAWA** — Team Canada has collected five medals and 10 medallions for excellence at WorldSkills São Paulo 2015, a global showcase of the best in skilled trades and technologies training.

The Canadian team consisted of 29 young people from across Canada who participated in 27 out of 50 team and/or individual skill areas relating to trades, technologies and service-oriented careers.

The top competitors collected two silver and three bronze medals.

Canada's Best of Nation Award went to silver winner Sébastien Rémillard, 19, from Quebec City for his performance in the cooking competition.

Zachary Larose and Maxime Marineau, both 19 and from Hearst, Ont., picked up a bronze for mobile robotics. Tommy St-Martin, 19, from Notre-Dame-des-Prairies, Que., took home a medallion for welding.

WorldSkills, which occurs every two years,



Team Canada at WorldSkills São Paulo 2015 in Brazil.

PHOTO: SKILLSCANADA

brings together the best of member countries and regions and represent the best of their peers.

Skills/Compétences Canada is the Canadian member organization of WorldSkills International.

WorldSkills São Paulo 2015 had 1,189 registered competitors from 59 countries and regions.

Visit [www.worldskillssaopaulo2015.com](http://www.worldskillssaopaulo2015.com) for a list of winners.

## Halla Visteon reverses plant closure

Investment keeps Belleville, Ont. facility open, creates 70 jobs

**BELLEVILLE, Ont.** — FedDev Ontario has provided an almost \$2.2 million repayable loan to Halla Visteon Climate Control Canada Inc. to adopt new technologies and manufacturing processes and reverse the closure of one of its Belleville, Ont. plants.

The company will use the investment to launch a line of thermal engine control parts, including throttle bodies and electronic coolant valves.

The project at the College Street plant is to create up to 70 new jobs and maintain 25 existing positions.

Halla Visteon Canada, a subsidiary of global auto parts supplier Halla Visteon Climate Control, manufactures parts for climate control systems. Established in 1986, the company employs more than 340 workers at two facilities in Belleville.

Palcam Technologies Ltd.



Halla Visteon is developing a new line of thermal engine control parts.

PHOTO: HALLA VISTEON

will also receive \$1.84 million in federal funding through the Automotive Supplier Innovation Program to develop new aluminum die casting technologies that improve cycle times and reduce energy inputs and tooling costs. The investment will create up to 100 jobs.

The assistance is in addition to a \$3.6 million investment by Palcam, which makes precision machined components in Newmarket, Ont.

Novo Plastics has been award-

ed \$850,000, also through the program, to develop a new plastic muffler, an advancement the company said will integrate into lighter vehicle designs and improve fuel efficiency. The company will invest \$1.7 million and expects to add up to 350 jobs.

Meanwhile, the federal government has aligned new vehicle and fuel standards with the US to cut air pollution, including more stringent emission rules for passenger cars, light-duty trucks and heavy-duty vehicles starting with 2017 models.

Limits are also lowered for allowable sulphur content in gasoline.

Once the Tier 3 vehicle standards align with the 2025 vehicle model year, smog emissions will be reduced by 80% compared to the current Tier 2 standards.

## PLANT Off-Site

Brian takes in the view in Peru

*Brian Cressman, executive engineer at Ontario Drive and Gear Ltd. in New Hamburg, Ont. took some time during an excursion to Machu Picchu in Peru to take in the magnificent view and catch up on what's going on in PLANT.*

When you go on a business trip or vacation, be sure to take a copy of **PLANT** with you. If you have a photo taken while reading your favourite manufacturing publication in a remote, interesting or exotic location and we use it, you'll get \$75.

Send photos with name, title, company, address and phone number to Off-Site, **PLANT**, [jterrett@plant.ca](mailto:jterrett@plant.ca). Digital photos should be at least 5x7 inches and 300 dpi.



## U of Manitoba gets \$2.3M for innovation

**WINNIPEG** — The University of Manitoba is receiving \$2.3 million in federal funding for two innovation projects in Western Canada.

The university's Technology Transfer Office gets \$1.8 million to lead a pan-western consortium of Western Canadian Innovation Offices that will address issues by industry partnering with academic institutions and other research-based organizations.

And the Engineering Faculty gets \$500,000 to develop and calibrate new tools, systems and technologies for testing prototype hydrokinetic turbines in Manitoba rivers, as well as marine tides off the coast of Vancouver Island.

The aim is to develop commercialization opportunities for the global marine energy market.

## Public health care: It's not free!

Your family pays almost \$12K a year

**VANCOUVER** — Turns out public healthcare insurance in Canada isn't free after all. A typical Canadian family of four will pay \$11,735 in 2015, finds a Fraser Institute study.

The public policy think-tank points out Canadians pay "a substantial amount for health care through their taxes."

The Price of Public Health Care Insurance, using data from Statistics Canada and the Canadian Institute for Health Information, finds the average family earning \$119,082 will pay \$11,735 for public health care insurance in 2015. An individual earning \$42,244 pays \$4,222.

Between 2005 and 2015, healthcare costs for all families increased by 48.5%, dwarfing income (30.8%), shelter (35.9%) and food (18.2%).

Here is a breakdown of the cost of health care insurance for different family types:

- Unattached individuals: \$42,244, \$4,222
- 2 adults, 0 children: \$104,339, \$11,767
- 2 parents, 1 child: \$121,701, \$12,055
- 2 parents, 2 children: \$119,082, \$11,735
- 1 parent, 1 child: \$54,821, \$4,641
- 1 parent, 2 children: \$53,209, \$3,789

## Tigercat opens \$12M Ont. facility

Paris plant built with energy and cost savings features

**PARIS, Ont.** — Tigercat has opened the doors of its \$12 million plant in Paris, Ont., which will produce swing machines and cut-to-length attachments, including the company's 200 series loaders and the 800 series track feller bunchers, harvesters and loggers.

The 127,000 square-foot plant saves energy with light sensor skylights and bay door windows along with motion detector lights. The building's roof is a white rubber membrane that reflects UV rays to reduce heating and cooling costs and there are six overhead cranes in each bay. Specialized concrete was used for the floors to support the machines that will be produced in the plant.

The Brantford, Ont.-based manufacturer of



Tigercat's Paris, Ont. employees celebrate the plant's opening.

PHOTO: TIGERCAT

off-road equipment for the forestry industry now has nine locations across southern Ontario, a parts distribution and training centre in Georgia, a sales and distribution facility in Sweden and a dealer network that covers North and South America, Australasia, Africa, Europe and Russia.

The company exports 75% of its production.

## Ardent Mills acquires Mondelez mill

**DENVER** — Ardent Mills will acquire the Mondelez Canada flour mill in Mississauga, Ont., which produces hard and soft wheat flour.

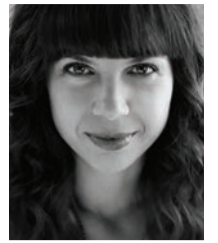
Ardent mills said the Mississauga facility will enhance its ability to serve Canadian bakeries and food manufacturers. The company intends to retain Mondelez's 30 existing team members.

Ardent Mills, a flour-milling and ingredient company based in Denver, also has operations in Saskatoon and Montreal, as well as a bakery-mix facility in Burlington, Ont.

## » Careers



Hartland Paterson



Laura Clunie



Steve Headden



Chris Huskamp

SNC-Lavalin has appointed **Hartland Paterson** executive vice-president and general counsel. The global engineering firm based in Montreal says Paterson will oversee legal, and ethics and compliance. He joins SNC-Lavalin after 14 years with aerospace firm CAE Inc., where he was a member of the executive committee.

Toronto-based Spin Master Entertainment (SME), a division of Spin Master Corp., which designs and manufactures children's toys and games, has appointed **Laura Clunie** vice-president, entertainment. She moves up from vice-president, girls and preschool. She'll spearhead all SME's business including creation, acquisitions, development, production, financing, distribution and newly launched digital platform, SpindoTV.

Linamar Corp.'s Skyjack division has appointed **Steve Headden** vice-president of sales, used and reconditioned equipment. This new position was created to help dealers upgrade their fleets with the newest Skyjack machines. Headden comes from a "competing company" where he had a similar role. Skyjack, based in Guelph, Ont., makes access and telehandler equipment.

IBC Advanced Alloys Corp., a manufacturer of rare metal alloys based in Vancouver, has appointed **Chris Huskamp** acting president of its subsidiary IBC Engineered Materials Corp. in Wilmington, Mass. Huskamp is an advanced automotive and aerospace materials expert and vice-president of business and technical development since 2014.

**Mayo Schmidt** is Hydro One's new president and CEO, the Toronto-based electricity transmission and distribution company that's about to go public. Schmidt is a former CEO of Viterria and its predecessor, the Saskatchewan Wheat Pool.

Sightline Innovation Inc. has established its Scientific Working Group and appointed HIV/AIDS physician-scientist **Frank Plummer** as its Chair. The Winnipeg-based machine and deep learning cloud services company specializes in advanced quality inspection and data analytics servicing multiple industries, including manufacturing.



Varden Labs founders Michael Skupien and Alex Rodrigues. PHOTO: VARDEN LABS

## Engineering students develop autonomous shuttle

**WATERLOO, Ont.** — Two University of Waterloo engineering students have created the first autonomous vehicle to move people on campuses and retirement communities.

Michael Skupien and Alex Rodrigues, second-year engineering students at the Waterloo, Ont. university and founders of Varden Labs, developed the short bus during an e-co-op term. The program run through Waterloo's Conrad Business, Entrepreneurship and Technology Centre has students launch businesses while earning a co-operative education credit.

## \$2.6M for EMC skills web portal

**OWEN SOUND, Ont.** — The Excellence in Manufacturing Consortium (EMC) is getting \$2.64 million from the Employment and Social Development Canada's Sectoral Initiatives Program to develop a new labour market information web portal for the manufacturing sector.

The non-profit organization, which helps manufacturers grow and become more competitive, says the new project will help address a shortage of available skilled workers.

The portal will feature up-to-date manufacturing-related information, including what

skills labourers and companies require, and which post-secondary institutions they should be looking at to meet their needs.

The organization will survey up to 5,000 manufacturers across the country to better understand their skills needs. Along with skills required, manufacturers will be asked about compensation rates, what work they do now and could do in the future, and workforce trends.

EMC also expects to survey 200 educators and government agencies for information to populate the portal.

## Waterloo unveils new \$9.3M brewhouse Kitchener facility to handle all craft beers



Cutting the ribbon at Waterloo Brewing's new home.

PHOTO: WATERLOO BREWING

**KITCHENER, Ont.** — Waterloo Brewing Co., the craft division of Brick Brewing Co. Ltd., unveiled its new environmentally friendly state-of-the-art brewhouse in Kitchener, Ont. on Aug. 13.

The new \$9.3 million facility, which will brew all of the Waterloo products and seasonal small-batch brews, features Bavarian brewing technology and equipment

that ensures sustainability in the brewing process through improved material use, lower energy consumption, reduced waste and lower wastewater discharges.

Event attendees toured the fully operational facility and sampled products, including Waterloo's soon-to-be-released small-batch Waterloo Smoked Applewood Roggenbier.

## » Feedback

### DRIVING OUT MANUFACTURING

Re: Ont. spending itself into economic crisis (PLANT, July/August 2015)

As an owner of a manufacturing plant in Ontario, I have to agree 100% with Niels Veldhuis's article. What's driving manufacturing out of Ontario is very likely the high cost of hydro.

The Ontario Liberals are still signing up people and companies for the solar and wind projects when we already have surplus electricity. Can you imagine a company that buys high and sells low? If I did this in my industry, I would've been of business a long time ago. There

really is something wrong here.

We continue to investigate moving our business to the US.

Selling off part of Ontario Hydro is just another fumble on the government's side and in the coming years, industry and the public will be paying for this blunder.

Bill Mechar  
Integrated Packaging Films, Inc.  
Ayr, Ont.

We'd like to hear from you. Send comments to [j.terrett@plant.ca](mailto:j.terrett@plant.ca) with your name, address and phone number. Submissions will be edited.

## Comaintel gets \$168K for new equipment

**SHAWINIGAN, Que.** — Comaintel Inc. has been granted a \$168,500 repayable loan through the Quebec Economic Development program to purchase new production equipment and expand into export markets.

The company, based in Shawinigan, Que., is a manufacturer of magnetic induction roll heating systems for equipment used in paper, cardboard, aluminum and steel production.

The funding will be used to purchase new equipment and carry out improvements at its manufacturing and R&D facilities, and to hire a market development specialist that will focus on global trade shows and exhibitions.

## SmartHalo makes bikes smarter

Pairs with smartphones as a navigation guide

**MONTREAL** — A Canadian technology company has developed an attachment that will instantly make your bicycle “smart.”

The SmartHalo, which at first look is more hockey puck-like than super-powered “connected” device, attaches to the handlebars of any normal bike and pairs with your smartphone to act as a visual navigation guide, complete with turn-by-turn signalling.

The idea is meant to keep cyclists’ eyes on the road and off their phone or smartwatch when navigating around town.

The unit is connected via Bluetooth

to a dedicated smartphone app. When a turn is approaching, the signal beams a white and green warning. When you’ve made a wrong turn, you’ll get a red flashing prompt. Another light signals a phone call.

The device, retailing for \$149, provides biking statistics, including distance travelled, average speed and calories burned, and an alarm alerts users if someone tries to take it off your bike.

When night approaches, it automatically turns on a front-



Hands and distraction free navigation.

PHOTO: SMARTHALO

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mounted headlamp that turns itself off when you stop and dismount.

SmartHalo's creators say the battery will last up to three weeks.

It's available to early adopters for \$99 via Kickstarter, where the company's campaign has already surpassed \$40,000 of its \$50,000 goal.

The devices are to be available by May 2016.

## » Events

### Industry Summit PTDA

Oct. 21-24, Chicago

The Power Transmission Distributors Association hosts this event that features networking and business solution sharing. Visit [www.ptda.org](http://www.ptda.org).

### CESCF 2015

Junewarren-Nickle Energy Group  
Oct. 27-29, Calgary

The Canadian Energy Supply Chain Forum (CESCF) brings together buyers and sellers along the energy supply chain. Visit [www.supplychainforum.ca](http://www.supplychainforum.ca).

### Advanced Manufacturing Canada SME

Nov. 18-19, Montreal,

The conference focuses on advanced manufacturing technologies, including automation and robotics, additive manufacturing/3D printing, materials and software for the Quebec market. Visit [www.advancedmfg.ca](http://www.advancedmfg.ca).

### 2016 AHR EXPO

International Exposition  
Jan. 25- 27, Orlando, Fla.

The international heating, ventilation, air conditioning and refrigeration gathering featuring more than 2,000 exhibitors, plus education sessions. Visit [www.ahrexpo.com](http://www.ahrexpo.com).

### ISCEA Supply Chain Technology Conference and Expo ISCEA

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# Secret TPP talks must stop, union says

## Unifor calls on officials to release details of trade deal negotiations

The president of Canada's largest private sector union says Canadian trade negotiators have "no mandate" to accept terms in Trans-Pacific Partnership negotiations that would damage key Canadian industries, including agriculture, dairy production and manufacturing.

"These talks have occurred in secret. Business leaders may know what's on the table, but Canadians don't," said Jerry Dias, president of Unifor.

Dias has called on Department of Foreign Affairs, Trade, and Development

**"This deal isn't even about trade. It is motivated by a desire to enforce a very pro-business set of rules and regulations on the entire Pacific Rim economy..."**

officials to release details of concessions they have made in the negotiations to provide Canadians with a full understanding of what's at stake heading into the upcoming election.

The union noted most TPP discussions so far have revolved around the fate of agricultural marketing programs in the dairy and poultry industries,

both sectors it contends would suffer major damage if demands to eliminate Canada's marketing rules were accepted. Unifor also believes the deal would harm many other industries, including automotive, machinery and other manufacturing.

While critics of TPP argue the trade deal will have disastrous consequences

for numerous Canadian industries and do little to boost exports, supporters say it would help Canadian companies looking to expand their businesses abroad and prevent the market share erosion that would occur if Canada is left out.

The TPP includes 12 countries that account for 40% of global GDP.

Unifor, which represents about 40,000 members working in the auto assembly and parts industries, pointed to the experience of the Canada-Korea free trade deal, which came into effect on Jan. 1 to confirm the lopsided impacts of Canada's free trade experiences with state-managed Asian economies. The union noted Canada's exports to South Korea fell 9% during the first six months of free trade, while imports increased 5%.

Because TPP would grant tariff-free access to the North American market to vehicles from Japan (potentially even vehicles with high levels of non-Japanese content, due to heavy use of low-cost parts from China, Thailand, and other non-TPP countries), the union argues it would cause a significant erosion of North American sales for Canadian-made vehicles and parts.

### Union wish list

Canada already has free trade deals with four of the countries participating in the TPP talks. Of the seven others, Japan is by far the most important.

Canada incurs an annual \$5 billion deficit in bilateral automotive trade with Japan, the union said. In 2014, Canada imported 139 times as much value in automotive products from Japan than it exported.

While Dias said the union supports measures that strengthen the quantity and quality of Canada exports, what Unifor wants to see in a final agreement are full democratic elections, human rights and labour freedoms for participating nations, strong trade balance provisions and the rejection of investor-state dispute settlements.

"Bitter experience shows that signing more NAFTA-style trade deals has exactly the opposite effect," said Dias.

The union is also warning other potential impacts include higher prescription drug prices (resulting from longer patents), restrictions on public procurement (of everything from public transit vehicles to pharmaceuticals), the creation of a quasi-judicial arbitration system solely for use of global investors, and limits on future regulatory action by governments in sectors ranging from telecommunications to transportation to banking.

While negotiations are ongoing, it's likely talks could be halted if an agreement isn't reached ahead of the Canadian general election set for Oct. 19, according to *Market Pulse*, a news website for investors.

Comments? E-mail [mpowell@plant.ca](mailto:mpowell@plant.ca).



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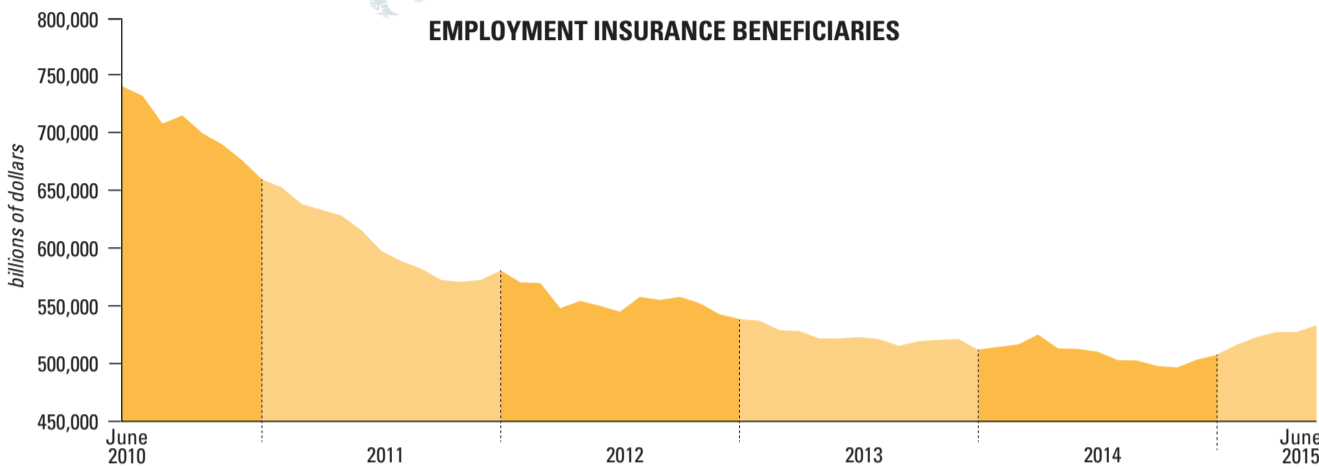


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# PLANT PULSE

## ECONOMIC DEVELOPMENTS AND TRENDS



### EI BENEFICIARIES RISE IN JUNE

There were 531,700 employment insurance beneficiaries in June, an increase of 5,200 or a 1% from May. Compared to a year ago, the number is up 2,300. Processing, manufacturing and utilities registered 46,620 for the month, down 2,500 from May. The numbers were up 7.7% in Alberta, the eighth consecutive increase. Ontario, the manufacturing heartland, saw a 0.7% increase.

Statistics Canada



# 400,000

The number of job vacancies across Canada in Q1. Western Canada had the highest rate but Ontario accounted for 62% of the vacancies in manufacturing. In trades, the highest rates were in industrial, electrical and construction (17,000), followed by maintenance and equipment operation (12,000).

Statistics Canada



Where the loonie was hovering in August. How low can it go? Here's a recap. It was around 75 cents through the 1990s, dropped to a low of 62 cents in 2002, was par with the US buck in 2011 before slowing down in 2012.

Statistics Canada

The Machinery and Equipment Price Index's decline in Q2, the first quarterly drop since Q2 in 2014. Manufacturing, responsible for almost 12% of the index total, was down 0.8%. The total MEPI increased 11.2% from Q2 last year, reflecting large price increases in Q1 this year. Blame the depreciation of the loonie.

Statistics Canada



The increase in manufacturing sales for 18 of 21 industries in June. Encouraging, but a sharper gain based on anticipated export growth was expected. Looking ahead, non-commodity exports are to turn in a more solid performance during the second half of the year.

TD Economics

### WAGE SLOWDOWN

Base salaries to rise 2.4%, according to a Hay Group study

Canadians can expect to see average base salary increases of 2.4% in 2016, according to a national survey by the Hay Group, a global management consulting firm.

The survey of 525 public and private sector employers conducted in June and July found the projected base increase to be 2.4%, down 0.2% from 2015. This continues a downward trend since the economic downturn in 2008/2009.

US projections are 3%, the same as 2015.

Seventy per cent of Canadian employers say they will provide base salary increases next year, much less than last year when 83% of employers said they would do so.

The Hay Group attributed the decline to continued economic uncertainty across many sectors in the economy and that more employers are now adopting a "wait and see" position before increasing their budgets.

With such high demand for skilled labour, workers in the oil and gas sector have traditionally received the highest salary increases. Collapsing oil prices over the last year means they're now looking at the lowest increases at 1.5% as employers shed jobs and the labour supply exceeds demand.

Credit unions (3%), leisure/hospitality (3%) and insurance (2.9%) will lead all sectors with higher increases than the national average.

### Taxes first, then food

The average Canadian family is spending more of their income on taxes than they do on food, clothing and shelter combined, finds a new study by the Fraser Institute.

The public policy think tank reports in 2014, the average Canadian family (including unattached Canadians) earned \$79,010 and paid 42.1% of their income in total taxes (\$33,272) compared to 36.6% (\$28,887) on food, clothing and shelter combined.

The report suggests this trend is a marked shift since 1961, when the average family spent 33.5% on taxes and 56.5% on food, clothing and shelter.

The total bill reflects both visible and hidden taxes families pay to the federal, provincial and local governments, including income, payroll, sales, property, health, fuel, alcohol, and other taxes.

The average Canadian family's total tax bill increased by 1,886% since 1961, dwarfing increases in annual food costs (561%), clothing (819%) and shelter (1,366%). Even after accounting for changes in overall prices (from inflation) over the 53-year period, the tax bill shot up 149.2%.

### PROFITS (SORT OF) REBOUND

There was an unexpected rebound in corporate profits in Q2, rising 12.9% after a decline of 10.6% in Q1. However, TD Economics observes after falling in two prior quarters, profits are still 3.8% lower than they were a year ago. And growth was not widespread, increasing in only 11 of 22 industries.

Good news for manufacturing though: profits were up 6.5%. Elsewhere, most growth came from a 49% turnaround in financial sector profits after two quarters of big declines.

TD economist Leslie Preston warns in a bulletin that renewed weakness in commodity prices casts a pall on prospects for resource producers in Q3. But there will be a return to growth in the quarter and weakness in profits should abate as the economy improves.



# \$52.5 BILLION

The value of energy investments this year, down 33% from last year's \$68.8 billion. As a result, business investment will be the weakest part of the economy, says the Conference Board of Canada. The Ottawa-based research firm is adjusting its growth forecast to 1.6% this year, citing the economic contraction in Q1, lower oil prices, a huge trade deficit and iffy global markets.

» Autonomous Vehicles

# Clearpath's ROBOTIC revolution

AUTOMATING THE WORLD'S DULLEST, DIRTIEST AND DEADLIEST JOBS



Breakneck growth hasn't stopped the Kitchener, Ont.-based manufacturer from thinking like it's still a start-up, which has helped to manage growth, drive innovation and cultivate a 21st century corporate culture.

BY MATT POWELL, ASSOCIATE EDITOR

There's a convergence happening in Canadian manufacturing. It's encouraging new companies and driving established ones to embrace a growing synergy between rugged hardware and sophisticated software for a new regime of smarter, higher tech and more agile manufacturers.

Clearpath Robotics Inc., a robotics innovator based in Kitchener, Ont., is one of those companies. It was launched in 2009 by three University of Waterloo mechatronics engineering pals bored with their internships, who enjoyed building robots as a hobby. Soon enough, the three amigos had formalized a vision: to automate the world's dullest, dirtiest and deadliest jobs with intelligent service robots.

"Powerful manufacturers today have a differentiated product, and there's a growing pattern in software enabled hardware," says CEO Matt Rendall, 30, who began his career developing complex electro-mechanical systems while holding various research and development positions in the automation, automotive and defense industries.

"We're unique in the sense that we develop valuable software that pairs nicely with our hardware."

Clearpath engineers driverless, heavy-duty yellow and black robots – think Tonka truck meets Pixar's Wall-E – equipped to travel by land, air or sea for mining companies, manufacturers, the agriculture industry and military applications. Basic models start at \$10,000 before modifications, such as mechanical

*Simon Drexler, Clearpath's director of indoor industrial products, will lead the company's latest venture: material transport inside industrial facilities.*

PHOTOS: STEPHEN URHANEY



Clearpath's flagship product for research and development, the Husky Unmanned Ground Vehicle.

arm extensions, camera and lasers.

Larger robots are priced closer to \$125,000. The company currently produces its autonomous robots – the Grizzly, the Husky, the Jackal and the Kingfisher – from its 25,000 square-foot Kitchener headquarters, which currently has about 80 employees. Forty of those are in the engineering department, emphasizing the manufacturer's focus on innovation and product development, says Bryan Webb, Clearpath's COO, who managed to stretch the company's initial \$360,000 in equity financing over four years and add 30 employees.

"Canadian manufacturing is, in general, a higher-tech product because we're traditionally much better with the high knowledge products and processes."

Clearpath's rise has been meteoric, especially by Canadian standards (according to Rendall, its compound annual growth rate is 250%). It turned a profit just 18 months after commercializing its first product, the Husky 4200 unmanned ground vehicle, and sold its 1,000th robot in 2014. This year a round of series A financing raised \$14 million in venture capital.

The company has also ventured into California's Silicon Valley to open an office by the end of this year that will attract up to 40 more highly skilled employees who will focus on product design. Chief product officer Mike Hanuschik will develop the US office, joining Clearpath after 14 years leading design and product management at daVinci Surgical Systems, a surgical robotics platform.

Clearpath currently works with more than 500 companies – including General Dynamics, Honda, Intel and Microsoft – in more than 40 countries and is continually enhancing its international reputation. Founders Rendall, Webb and CTO Ryan Garipey have been included on

*Business Insider's* '40 Under 40: People to watch in 2015' list, placing the relatively new Canadian entrepreneurs in the company of Facebook's hoodie-wearing Mark Zuckerberg and Yahoo's golden girl Marissa Mayer.

Some of Clearpath's other accolades include a place on the *Canadian Business* Top 15 Most Innovative Companies list, being recognized as one of Canada's Top 100 Small & Medium Employers, and has scored awards including a *Robotics Business Review* Top 50 Company designation and an Edison Award for Innovation.

**“ We're a hardware company that started with \$200 in the bank and became profitable in 18 months...by maintaining balance throughout the organization.”**

The robot-maker is definitely onto something. Management consulting firm McKinsey Global Institute suggests the global advanced robotics and automation sector will have an economic impact topping \$4.5 trillion by 2025. And a recent study by the Boston Consulting Group (BCG) forecasts the growing appetite for industrial robots in the world's 25 largest exporting nations is about 10% growth per year through 2025, overshadowing current growth of 2% to 3%.

There's also major cost and efficiency gains for industrial customers. The BCG report suggests robots like Clearpath's could reduce labour costs in Canada by up to 24%.

This isn't Skynet – the evil artificial intelligence system from James Cameron's 'Terminator' film franchise – Clearpath is committed to building robots that only do good. The company was the first robotics firm to support the Campaign

Against Killer Robots, a non-government coalition pushing for an international ban on the use of robots as autonomous weapons.

### Building the business

Despite the company's many early successes, Rendall maintains Clearpath still thinks of itself as a start-up, which has become a key tool to manage cashflow and encourage growth. Even the office is still outfitted with some furniture Clearpath inherited from the building's previous tenant.

"We were allergic to spending money,"

he says, adding that management carefully scrutinizes every spend and tries to make every dollar count. After all, one of the company's seven values is "spend it like it's yours."

Rendall notes the co-founders didn't pay themselves for the first two years.

"We're a hardware company that started during the height of a global recession with \$200 in the bank and we became profitable in 18 months – we did that by making sure we maintained balance throughout the organization."

Unlike software developers, hardware producers have a tougher time with cash flow planning, especially early on, Rendall says.

"We had no cash in the bank, so if a customer wanted to work with us, they had to pay up front – I don't know how we pulled that off."

Rendall calls those struggles lessons well learned. They taught the young

entrepreneurs the value of cash flow management and discipline, and paying attention to financial terms from clients.

"We structure payments with the work we're doing so we're not waiting around 120 days to get paid. That has been critical to managing our cash and growing our business."

### Lunar beginnings

Clearpath's "Aha" moment came when the University of Toronto came calling, seeking use of the company's Husky model as a stand in for the Mars Rover in a space simulation project run by the school and the Canadian Space Agency.

"That project was really important to us because it validated that someone would pay for what we were doing," says Rendall. "It proved that we weren't just building robots that you could tinker around with in a lab. These were real products that were able to do important things humans can't do on their own."

The four-wheeled robot, used to develop mapping algorithms for lunar surfaces, was equipped with laser-based three dimensional image sensors to roam around the University of Toronto's MarsDome.

Clearpath completed research robots for five other universities before the opportunity with the University of Toronto came up. It used this experience as a tool to gather market data across a variety of industries.

"Those projects were a great opportunity for us to isolate patterns in a number of markets and identify opportunities. And we got paid to gather that insight," says Rendall.

Some of the company's newer projects include a semi-autonomous robot deployed in Sweden that detects methane gas emissions; one in Australia that builds traversability maps to help plan navigation paths; and an autonomous robot improving the safety and efficiency of tele-operated mining. And municipalities could use its Kingfisher aquatic model equipped with sonar technology to monitor sludge buildup in the ponds used to collect storm water.

Clearpath has used SR&ED tax credits, plus funding from Ontario Centres of Excellence and IRAP, government support that Webb says has provided a boost as they move out of the start-up phase.

"We are continually designing, testing or prototyping on various products. So, compared to the US, the government support we have in Canada is better," he says, explaining that the US tends to have open contracts that companies are invited to bid on. That's instead of funding R&D directly, which he believes doesn't always address market needs.

Continuous innovation helps the company remain agile and move quickly through hardware cycles.

*Continued on page 12*

# Rolling on...

Continued from page 11

“The speed at which we can move nowadays is definitely changing how manufacturers operate. We can go from a sketch on a napkin to a functioning prototype in less than nine weeks,” says Rendall. “Five years ago that wouldn’t have been possible.”

Customization also plays a significant role in Clearpath’s manufacturing process. It produces autonomous vehicles for a number of industries and a variety of specific applications.

Webb says the company sources about 80% of its parts from Canadian suppliers and the Kitchener facility is dedicated to design and assembly, so metal fabrication and electronics assembly are outsourced to contract manufacturers. Base platforms for each robot are built in batches and customized options, such as cameras, sensors and GPS units, are added as orders come in.

“Having a base platform makes us more competitive because we have a tool that gives us a headstart with each project,” says Webb, adding that Clearpath is preparing for the challenges associated with increasing manufacturing volume.

“You have to decide if you’re going to develop that capacity in-house or if you’re going to outsource it – there’s a lot of considerations in that respect. Canada has some limitations in terms of suppliers, especially considering it might be a lot easier to recruit new capacity in places like Asia.”

He concedes, however, that maintaining manufacturing in Canada would retain the quality for which the company is known.

“We’re producing very high-tech products that require lots of knowledge workers to support them. We’re able to satisfy that need in Canada – in Asia, we wouldn’t get the same product out the door.”

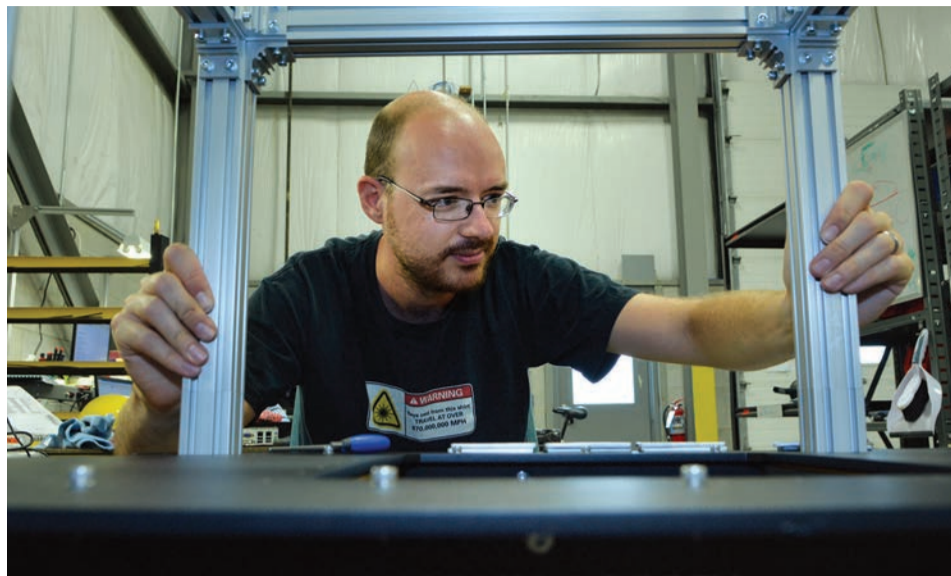
## Material movers

These are considerations Clearpath will need to analyze as it moves into its next venture and tries to tap an entirely new pool of customers.

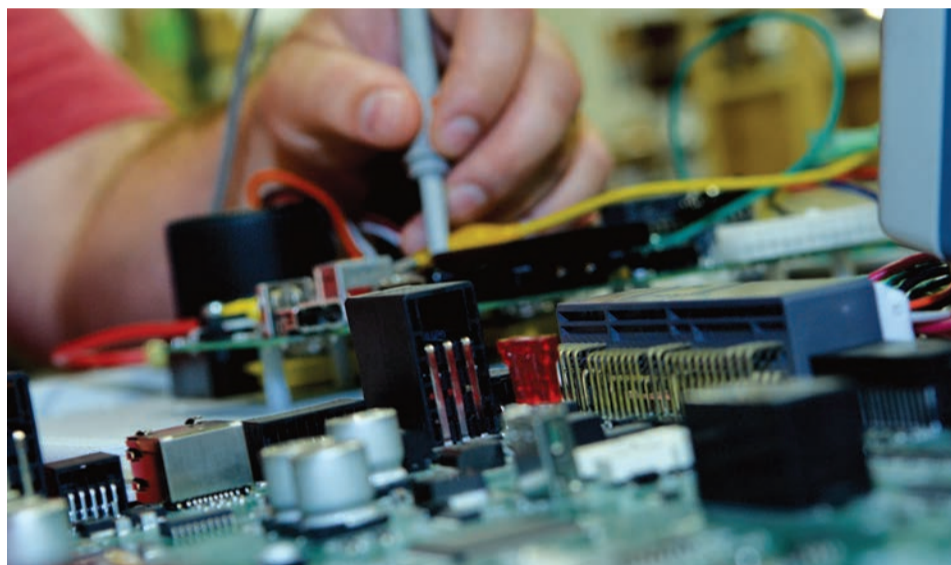
“We’re focusing on the automation of material transport inside industrial centres. By extension, our technology elevates manufacturing’s human workforce,” says Simon Drexler, Clearpath’s director of indoor industrial products.

The indoor industrial venture is the company’s latest initiative, a yet-to-be-named robot that will work in a materials handling capacity, picking materials workers need fetched.

The robots would move around a factory between the warehouse and the production line. Sensors and automated platforms tell the robot if something is in its way and provide another route. It can tell if a worker has moved to a different part of the production line and the vehicles won’t need magnetic tape on the floor or other similar aids to tell it where to go.



Jeff Schmidt, one of Clearpath’s systems integration technologists, fastens a payload mount to the Husky Unmanned Ground Vehicle.



A Clearpath team member prepares a circuit board for installation in one of the robots.



Some of Clearpath’s research platforms use Nintendo controllers to drive the robots making the user experience more intuitive.



System integration technologist Bryce Vondervoort handles a gripper system.

Drexler says the company is also working on an autonomous software that would enable third-party vehicles, such as forklifts, to communicate with Clearpath’s autonomous robots to create an interconnected ecosystem, similar to the Kiva robots used by e-commerce giant Amazon at its distribution centres.

“Now that you have real-time data on these autonomous vehicles, you can do interesting things in terms of data tracking,” says Drexler. “If you know where these vehicles are and how they’re moving, you can take that data to look at your system critically and understand how material flows through your facility.”

## Cultivating a culture

Rendall attributes a lot of Clearpath’s success and its drive for continuous innovation to a strong culture. Indeed, it’s become a buzzword within the entrepreneurial community, but it has become an asset for 21st century organizations and a critical tool in attracting top talent.

“The culture is the DNA of your organization. It allows you to attract people with the same values and the desire to complete the mission you’re bringing to the table,” he says.

Headquarters is dotted with obligatory start-uppy accessories, such as a foosball table. Visitors are greeted by robot receptionist “Rosie,” and there isn’t a cubicle in sight – a nod to the collaborative culture so popular among software start-ups that Rendall believes contributes to Clearpath’s energetic work environment.

Every few months, there are “hack days” when the development team focuses on whatever they want, a practice that Rendall believes drives their creativity and hones their skills.

Close relationships with universities, specifically the University of Waterloo and its mechatronic engineering department, also provide Clearpath with an “in” to top talent.

“Mechatronic engineers don’t want to go work at Facebook or Google – they want to built stuff,” says Rendall.

As its international scope has grown, he says the company is attracting top-tier talent from around the world, including engineers from Asia and Europe.

He also believes the company is at an advantage with a new generation of workers – you know, those pesky Millennials traditional companies seem to struggle with. Career paths are changing, Rendall adds.

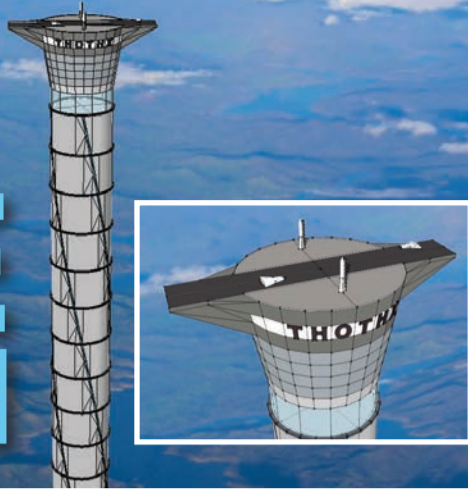
“People don’t go work for the same company for 30 years, collect their pension and retire anymore – nowadays it’s not as much about just collecting a paycheque. People want to make a difference.”

Rendall is proud of Clearpath’s effort to create an environment and culture where great work is done.

“When you get that culture right, it becomes magnetic.”

Comments? E-mail [mpowell@plant.ca](mailto:mpowell@plant.ca).

# Elevating SPACE EXPLORATION



A CAD rendering of the ThothX Tower and platform.

PHOTO: THOTH

## THOTH REACHES THE EDGE OF EARTH'S ORBIT

Ontario technology manufacturer wants to redefine space access and cut costs by up to 30%.

She believes the space tower, coupled with self-landing rocket technologies being developed by others, will herald a new era of space transportation.

The company also specializes in spacecraft naviga-

tion and tracking services, spectrometers, electronics software and hardware, thermal vacuum systems, and atmospheric and optical simulation services.

Roberts, in an interview with the CBC, said Thoth is also working on a Canadian patent and that the technology would work well with the reusable rocket technology being developed by Elon Musk's rocket developer, SpaceX.

The tower would withstand lightning, meteors and even category five hurricanes. The design includes gyroscopes to control the tower's movement and stabilize it during storms. The company hopes to build a 1.5-kilometre version within five years and Roberts believes the higher version could be built within the decade for about \$5 billion.

Talk about a ride of a lifetime.

Comments? E-mail [jterrett@plant.ca](mailto:jterrett@plant.ca).

BY PLANT STAFF

Those who get a bit wheezy in elevators may not want to read much further. For those of you still with us, a Canadian company has been granted a US patent for a 20-kilometre high space elevator. The freestanding space tower, announced recently in the US Patent and Trademark Office Official Gazette, has been developed by Pembroke, Ont.'s Thoth Technology Inc.

At its 20-kilometre height (and 230 metres in diameter), it would stand more than 20 times higher than any other man-made structure. As a space launch platform it could also support massive wind turbines to generate energy, be an alternative to satellites as a place to attach communications technology, and be an attraction for tourists seeking the ride of a lifetime.

Thoth, by day a manufacturer of miniaturized payloads for space and UAV platforms, says the technology will provide a new way to access space using completely reusable hardware while cutting rocket fuel costs by more than 30%.

"Astronauts would ascend by electrical elevator. From the top of the tower, space planes will launch in a single stage to orbit, returning to the top of the tower for refueling and reflight," said Brendan Quine, the technology's inventor who is Thoth's CTO and an associate professor of space engineering at York University in Toronto.

### Reaching for the stars

According to the patent documents, the tower would be comprised of a pneumatically pressurized structure formed from flexible sheet metal – stacked rings of Kevlar cells inflated with hydrogen or helium at an extremely high pressure.

The ThothX Tower has a carbon benefit – it would eliminate vertical flight and drop-off stages, which are very energy intensive.

The patent, also granted in the UK, covers the 20 kilometre height, but the tower could be built to more than 200 kilometres, reaching into low Earth orbit.

"Landing on a barge at sea level is a great demonstration, but landing at 20 kilometres above sea level will make space flight more like taking a passenger jet," said Caroline Roberts, Thoth's president and CEO.

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Peter Omran

Account Manager

WFS Ltd.,  
an Acklands-Grainger company  
Mississauga, Ontario

"When I visit a customer, I keep my eyes open for problems I can help solve. By offering solutions, I become my customer's go-to. It's my purpose during each visit. I take pride in that."

At Acklands-Grainger, we take a special pride in solving problems, not just selling products. We find ways to make our customers' businesses stronger by finding solutions to problems big and small. It's how we do business every day.

Peter Omran is an example of this thinking. One of his customers, an automotive parts manufacturer in Ontario, had a piece of machinery that was critical to production. What the customer didn't have, though, was a maintenance kit for the machine. The kit had been discontinued and without it, an otherwise functional piece of equipment would effectively become obsolete.

Get the full story of how Peter solved this problem, as well as other examples of Acklands-Grainger team members finding solutions, by visiting:

[AcklandsGrainger.com/ProblemSolved/Peter](http://AcklandsGrainger.com/ProblemSolved/Peter)

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» Think Lean

Change up Deming's cycle to CAPD and combine with value stream mapping to identify the waste and progress to the ideal future state.

BY RICHARD KUNST

Many manufacturers subscribe to value stream mapping (VSM) as an opportunity to "learn to see" waste within their processes, but it seems the tool is an initiative rather than a solid (yearly, at least) management practice conducted. Also, many organizations use the Deming cycle (Plan, Do, Check, Act or PDCA) formally or informally.

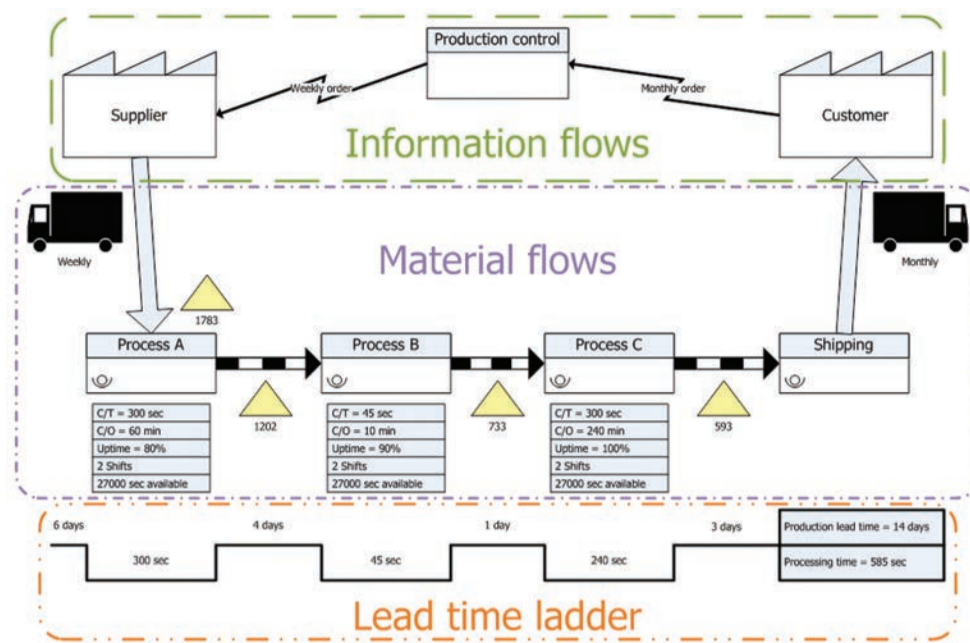
Both are great management techniques. By changing the order of the Deming cycle to Check, Act, Plan, Do (CAPD) and imposing it upon your VSM, your organization will reap significant benefits.

**CHECK.** As you draw your "current" state map, walk the value stream and if you can't see, feel touch, taste or smell the evidence, what you're being told is just a story. Folks are usually afraid to be honest about the gremlins that have invaded the value stream. Constantly check the current state against your control plans and/or the original quoted process plan a product or service.

In one organization the check phase was used to monitor specific metrics annually to see if initiatives were actually delivering the desired results. For example, the daily monitoring and recording of scrap generation was abandoned, focusing instead on the annual VSM exercise as the review point. Using other techniques, team members would quickly identify when a deviation in process began to generate scrap above the norm. After calculating the time being spent monitoring and inputting daily scrap data, it was evident the equivalent of 14 people could be diverted to scrap reduction and yield improvement.

**ACT.** As you conclude your current state and you have a list of deviations based on your control plan, it's time to act! If customer requirements have crept into your value stream as changes, review the cost impact. Will the customer pay for the requested changes? Does the customer see the changes as truly adding value? Also remove intermittent changes that may have allowed non-value add activities to creep into the value stream. This is also a good time to compare your current state map to your costing model to ensure they are in sync.

When leaning out a process, immediately assign personnel to other activities such as 5S or set-up reduction. If your process change isn't working, parachute the resource back into the



Value stream mapping employs standard symbols. Knowledge of these symbols is essential to correctly interpret production system problems. ILLUSTRATION: DANIEL PENFIELD

# Map your FUTURE

## HOW DEMING'S PDCA AND THE VALUE STREAM GETS YOU THERE

process without impacting customer needs.

**PLAN.** Create a future state map that can be completed and implemented within the next 12 months with existing or justifiably acquired resources. Inspire the mapping team by introducing them to the 50% rule: reduce inventory by 50% within the value stream, reduce the distance travelled by the goods, services and team members by 50% and improve your through-put yield by 50%.

Creating the ultimate state should involve others within the organization. Start with how to reduce process steps or the part count by 50% without impacting value to the customer. This will require significant involvement from engineering in product design and potentially the introduction of increased automation. Spend time focusing on standardization across various product lines that will allow you to run a higher volume of mix model combinations.

Let the creative minds wander. You could end up with a design that's a game changer.

**DO.** Harnessing time and resources is a challenge. Leaders need to reinforce

discipline and accountability against a strong project management infrastructure. If planning is balanced each month's bottom line should improve with additional cash as projects are completed.

Include a visit to the gemba so you and your team can feel, touch, taste and smell the improvements being made.

Some final thoughts: a current state map without a future state map is a waste of time since you're accepting what's currently happening without a desire to improve. A future state map without an ultimate state map is accepting mediocrity. And a budget or annual operating plan not supported with VSMs is just a wish. The goal must be to create a unified, structured approach to improvement with incremental milestones.

*Richard Kunst is president and CEO of Cambridge, Ont.-based Kunst Solutions Corp., which helps companies develop evolutionary management and implement lean solutions. Visit [www.kunstso-lutions.com](http://www.kunstso-lutions.com). E-mail [rkunst@kunststartof-solutions.com](mailto:rkunst@kunststartof-solutions.com).*

**Comments? E-mail [jterrett@plant.ca](mailto:jterrett@plant.ca).**

» Book Review

### Leading the lean journey

CEOs tell their success stories

Lean manufacturing succeeds best with the CEO and senior management inside. Toronto business writer Jacob Stoller demonstrates how pivotal the chief executive's involvement can be in his new book, *The Lean CEO, Leading the Way to World-Class Excellence* (McGraw Hill).

Stoller (who has written for **PLANT**) has interviewed 28 mostly US corporate leaders to discuss their companies' lean journeys. What's most striking about their stories is how they shifted away from traditional hierarchal and/or autocratic management, standard cost accounting, and producing stuff in large batches.

Lean is all about eliminating waste and to do so everyone must pull together to continuously improve processes, but it only happens when people on the plant floor and those working in the front

office are believers. These CEOs recognize the people closest to the work aren't mere units of production: they know what's going on; they know where the problems



are and will most likely be the ones who provide solutions. They also recognize the importance of eliminating silos, changing the corporate culture and aligning what's going on in the plant to the company's strategic direction.

Stoller provides many examples of impressive outcomes. PLZ Aeroscience, a designer and manufacturer of specialty aerosol products, nearly tripled revenues to \$425 million over its five-year lean journey. Dan Ariens, chief of Ariens Co., recounts how lean saved the family business (manufacturing lawn and garden machinery, and agriculture equipment). And many others describe how lean helped get them through tough or stagnant times with impressive financial results, ultimately creating much stronger businesses.

The details of their journeys, challenges, successes and failures will be useful to anyone embarking on, or involved in a lean transformation. But the key take away is the importance of lean's philosophical underpinnings. The CEOs demonstrate a workforce that believes is the foundation of a sustainable lean culture, but that belief must also come from the top.

The book is available in bookstores and on Amazon.ca in digital and hard copy.

(ISBN 978-0-07-183306-6/MHID 0-07-183306-04)



## LEAN ALERT

Pick value streams that matter, says Judy Worth, a writer and Lean Enterprise Institute faculty member in an online post at [www.lean.org](http://www.lean.org) (Community, The Lean Post). They should link to your strategic plan, annual goals and balanced score card performance so be clear about your customers' requirements, the major value streams and how well those streams are performing.

Source: *10 Tips for Getting the Most Value from Value Stream Mapping*

## » CCOHS Safety Tips



There are different types of hoists, but precautions are similar.

PHOTO: THINKSTOCK

# Moving a HEAVY load?

## HOW TO HOIST MATERIALS SAFELY

**W**hen a heavy load has to be moved or lifted, using a hoist can make the job easier and safer.

In addition to always following the manufacturer's recommendations, apply these workplace safety tips:

- Inspect hooks, ropes, brakes and limit switches daily for wear and damage.
- Ensure upper and lower hooks swivel.
- Replace worn chain, wire or fibre rope immediately.
- Keep wire ropes and chains lubricated.
- Post the hoist's safe load limit and don't exceed it.
- Ensure the hook area is directly in line with the shank.
- Place the load on the lower hook directly in line with the hook shank.
- Remove slack from the sling and hoisting ropes, and all loose materials, parts, blocking and packing before lifting.
- Lever-operated hoists pull in any direction, but maintain a straight line. Side pulling or lifting increases wear and sets up dangerous stress levels on hoist parts.

- One person only to pull hand, chain and lever hoists.

- Pushing a loaded hoist is safer. To pull, tie a rope around the load.

- Clear everyone away from the load before hoisting.

- Hoist directly over the load to prevent swinging.

What **NOT** to do:

- Lift people.
- Pass a load over people.
- Tip a load. This makes the load unstable and weakens the hook and hoist.
- Insert the point of the hook in a link of the chain.
- Hammer a sling into place.
- Leave slings dangling from the load hook.
- Raise loads higher than necessary to clear objects.
- Leave a suspended load unattended.

*This article was provided by the Canadian Centre for Occupational Health and Safety (CCOHS). Visit [www.ccohs.ca](http://www.ccohs.ca).*

## » Anniversary

### PEMAC celebrates 25 years

#### Promoting education and maintenance excellence

The Plant Engineering and Maintenance Association of Canada (PEMAC), a national not-for-profit outfit based in Mississauga, Ont. that provides education and maintenance management certification, is celebrating its 25th anniversary.

A group of people involved in plant and facility maintenance and engineering established the organization in 1989. Its not-for-profit charter followed in 1990.

Over the next nine years, PEMAC developed the Maintenance Management Professional (MPP) program through a partnership with PEMAC volunteers, the Colleges of Ontario Network for Education and Training (CON\*NECT),

and Durham College, which hosted the program's first students in 1999. Graduates collected their certificates in 2001.

Now with 800 graduates, the MMP program is offered through colleges, universities and technical institutes Canada.

PEMAC's annual MainTrain conference, inaugurated in 2004, is the leading professional development event for maintenance and physical asset management in Canada. And in 2011, the association joined the Global Forum for Maintenance and Asset Management to provide members with global best practices.

For a complete history, visit [www.pemac.org/newsletter](http://www.pemac.org/newsletter).

## » Retrofit

### New chillers cut energy use

Natural Resources Canada is leading by example, demonstrating to manufacturers and others what can be done to lower energy use. Its Sir William Logan Building in Ottawa uses much less energy now thanks to new chillers and associated equipment.

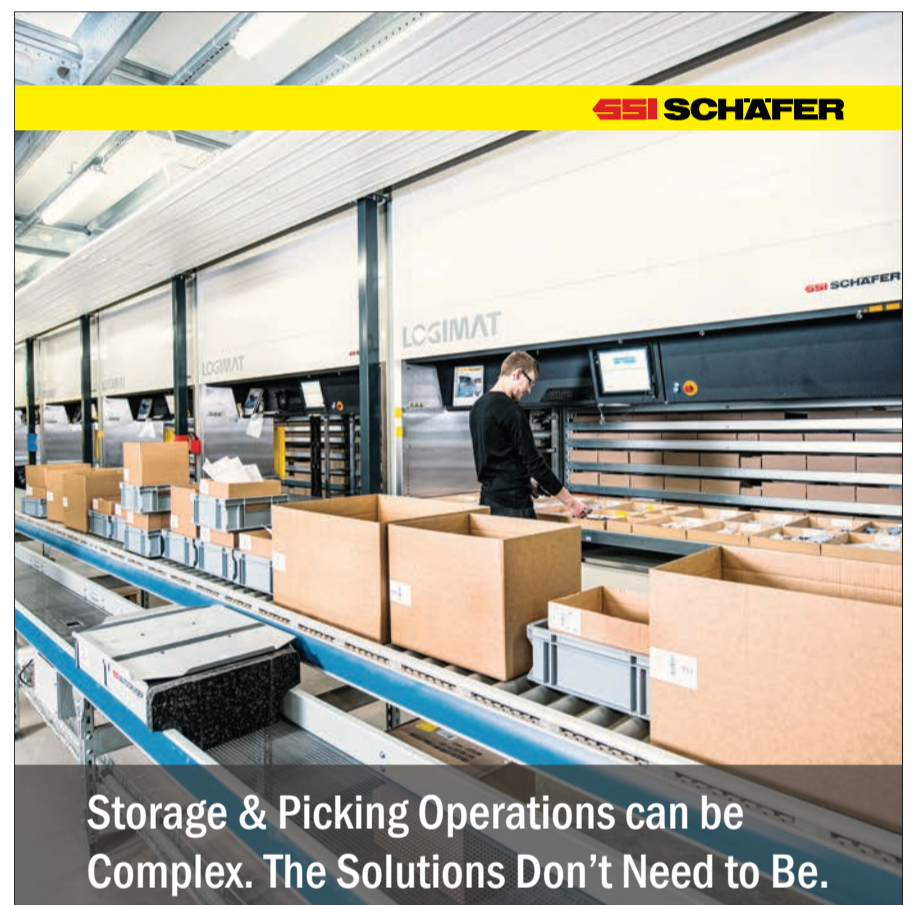
The \$635,000 project was part of Public Works and Government Services Canada's (PWG-SC's) goal to reduce greenhouse gas emissions from federal buildings to 17% below 2005 levels.

PWGSC, responsible for federal building maintenance, is partnering with Hydro Ottawa in a joint initiative that provides rebates to offset the cost of energy retrofits.

A few years ago, the two 40-year-old chillers in the Sir William Logan Building, struggling to cool the 21-storey tower, were ready for replacement. It was decided new, energy-efficient chillers were the answer, plus variable frequency drives installed on the distribution pumps and motors.

The chillers never run simultaneously, and they're saving about \$80,000 in annual electricity costs while avoiding 122 tonnes of GHG emissions. Payback is six years, thanks in part to the \$152,216 Hydro Ottawa incentive.

Source: National Resources Canada



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» Strategy

## How to be excellent 10 tips to get you there

Setting high standards for excellence in maintenance is easy, but accomplishing it is more challenging.

Andrew Thorne, vice-president of mining and operational excellence at Cameco Corp., a uranium company based in Saskatoon, defines operational excellence as “identifying the right things to do and doing the right things right all the time.”

He provided 10 tips to help you do so in a keynote presented at the 2014 MainTrain maintenance conference in Niagara Falls, Ont.

1. Find a good reason for change.
2. Speak “executive management.”
3. Get strong support from all levels of the organization.
4. Define the “what’s in it for me?”
5. Focus on employee behaviours.
6. Follow the money and seek out quick wins.
7. Use every opportunity to communicate.
8. Use your employees to solve the issues.
9. What gets measured gets done.
10. Safety is the top priority.

Andrew Thorne leads Cameco’s operations at the Cigar Lake mine, Rabbit Lake mine, its US mining ventures, and the company’s overseas efforts to reach world-class standards in operational excellence.

» Maintenance

# Overhung PUMPS

## HOW TO MAINTAIN PEAK PERFORMANCE

Become familiar with the pump’s proper performance, closely monitor its operation and quickly correct problems to avoid interruptions.

A pump breakdown can bring production to a halt so here are some troubleshooting tips to help you avoid potential problems.

In most end suction centrifugal

pumps the radial or line bearing, located closest to the stuffing box, handles most of the radial loads put on the impeller. The other bearing in the power end of the pump, located close to the coupling, is the thrust bearing.

Low or medium speed pumps usually have oil bath lubrication. The oil should be at the centre of the lowest rolling element. A sight gauge will monitor the proper oil level, which is maintained by a constant level oiler.

A single centrifugal pump impeller generates thrust in the direction of the suction eye, keeping the shaft in tension. This is because the impeller discharge pressure acts on both the front and the back shrouds. The rear shroud has a larger surface area, so there’s a thrust toward the eye. Almost all pumps thrust toward suction.

On small low-pressure pumps the thrust is relatively small. But as pressure rises, the thrust must be compensated to avoid the need for larger thrust bearings. The most common way to achieve this compensation is to use balancing holes. They relieve pres-



Flowserve’s overhung, end suction industrial process pump for water supply and distribution.

PHOTO: FLOWSERVE

sure on the back shroud by providing a flow path to suction, which reduces axial thrust. Close-fitting clearances between the impeller and the casing also help reduce the pressure on the lower part of the rear shroud by throttling flow.

Pump-out vanes on the rear shroud also reduce thrust. These vanes pump the high pressure liquid back into the main flow, reducing the pressure acting on the back shroud.

Keeping water and moisture out of overhung pumps is a problem.

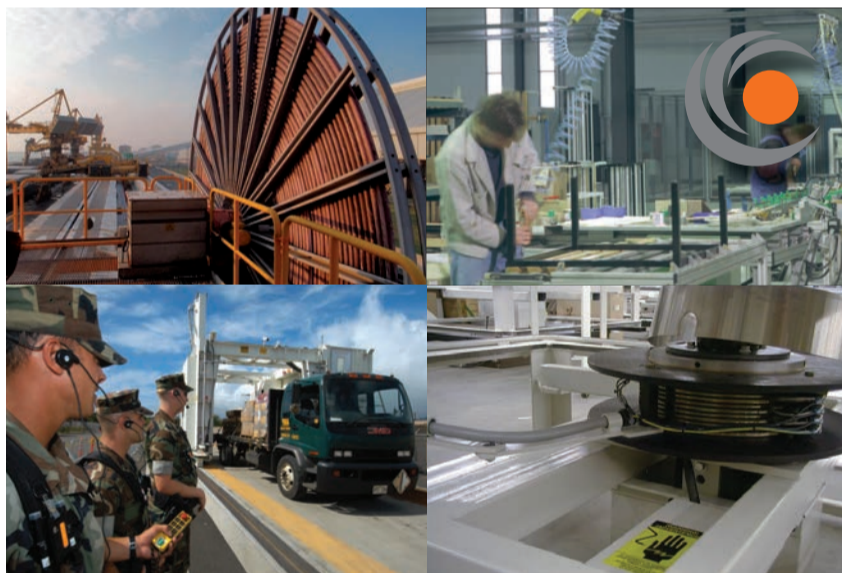
### Using seals

Using flinger rings is usually the most effective way to protect bearings from moisture. Keeping bearing oil hot is a poor practice since bearing life is directly related to heat. Many commercially available pumps do not have enough oil capacity. The minimum should be two litres.

Seals are usually not very effective. Grease or lip seals have a useful life of about 2,000 hours, equal to 84 days when the pump runs 24 hours per day. Labyrinth seals are superior to lip seals but are not totally effective because they seal with non-contacting surfaces. There are, however, some new labyrinth seals that come with a static O-ring that provide superior static stability. — Steve Gahbauer

Source: Michael Dufresne, customer support services at Sulzer Pumps (Canada) Inc. in a presentation to the Hamilton Section of the Society of Tribologists and Lubrication Engineers (STLE).

Comments? E-mail [jterrett@plant.ca](mailto:jterrett@plant.ca).



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### TROUBLESHOOTER CHECKLIST

- Maintain fits, impeller balance and oil levels.
- Use balanced closed-loop oilers if condensation is a problem.
- Make sure O-rings are round, not oval, and they have a correct profile.
- Use bearing isolators to keep oil clean and water out.
- Maintain alignment, running clearances and suction plate running clearances in open impeller pumps.
- Use application-appropriate bearings with correct internal clearance.
- Set back-to-back thrust bearings with correct loading.
- Maintain end float.
- Never mix balanced and unbalanced impellers to avoid thrust problems.
- Focus on measuring, trending and recording. Observe changes.



## » Exporting

President Jokowi's efforts to clean up crony capitalism, the power of the "elites" and endemic corruption could unleash real economic growth.

BY MARK DRAKE

New brooms sweep clean, as the saying goes, but not very easily in Indonesia, where there are more than 300 ethnic groups and 700 different living languages, 6,000 inhabited islands (many more uninhabited), and where democracy is a relatively new concept.

International trade has been conducted from there for more than 600 years. Since independence in 1946 the predominantly Muslim country has faced several natural disasters (it lies right on the ring of fire), separation issues, extensive corruption, turbulent politics (dictators and nepotism) and rapid economic change.

Recently elected president Joko Widodo (known to everyone as Jokowi) plans to clean things up. If he is successful, particularly in the reduction of crony capitalism, the power of the "elites" and endemic corruption, he could release the potential for real economic growth in the country, with its huge population, growing middle class (in spite of much poverty) and abundant natural resources. Indonesia is the world's largest exporter of thermal coal and palm oil, plus it has major reserves of tin, nickel, oil and gas. Recent annual growth has been between 5.8% and 6.2%, inflation is about 6.4%, and GNP per capita is US\$3,580.

Indonesia is ripe and ready for Canadian exporters and investors. As the *Globe and Mail* reported, Canadian entrepreneur extraordinaire Sir Terence Matthews has just opened an office in Jakarta for his investment company Wesley Clover, and considers the country to be like "China in the 1980s" – ready for an impressive growth spurt.

Bilateral relations with Canada are good, and we are involved in many of the same organizations: ASEAN (Association of SE Asian Nations – whose secretariat is in Jakarta), APEC, the WTO and the G20.

Export Development Canada ([www.edc.ca](http://www.edc.ca)) describes the country as a "key market" and identifies opportunities in agriculture, consumer goods (for the growing middle class), construction/infrastructure (improvements badly needed throughout Indonesia), machinery, power generation and telecom.

Other areas of potential interest are mining, oil and gas, aerospace and financial services.

Canada already sells about \$2 billion to the country, our largest market in ASEAN (mostly machinery and equipment, mineral fuels and manufactured goods). It's also our top destination in the region for direct investment.

One of Jokowi's first actions as president was to eliminate the hugely expensive and environmentally damaging fuel subsidies. He plans to use the freed-up



The Jakarta skyline at daylight.

PHOTO: HANAFICHI/THINKSTOCK

## A PROMISING DESTINATION FOR INVESTMENT

cash to improve social programs and crumbling, antiquated infrastructure – especially rail and port facilities. So far so good, but the political steps may be harder.

### Barriers to entry

The Indonesian economy is stifled by a "tangled tax regime, regulatory system and government bureaucracy," says *The Economist*. Barriers to entry are high, with the World Bank's "ease of doing business survey" placing the country 114 out of 189. The complex system has been an encouragement for corruption at many different levels. Transparency International's bribery perceptions index gives Indonesia a score of 34 out of 100 (where 100 is squeaky clean) and a rating of 107 out of 175 countries. Compare China, slightly better (score 36 and rating 100/175), and Russia rather worse (score 27 and rating 136/175).

Reliable and trustworthy local partners

will help in this environment, as will awareness of Canadian laws and a determination to avoid the bribery sink hole, even if it means losing some business in the short term. The Canadian Embassy in Jakarta ([www.international.gc.ca](http://www.international.gc.ca)) can be very helpful with local contacts and reports on opportunities in the market.

The Asia Pacific Foundation ([www.asiapacific.ca](http://www.asiapacific.ca)) carried out a recent online survey of Canadian business activity in the ASEAN nations (Vietnam, Laos, Cambodia, Thailand, Myanmar, Malaysia, Singapore, Brunei the Philippines and Indonesia) – a market of over 600 million people. It noted the ASEAN story was largely an Indonesian one. Companies were more likely (58%) to be there than anywhere else except Singapore. Half the 138 companies surveyed had been in that market for 10 years at least, and 86 were profitable within three years of start up. Most were SMEs.

A 2013 survey by the Canada-ASEAN

Business Council CABC ([www.canasean.com](http://www.canasean.com)) took a detailed look at many market sectors on a country by country basis, outlining trade agreements and regional case histories, including BC Environmental Consultants Hatfield, who have been in Indonesia since 1990. The report lists some fundamental market entry strategies: go slowly, do research, commit resources, be flexible, work with professionals, leverage resources (like EDC and the Trade Commissioner Service) and network. Joining the Canada-ASEAN Business Council would be good start.

All this effort will no doubt be made very much easier if Jokowi moves his plans forward.

*Mark Drake is former president of Electrovert Ltd. and the Canadian Exporters' Association. E-mail corsley@videotron.ca.*

**Comments? E-mail [jterrett@plant.ca](mailto:jterrett@plant.ca).**

## » Training

## Start learning with 'why?'

Connect the task to its importance

BY HUGH ALLEY

A recent hire praised the training he received. What made it special? "They helped me see why what I was learning helped the organization achieve its mission," he said.

Simon Sinek, in an excellent book titled, *Start with Why*, argues that people "don't buy what you do, they buy why you do it."

This is a key point most trainers miss. When they don't know why a task is important, they tend to slough off the learning and take shortcuts in procedures that could put people's lives at risk.

At a plant that made railings, every component had been engineered to keep people from falling off the edge of the deck or balcony. This engineering focus extended to some small welded clips. When people were trained to do the welds, it was emphasized that a child's life would depend on each clip being made right. Trainees paid more attention to what they were learning and there were far fewer issues with sub-standard welds.

Supervisors and trainers may feel this is an extra step that it will slow



A little extra training time, reduced errors.

PHOTO: THINKSTOCK

them down. While it does add a bit to the training time, the payoff in reduced errors, higher yield and a better product or service is far greater.

Make sure your team members know "why" a task is important and insist that whoever does the training starts with that.

*Hugh Alley is operations manager of Westcan Industries, an industrial pump services provider in Port Coquitlam, BC. Previously he was president of First Line Training Inc. Call (604) 866-1502 or e-mail [halley@westcan.com](mailto:halley@westcan.com). View his blog is at <http://firstlinetraining.ca/blog>.*

» Manufacturing Month

# What's your STORY?

## WELCOME THE PUBLIC AND SHOWCASE YOUR BUSINESS

October is MFG MONTH, an ideal opportunity to show Canadians that manufacturing is an important economic driver and a great career choice for young people.

Imagine you're a contestant on Jeopardy with Sudbury, Ontario's Alex Trebek giving you this answer for the final question:

"British vacuum inventor James Dyson did 'make this up'. He describes this as more than just putting parts together. It's coming up with ideas, testing principles and perfecting engineering. A complete business system."

If you bet the farm and responded with, "What is manufacturing, Alex?" you would be a Jeopardy champion.

Unfortunately, not many North Americans would get the question correct.

"Canadian manufacturing suffers from an image problem," says Jeff Brownlee, vice-president of public affairs and business development at Canadian Manufacturers & Exporters (CME). "Many view it as an industry in decline, when in reality, it's driving Canada's economic and innovation engines."

Educating Canadians about the real business of manufacturing is the premise behind the industry association's MFG MONTH celebration this October. From St. John's to Victoria, manufacturers will open their doors to the public during the month to showcase the true innovative nature of Canadian manufacturing.

"We need companies to tell the Canadian manufacturing wealth creation story. Most importantly, we



An engineer shows an apprentice how to use a computerized lathe.

PHOTO: THINKSTOCK

need manufacturers to tell their own stories," Brownlee adds. "We must show Canadians that manufacturing is not a 4D industry (dirty, depressing, declining and dangerous). That it's high value, high tech, highly skilled and high paying."

Getting that message across is crucial. The industry, despite job losses in the last decade, is facing a shortage of workers that will be even more acute in the future. According to CME, there just aren't enough young people choosing manufacturing as a career.

### Education 3.0

"When you were in high school, how often did you have a teacher come to you and say that you should consider a job in manufacturing?" asks Brownlee. "You don't need to be a Jeopardy champion to answer that one – never."

That's why CME has partnered with Edge Factor on its Netflix-like platform, **eduFactor.org** to educate students on how exciting a career in manufacturing would be.

"This is education 3.0," Brownlee says. "What eduFactor does is tells the manufacturing story in a way that today's millennials will understand – through video and interactivity. Simply put, it's gnarly."

The two organizations along with MasterCam and In House Solutions have partnered to gift 200 secondary schools 12-month access to eduFactor curriculum.

"We want to give students the options many of us never had," Brownlee adds. "That means the information to make a decision about their future."

For those companies that have never hosted a tour or dealt with the public, CME has created a toolkit that provides guidance from beginning to end. Realizing that hosting a factory tour at a specific facility may not be possible, Edge Factor and CME have partnered and developed a virtual toolkit for companies to take and/or give to schools.

"We can rely on students to come to manufacturing, so why not take manufacturing to the students?" says Brownlee. "We want to make this as easy as possible for manufacturers to stand up, be counted and take a role in manufacturing Canada's future."

For a full list of manufacturing month activities or to promote a facility tour during MFG MONTH, visit **www.mfg-month.ca**. Alternatively, you can e-mail [jeff.brownlee@cme-mec.ca](mailto:jeff.brownlee@cme-mec.ca).

Comments? E-mail [jterrett@plant.ca](mailto:jterrett@plant.ca).

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## » Retirement

Manufacturers and business associations say the program adds unnecessary costs and impedes the province's competitiveness.

BY MATT POWELL, ASSOCIATE EDITOR

Ontario's Liberal government ruffled a few feathers – OK, a lot of feathers – when it revealed it would go ahead with the Ontario Registered Pension Plan (ORPP). Businesses and business associations across the province (unanimously) agree it's an unnecessary added cost to bottom lines, a barrier to attracting investment and an impediment to economic growth.

ORPP, passed in April, will be introduced gradually over two years starting in 2017. Premier Kathleen Wynne said it's intended to cover people without workplace pension plans, providing extra retirement income in concert with Canadian Pension Plan (CPP) benefits, specifically for low- and middle-income workers – the program's main target group.

Wynne, who engaged in a very-public game of he-said, she-said with the federal Conservatives over their unwillingness to enhance the CPP, said about 3.5 million workers are expected to participate in the program. Federal finance minister Joe Oliver told Wynne in a July letter that the government would not make any legislative changes to allow Ontario's plan to be treated like the CPP for tax purposes, or to integrate it with RRSP contributions limits.

Wynne's government believes Canada's current retirement programs, such as Old Age Security (OAS) and CPP, don't provide enough income replacement for middle-income earners.

Workers should aim to replace up to 70% of their income in retirement to maintain a similar standard of living. The Liberals maintain the CPP replaces only about 25% of a worker's income.

The province estimates just 34% of Ontario's workforce is enrolled in a workplace pension program and a Scotiabank survey shows personal savings rates have fallen from 22.7% in 1982 to 4.6% today.

According to Statistics Canada data, as of last year there were 6,999 pension

# Ontario's PENSION pains

## WHAT MANUFACTURERS NEED TO KNOW ABOUT ORPP



plans in Ontario covering 2.16 million workers (1.3 million in defined benefit plans; 419,332 in defined contribution options).

Business associations, including Canadian Manufacturers & Exporters (CME) and the Ontario Chamber of Commerce, are concerned about ORPP's impact on companies, especially the manufacturing sector. It's still finding its way out of the 2009 economic downturn, while coping with high energy costs, global competition and skills shortages.

"Manufacturing is incredibly important to Ontario and we should be doing everything we can to maintain that, not make it harder to compete, especially for small- and medium-sized firms that drive employment growth," says Ian Howcroft, vice-president of CME Ontario.

Liam McGuinty, manager of policy and government relations at the Ontario Chamber of Commerce, agrees.

"There are certainly retirement savings challenges, but [ORPP] is an added cost for employers that puts the province at a competitive disadvantage," he says.

The Canadian Federation of Independent Business (CFIB) says businesses would be hit with up to \$1,643 per employee a year in new payroll taxes starting

in 2017. In response, it launched a campaign to "Axe the Ontario Pension Plan."

A 2014 CFIB survey indicates 86% of business owners oppose a mandatory

### BY THE NUMBERS

- The plan will require equal 1.9% contributions between employers and employees on earnings up to \$90,000 per year.
- ORPP aims to replace 15% of an individual's earnings in retirement.
- Benefits will vary depending on how many years the employee contributes to the plan and how much he/she earns.
- Payouts can begin as early as 2022.
- A worker earning \$90,000 a year would receive an annual benefit of \$12,815 a year (indexed to inflation).

provincial pension plan, and that 69% of those indicated they would have to freeze or cut salaries if one was implemented. Fifty-three per cent said they would eliminate jobs and limit future hiring.

Howcroft and McGuinty believe the government should be exploring other, more flexible options, some of which are already offered by employers. These include pooled registered pension plans and defined profit sharing plans.

"There are employers out there who are working with razor thin margins, but there are flexible options that work quite well," says McGuinty.

### Phase in

On Aug. 11, the Ontario government revealed a number of amendments to ORPP phase-in dates and expanded comparability rules for those required to participate in the program.

For companies with 500 or more employees without a pension plan, contributions will begin Jan. 1, 2017. The contribution rate for both employees and employers will be 0.8%, rising to 1.6% in 2018 before plateauing in 2019 at 1.9%.

Wave two is directed at medium-sized employers with 50 to 499 employees. Contributions will commence Jan. 1, 2018 at the rate of 0.8%, jumping to 1.6% in 2019 and 1.9% by 2020.

Finally, small employers of 50 or fewer workers will start contributions Jan. 1, 2019 at a rate of 0.8%, 1.6% in 2020 and maxing at 1.9% come 2021.

Ontario-based manufacturers should examine their options carefully and understand which ones limit ORPP's impact on their operations. The only way manufacturers can avoid the plan now is under a Liberal or NDP federal government, both of which have pledged to make enhancements to the CPP, which the Harper government has so adamantly refused to do.

Comments? E-mail [mpowell@plant.ca](mailto:mpowell@plant.ca).

### AMENDMENTS TO "COMPARABILITY"

The government has set out several tests to determine "comparability," depending on the type of plan. Comparable plans include:

**DB plans based on earnings:** annual benefit accrual rate must be at least 0.5%.

**Flat dollar DB pension plan:** benefit formula must be converted to a percentage of earnings based on the highest hourly rate of plan members.

**Defined contribution (DC) plan:** Minimum threshold must be a total contribution of 8% of base salary earnings, 50% of which must come from employers.

**Pooled registered pension plans:** Comparability threshold for PRPPs will be equivalent to the characteristics of a DC plan.

**Group registered retirement savings plans (GRRSPs) and defined profit sharing plans (DP-SPs):** will not be considered comparable under the ORPP, and employers offering them will be required to participate in the provincial plan.



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» Renewable Energy

# Mapping the planet's SOLAR potential

## GOOGLE PROJECT USES 3D MAPPING TO OPTIMIZE SOLAR PANEL PLACEMENT

BY PLANT STAFF

Google has entered the renewable energy arena with a tool the tech-giant says will eventually help solar power users worldwide optimize photovoltaic panel placements.

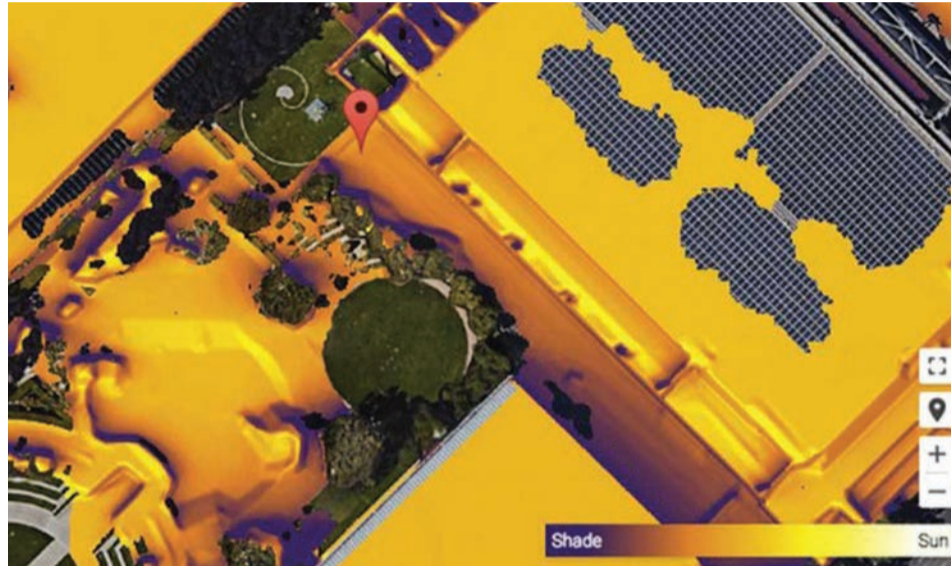
Dubbed Project Sunroof, the tool is essentially a solar optimization map that tells users where to find the best places in cities to gather solar energy from roof-mounted panels.

The search engine produces results by combining aerial and map data. Google Maps, 3D modelling of roof structure, and historical cloud and temperature patterns that could impact power generation are considered in the results as well.

Project Sunroof computes how much sunlight hits your roof in a year. It takes into account Google's database of aerial imagery and maps, shadows cast by nearby structures and trees, and possible sun positions over the course of a year.

It recommends an installation size to generate as close to 100% of a building's electricity use, based on roof size, the amount of sun hitting the roof and current electricity costs.

The map also provides cost estimates based on monthly electric bills to describe potential energy cost savings



A screen capture of Google's Project Sunroof dashboard.

PHOTO: GOOGLE INC.

over a 20-year period and provides a list of registered solar suppliers in the local area. Project Sunroof uses current solar industry pricing data to run the numbers on leasing, taking a loan, or buying solar panels for your building or house to help you choose what's best.

To calculate final costs, the tool compiles incentives including federal and regional tax credits, utility rebates, renewable energy credits and net metering.

When you plug an address into the search page, a map of the roof areas with

the most shade or sun exposure will appear. It also lists how much usable sunlight per year the roof could provide and the available square footage available for solar panels.

So far, the pilot project has been rolled out in Boston, the San Francisco Bay area and Fresno, Calif. Google says it plans to extend the coverage of the map to the rest of the US, then the rest of the world.

Comments? E-mail [mpowell@plant.ca](mailto:mpowell@plant.ca).

» Nuclear

## Isowater aims for the heavy water market

Production method reduces emissions by 95%

Isowater Corp. has completed a \$3.2 million project it says will advance production of deuterium oxide, or heavy water. It's a key component in the nuclear industry but also experiencing growing demand in life sciences, high-tech industries and environmental technologies.

The company, based in Collingwood, Ont., said its D2X process is built on a much smaller scale than traditional methods and produces heavy water at costs well below current production technology. Greenhouse gas emissions are also reduced by 95% while eliminating sulphur and ammonia byproducts entirely.

Deuterium oxide is a form of water in which hydrogen atoms are the stable deuterium isotopes rather than protium isotopes (light hydrogen). Isowater's proprietary process produces deuterium oxide in concentrations ranging from 70% to greater than 99.995%.

The company identified semiconductor, fibre optics, pharmaceutical, medical procedures, health and beauty products, research applications, and hydrology and eventually nuclear as key markets. It noted that, based on strategic energy policies, world supply to date has been funded solely by government entities.

The D2X project was developed with contributions from Isowater, Sustainable Development Technology Canada, the National Research Council of Canada's Industrial Research Assistance Program (IRAP), and Canadian Nuclear Laboratories.

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# MANUFACTURING ENERGIZED

Managing industrial electricity use more efficiently for savings and sustainability



Manufacturers of all sizes need to be engaged in seeking more efficient ways of using electricity and there are experts, tools and programs available to help make it happen.

By JOE TERRETT, EDITOR

Ontario manufacturers operate in a very competitive environment. Whether they're serving customers in North America or the wider world, manufacturers contend with global competitors that are relentlessly posing challenges to pricing, quality and service.

Ask plant execs to list their major concerns, they'll place costs at or near the top. Chances are their labour costs won't be competitive (hello Mexico, China and other "developing" economies) so manufacturers have to be clever about expenses by being innovative, improving productivity, eliminating waste and doing so with a growing emphasis on

reducing their carbon footprint.

The cost of electricity is a concern for many companies, obviously more so for those with operations that consume a lot of it, yet many manufacturers aren't as engaged as they could or should be in meaningful conservation strategies that would give them a break on costs while helping to reduce a plant's impact on climate and the environment.

Since most Ontario manufacturers fall within the smaller end of the SME category, it's safe to say resources for energy management are more limited than those available to their larger brethren, but companies of all sizes have common cause in seeking more efficient ways of using

electricity and there are experts, tools and programs available to help make it happen.

It starts with the understanding that the hourly wholesale price of electricity is combined with the Global Adjustment to form the total commodity price. How that price shifts from hour to hour affects the implementation of an energy management strategy.

With that in mind, using electricity more efficiently, conservation, challenges and strategies that are working for engaged manufacturers provided the focus of a roundtable held in April consisting of panellists representing various energy stakeholders. It was hosted by PLANT and made possible by the Independent Electricity System Operator (IESO).

## Energy lethargy

The session began with a quick look at results of a survey conducted for Annex Business Media (publisher of PLANT)

## Welcome Message

### The bottom line on conservation



Terry Young

In many respects, Ontario's businesses have led the way in creating a culture of conservation in the province. Large and small companies across all sectors are investing in energy saving and seeing the results on their bottom lines. In 2014 alone, business conservation efforts through the IESO's saveONenergy programs resulted in almost 600 GWh of energy savings.

The business case for conservation is pretty clear – it cuts costs. But conservation also delivers broader benefits for all Ontarians – reducing the need to build new infrastructure and lowering the wholesale price of electricity. We are helping to make our province more competitive for business while also contributing to a cleaner environment.

That's why the province has moved to a new framework that puts conservation first before all other supply options. This opens up a myriad of opportunities for businesses that are able to shift or reduce their demand for electricity. Through the IESO's saveONenergy programs, there are numerous opportunities for businesses to reduce their overhead costs through retrofits, energy audits, lighting and equipment upgrades, and participating in demand response.

However, this success depends on business, industry, associations and public agencies working together and combining their strengths to increase our conservation and business competitiveness.

Over the past four years, businesses have stepped up their conservation efforts – not only to capture cost savings but also capture the strategic value that conservation offers their organizations.

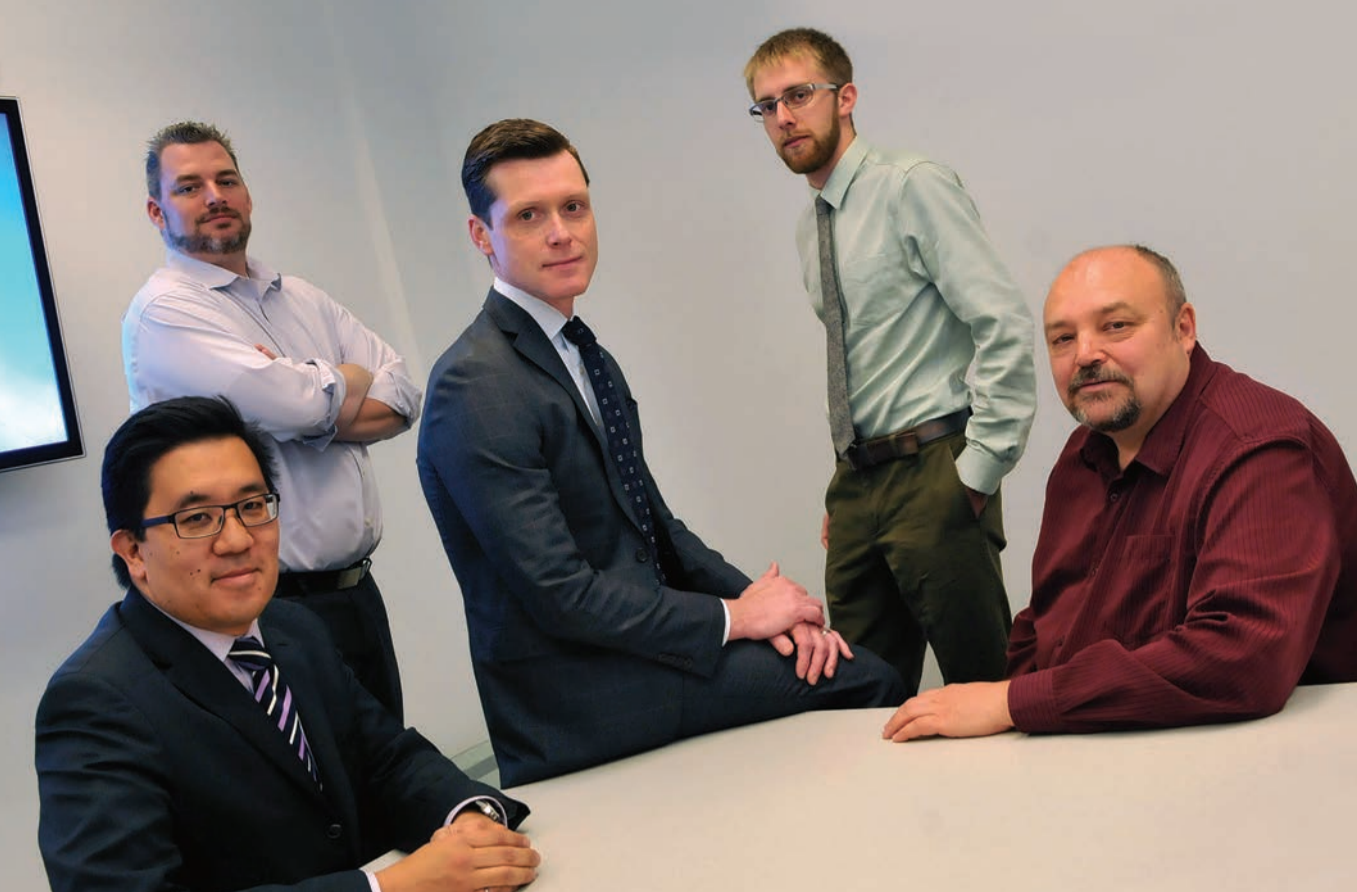
Now we must push further. The province has set new, more ambitious conservation targets. Our research shows there are many opportunities for us to work with businesses to achieve these results. We need to develop more comprehensive solutions – including the embedding of sound energy management practices within the core of business decisions.

PLANT aims to further this conversation. There are many dedicated individuals with great ideas about how to enhance our province's conservation capability – you will learn their stories here.

To find out what conservation can do for your business, visit [saveonenergy.ca/getstarted](http://saveonenergy.ca/getstarted).

Terry Young

Vice-President, Conservation and Corporate Relations  
Independent Electricity System Operator



Energy management roundtable panellists (L-R): **Victor Woo**, general manager – Internet of Things, Cisco Canada; **Brian Baxter**, supervisor, conservation and demand management, program delivery, Hydro One Brampton; **Sean Van Doorselaer**, CEO, Lind Equipment Ltd.; **Will Anker**, manufacturing engineering, Dynaplas Ltd.; **Douglas Dittburner**, manager power services, Campbell Company of Canada.

PHOTO: STEPHEN UHRANEY

## Powerful help: Incentives to bring ideas to reality

There are many reasons to focus on upgrading or modernizing systems for energy efficiency, ranging from reduced operating costs and increased sales to improved employee comfort and effectiveness. Fortunately, there are also incentives and rebates available as well as non-financial tools and resources.

In Ontario, these incentives and resources can be accessed through the saveONenergy program.

### Energy audits and engineering studies

This is often a first step for businesses looking to improve efficiency. They are used to identify opportunities for improvements and provide business cases. They can:

- Classify energy savings by potential project
- Identify potential non-energy related improvements including productivity, safety, yield, sales, etc.
- Identify the capital cost of the projects
- Summarize the return on your investment for each project and prioritize the projects based on capital cost, lifecycle cost savings and non-energy related financial benefits. Use this to provide return on investment, savings to investment ratio, payback periods, etc.

SaveONenergy can cover up to 50% of the cost of audits. Once opportunities are identified with an audit, more detailed engineering studies can define what exactly is required and provide more accuracy on the potential savings and costs. 100% of the cost of engineering studies is covered by saveONenergy.

### Retrofits

Once a business is ready to upgrade to high-efficiency systems for lighting, HVAC systems, pumps, motors, fans and other plant equipment, funding is available through saveONenergy. Companies can receive up to 50% of their project costs through the program.

### Energy managers

Free energy manager resources may be available through local utilities' Energy Manager Program.

### Energy management training

Businesses can receive a rebate worth up to half the cost of certified Energy Manager, Commissioning Agent and Measurement & Verification training.

Find out more at [saveONenergy.ca/business](http://saveONenergy.ca/business) or get your local electric utility to contact you at [saveONenergy.ca/get-started](http://saveONenergy.ca/get-started).

earlier in the year that focused on Ontario companies' energy efficiency efforts. The survey revealed most of the 510 industrial respondents have not taken measures to increase energy efficiency. Despite the proven effectiveness of energy audits, more than half of those surveyed haven't conducted one, and 60% of those companies have no plans to do so.

The results didn't surprise panellist Sean Van Doorselaer, CEO of Lind Equipment Ltd., whose company, based in Markham, Ont., manufactures and distributes static grounding, hazardous location and industrial work lighting, portable power and GFCI products.

"I suspect that part of it is smaller manufacturers spending less time on this kind of thing because of resource constraints and a perception that it isn't as major an issue for them as it would be for a larger plant."

The numbers didn't surprise Brian Baxter either. The supervisor of conservation and demand management and program delivery at Hydro One Brampton (serving 150,000 homes and businesses in Peel Region) observed, "SMEs don't have the resources larger companies have to engage in energy management, and they're not necessarily educated about how energy consumption affects bottom lines and production levels."

Lack of a consolidated strategy is another issue raised by Victor Woo, general manager – Internet of Things, with Cisco Canada, the technology company that makes the infrastructure that powers the internet and some data centre enterprise equipment. "We find a lot of companies are really siloed in terms of their approach." He noted in many companies people on the plant floor, in IT and facilities, for example, pursue energy efficiency independently.

Doug Dittburner, manager of power services for Campbell Co. of Canada in Toronto, said the lack of an energy team represents another challenge for smaller firms. "If you don't have an energy team, it's pretty hard to ask for volunteers. Most places have done enough cost-cutting that people don't have the extra time," said the 25-year energy management veteran who has worked the file with Unilever, Mondelez International and Molson.

Most individuals who do perform the energy management role don't have the technical background to understand implications, said Will Anker, manufacturing engineering with Dynaplas Ltd., a high-precision injection moulder in Toronto. "They don't understand the magnitude of energy savings that can be found and how they affect systems plant-wide. It's not just a matter of saving money or saving energy, but that systems tend to run better."

## Executive engagement

So what's the treatment for companies that are lethargic managers of their energy use?

Panellists agreed engagement from senior management is key, although it's not easily achieved.

Indeed, Baxter doesn't have difficulty getting mid-level managers involved. "It's the high level ones, it's really hard to get some table time with them," he said. "And those are the people we have to convince to do these projects."

"It's not necessarily their number one priority," said Paul Clipsham, director of policy and programs for Canadian Manufacturers & Exporters Ontario (interviewed after the roundtable). "It may be productivity, sales growth or finding new customers, so how you tie in or package energy management with other KPIs senior management is thinking about is critical to promoting energy management going forward."

Getting senior management interested may be a challenge but he said it represents a real opportunity. "Where there is executive engagement the results are exponentially greater," said Clipsham.

Buy-in from senior management wasn't an issue at Campbell, where the lead came from the top down. Campbell's goals, to be achieved by 2020, include reducing its environmental footprint by half, reducing its energy needs and seeking greener energy sources.

"I think at Campbell we're a little bit different," said Dittburner. "We have already set targets... and they're pretty tough to achieve in terms of how much water and energy we use per ton of product."

He said getting capital is easier when the case can be made that corporate targets won't be achieved without the funding.

Panellists agreed it also helps to use language the C-suite and vice-presidents understand. One of the hurdles Baxter has encountered working with industrial clients is relating the payback to company priorities. "They know their widgets, how many they need to make and they know their bottom lines... So relating energy efficiency projects, reports and audits to how many more widgets they would need to make over the lifespan of the project is the driving factor. Once you put it in that context, it really clicks and drives the project home."

Take margarine. The payback for a lighting project at the Campbell company is the equivalent of making an additional 200,000 tubs, said Dittburner. "And everybody would say, 'Whoa. We should do this, right? That's a lot of margarine.'"

He recommended doing a project that demonstrates quick ROI to senior management, a suggestion Woo liked.

"That tends to gain the attention because it can be amplified over the entire plant or the enterprise infrastructure," said Woo. "We've done pilots with our customers where we've shown a payback of 30% in six months. And having that champion absolutely helps us to carry that message."

At Dynaplas, "show me the money" really got the ball rolling internally when the company got a \$27,000 incentive cheque for a variable frequency drive project. Anker said that drew attention to how looking at energy efficiency for capital projects or investments would actually help put better systems in place.

## Building a team

Doorselaer highlighted the importance of having an integrated strategy that looks at energy management broadly across the whole company. Such a strategy should address how one project rolls into the next, and have a five- or 10-year plan rather than siloed projects "where you're not seeing the net benefit from lighting as it relates to HVAC, or from your heating and cooling plant to production."

St Marys Cement, a manufacturer of cement materials and part of Group Votorantim, a diversified Brazilian conglomerate, is a massive user of electricity. It's Bowmanville, Ont. facility has integrated its strategy.

The heart of the plant's production is a rotary cement kiln that operates at 1,500 degrees C to produce the clinker used to make cement. Each kilogram of clinker requires 800 kilocalories of energy, which doesn't include the electricity needed to drive the plant's 900 motors operating throughout the process on a 24/7/365 basis.

There was a company-wide focus on using electricity more efficiently, but the Bowmanville plant's energy management program was the result of some forward thinking from the plant manager and electrical maintenance manager who in



2005-06 saw where electricity rates were going.

Rather than going with a single energy manager, they decided to create an energy management conservation committee called E=MC2, explained Jason Schultz, the plant's quality control manager (in an interview after the roundtable).

"That got off the ground very early on. We needed representation from all our departments in the plant. Not just production and maintenance, but also the quarry, the stock room, purchasing and procurement, because they have a lot of different skills sets."

The result is a diverse group of up to 11 people. Since starting its energy management program, the Bowmanville plant has achieved \$10 million in cost savings (as of last year), reduced energy use by more than 171 million kWh; and lowered its CO2 emissions by almost 32,000 tonnes (since 2009).

## Doing audits

Launching a management strategy begins with understanding how electricity is used in a plant. This requires auditing. There is funding available through IESO for audits that assess potential savings from equipment replacement, operations or demand response (reducing energy use during peak periods of demand).

In Hydro One Brampton's world, there are three types of audits: a building electricity survey, typically done by a consulting firm or an outside company; a building systems audit, which is system-specific (such as compressors, refrigeration); and higher level audits (also system specific) of processing systems with detailed engineering studies. Baxter said these would involve plant, facilities and or energy managers who would be knowledgeable about day-to-day operations.

"A good auditor would interview staff to find out what they actually do during the day, how the plant operates, what

maintenance programs they have and who the providers are. There's a lot involved."

Baxter warned that CEOs, CFOs and high level managers won't read a 100-page report with graphs, tables and charts full of information so the important part of the audit is the one-page executive summary that highlights how the company will save electricity and how it relates to the senior executives' priorities.

Cost will depend on how involved the audit is. Baxter said it can range from \$1,000 to \$100,000 based on the process or the systems, and what type of measurement is required to validate the potential energy savings. If a third-party auditor is used, it's up to the company to ensure the provider will do the job satisfactorily. The utility can't make recommendations.

Campbell did a compressed air audit using a third-party that wasn't selling equipment. "We really went through everything with the systems, not just the equipment," said Dittburner.

The audit checked the efficiency of compressors and the system, the pressure drops, use of air blowers and even how much energy went into picking up a sheet of cardboard. Projects were selected from the list and scheduled.

## Opportunities to conserve

Where are the big opportunities for savings?

Today, a favourite target is lighting, particularly for bay areas. Old lighting includes high-pressure sodium and metal halide lamps that take three to four minutes to power up to full brightness; and T12 fluorescents with their inefficient ballasts. Newer lighting includes energy efficient metal halide, T5 and T8 fluorescents and LEDs, which are expected to be effective for bay areas in one to two years.

But Van Doorselaer's company is all about using LED lighting during the construction phase of a building project, a niche that's overlooked.

"We try and provide tools to large general contractors to help them understand how using energy-efficient lighting and power products during the construction phase can actually help them save money on the project. And we also try and communicate to them that it's not just the actual power savings or fuel savings in the generator, but oftentimes using energy-efficient products is better from a process standpoint."

In the construction setting, LEDs use 70% to 90% less energy. There will also be significant savings when the technology offers the brightness levels required for industrial use. And Van Doorselaer sees additional savings from maintenance (such as much less frequent bulb changes).

Cisco is moving into RBC Waterpark Place in Toronto, which Woo describes as one of the most energy-efficient buildings in North America. Cisco's floors will use LED lights, but powered by network switches.

"Now we can do creative things. We can actually tie in our security cameras to activate lighting based on who's in the room. So it's not just a turn the lights on and off situation."

But there are other areas that deliver energy savings. An Ontario Power Authority (now the IESO) Achievable Potential study released last year looks at 2012 to 2032 and the most likely candidates for conserving electricity on the industrial side. The leaders are compressed air, motor systems powering pumps, HVAC and other motors.

Dynaplas, which is starting work on a heat recovery system, ran a compressor project (switching from running fulltime to load/unload to VFDs), did lighting and ran a project involving thermolators, which control the process temperature. A switch was made from oil to the higher heat capacity of circulated water. "Because you're transferring more heat, everything runs for less time. Each cell has an injection-moulding machine, dryers and temperature controllers in three or four different places. And you've got all kinds of things associated with the cell that are now

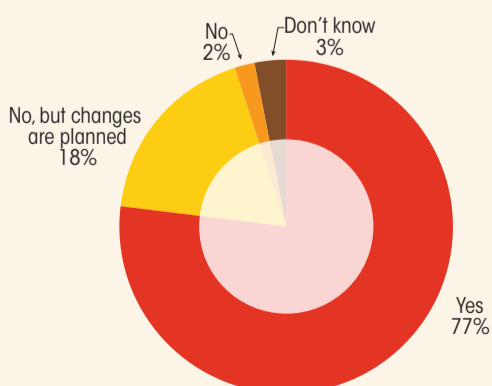
## Conserving energy: A study of company engagement

Early this year Annex Business Media (publisher of **PLANT**) conducted a survey of 510 industrial companies to determine whether or not they were engaged in energy efficiency projects.

Here are some highlights:

- 51% agree energy management is a top priority, but most companies have not taken measures to increase their energy efficiency.
- 56% have not set energy efficiency targets. Of those who have, 28% say the most common target is electricity.
- 78% of companies don't have an energy manager on staff, 32% report the owner/CEO is responsible for their energy spend/usage.
- 62% have not conducted an energy audit in the past five years.
- 60% of those who have not done an energy audit, don't plan to do one.
- 35% cite a lack of staff and resources as the top reason for not conducting an audit followed by no executive mandate (28%).
- 49% of the companies that did conduct an audit identified cost savings as the key motivator.
- 85% report savings resulting from an energy audit.

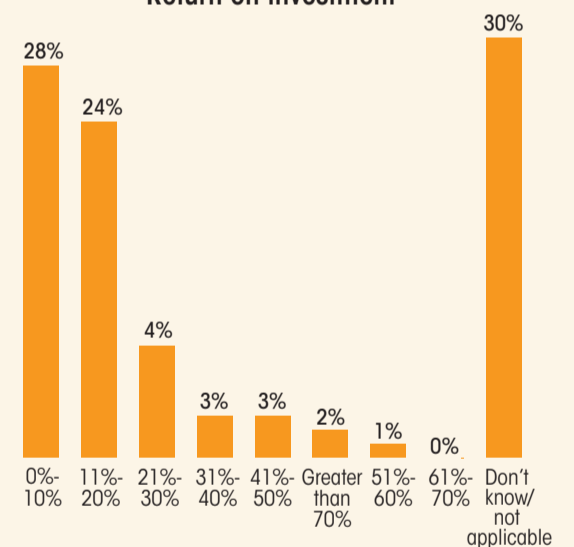
### Changes made as a result of an audit



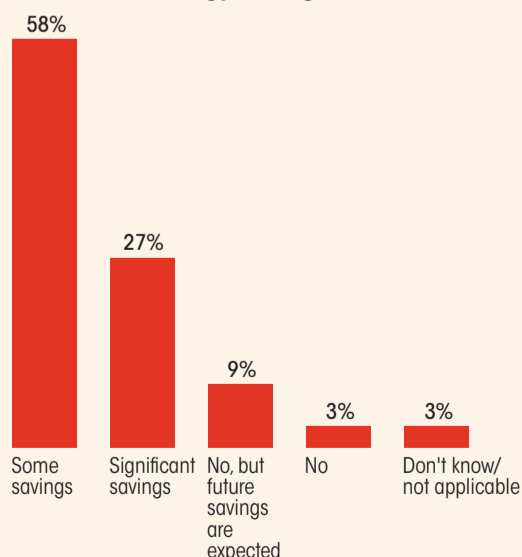
### Barriers to investment



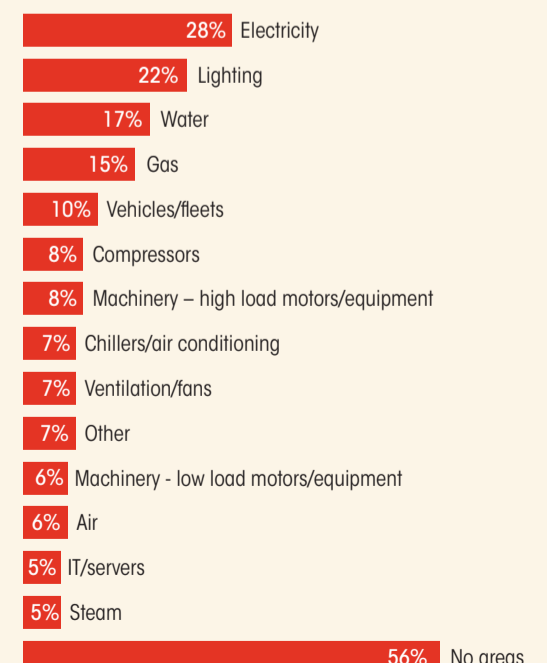
### Return on investment



### Energy savings



### Energy efficiency targets





running less or with less demand because it's running faster."

### Incentives and assistance

"There are lots of opportunities, lots of program, lots of projects that would qualify for any type of incentive. As long as it saves energy, IESO and your local distribution company will incent it," said Baxter.

Indeed, IESO's retrofit program provides up to 50% of costs for upgrading old or inefficient equipment; there's audit funding; process and systems assistance for engineering studies; and funding for capital costs for energy efficiency upgrades. (See also **Powerful help** sidebar).

CME Ontario, partnering with energy services provider 360 Energy in Ancaster, Ont., is offering its members the CME 360 Energy Coach Program. It involves helping companies set up cross-functional teams and providing access to world-class best energy management practices. The aim is to reduce energy costs by 5% to 25% annually, and to sustain long-term savings through continuous improvement.

CME is also partnering with IESO on the Energy Pathfinder initiative that identifies new best practices for process energy management – projects that don't require huge capital outlays.

Federally, NRCan offers financial help for developing and disseminating information about energy efficiency; training; assessments, evaluations and benchmarking studies; and technical guides and reports, implementation roadmaps and

best practices studies.

There's also help for implementing the ISO 50001 standard, which establishes systems and processes for taking a systematic approach to achieving continuous improvement of energy performance.

In 2011, the St Marys Bowmanville plant was the first in North America to earn ISO 50001 certification.

"When resources are limited, working in a systematic fashion is the only way to move forward," said Schultz, who emphasized the value flowing from 50001.

Energy management is part of the company culture. It has helped to cut a huge monthly electricity bill significantly enough to reduce the kilowatts-per-hour unit cost, noted Louis Kaye, plant accounting manager. "We understand how power works in Ontario, so when it's budgeting time each year, we're given a lower unit cost target."

You'd expect a big power user like St Marys to make big capital investments to achieve savings, but Kaye said when the process began, capital was under constraint. Nevertheless, they've harvested to good effect low-hanging

fruit such as managing lighting, replacing monitors, investigating return air in the plant and turning off fans.

"[Energy management] is part of our capital process, so when we do a project now, there are a couple of questions on the form, 'Have you considered energy efficiency as part of your analysis, and if so, quantify it? We track that. For example, we'll look at motors that are energy efficient.'"

ISO 50001 helped to raise the energy profile among employees, but the E=MC2 team also built engagement by bringing in outside experts to go over employees' home hydro bills. Bringing the savings home reinforces the drive to do the same at work. And each year the plant hosts an Energy Week event featuring presentations from staff and the E=MC2 committee, plus outside experts who update millwrights, process engineers and electricians on new developments and technology.

There are other ways to engage employees. At Campbell's facility (500,000 square-feet of energy saving potential), there are 151 people at the corporate head office and 400 plant employees. Everybody gets a \$100 bonus if energy targets are met.

"We also get free lunch coupons," said Dittburner, who picks a couple each week for mechanics who fix compressor leaks. Eternal vigilance is the only way to keep them fixed, he said. "The low-hanging fruit grows back. If you don't look at your air compressor system for two years, it's going to be horrible again."

There's also a free lunch for individuals who show initiative, such as an employee who is observed to be consistently turning lights off in a work area. And there are awards, plus bonus points that can be used to buy things such as trips or appliances.

Although electricity for some is considered just a cost of doing business, it's a cost that can be better managed. Consider the big picture: conservation is how the provincial load will be managed into the foreseeable future. And it's more than a demand and supply issue. The Ontario government is attaching a price to carbon to ensure emissions are reduced. There are best practices, programs and incentives that will help manufacturers of all sizes make the management of electricity use key to their operations. For those who don't have a strategy in place, now is a good time to get energized.

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Once he reduced his energy costs by 55% after installing a VFD, savings in other parts of his business went into overdrive.

Once you start seeing the benefits from our incentives for installing premium efficiency motors and VFDs, you'll want to look into making other parts of your business like lighting, HVAC and compressed air systems more efficient too. When you do, you'll be joining thousands of organizations across Ontario who are already enjoying the savings that our programs deliver.

Take a look at their stories and our incentives at [saveonenergy.ca/business](http://saveonenergy.ca/business)



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# C I E N

CANADIAN INDUSTRIAL EQUIPMENT NEWS

## » Case Study



## Feed screw FAILURE

### HOW A METALLURGICAL ANALYSIS SOLVED THE PROBLEM

Failure analysis provides a clear understanding of why a component fails so a solution can be developed that will prevent the problem from recurring.

BY SHANE TURCOTT

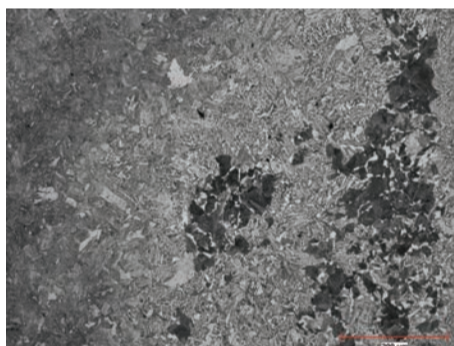
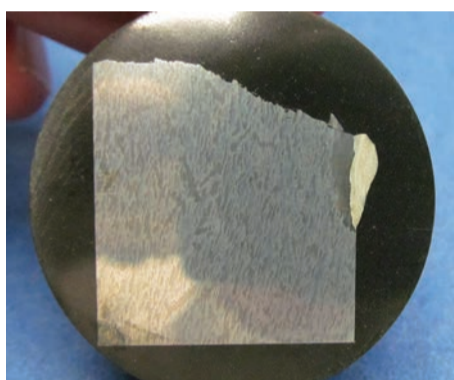
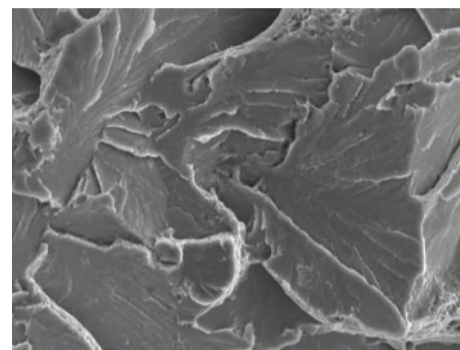
When a large feed screw snapped during a straightening operation and the cause was not immediately obvious, the Canadian manufacturer decided to conduct a metallurgical analysis to determine the details of the failure.

The 12.5-inch diameter, AISI 4140

forged steel screw was quenched and tempered. After rough machining, grooves were cut for the flutes, overlaid with stainless steel and then ground flat. Welding of the flutes required an 800 degree F (427 degree C) pre-heat and interpass temperature.

Stereoscopic examination found the brittle fracture had initiated from a pre-existing crack along a small circumferential weld. A scanning electron microscope (SEM) resolved the initial 0.080-inch (approximately 2-mm) region of the fracture to exhibit intergranular features typical of hot tear cracks, therefore the initial cracks had formed during welding.

The brittle fracture indicated the feed screw failed during a sudden impact-loading event while being straightened.



(Left) Portion of the feed screw submitted for analysis. (Top) Brittle fracture of the base metal. (Middle) Cross-section through crack initiation. (Bottom) Core structure of the feed screw showing tempered martensite to the left, bainite (middle area) and pearlite (darker areas). PHOTOS: STEEL IMAGE

Discussion with the manufacturer (unidentified by request) also revealed the feed screw may have been manually hammered.

A metallographic cross-section was taken adjacent the fracture initiation region and examined with an optical microscope. Numerous weld cracks were observed within the heat-affected zone (HAZ) of the circumferential weld. These hot tear cracks ranged up to 0.080 inches deep and were similar to the crack where the failure was initiated. The weld HAZ comprised of untempered martensite had a hardness ranging up to 57 HRC. This extremely hard HAZ indicated the circumferential weld had been made without the required pre-heat treatment.

The flute welds in the neighbouring

Continued on page 28

## » Supply Lines



Econo-Rack acquisition expands G.N. Johnston's product offerings. PHOTO: ECONO-RACK

### ECONO-RACK ACQUIRED

The G.N. Johnston Equipment Co. Ltd. has acquired the assets of The Econo-Rack Group Inc., a Canadian manufacturer and dealer of racking and related material handling products and services.

G.N. Johnston, an authorized sales and service centre of the Raymond Corp. based in Mississauga, Ont., said Econo-Rack became a wholly owned subsidiary of Johnston on Aug. 1.

Econo-Rack has eight locations, including a 210,000-square-foot manufacturing facility in Brantford, Ont. Combined, Johnston and Econo-Rack have more than \$400 million in sales and employ 1,150 associates.

Raymond is a global manufacturer of lift trucks based in Greene, NY.

### NEW UNICARRIERS OWNERS

Mitsubishi Heavy Industries Ltd. (MHI) and Mitsubishi Nichiyu Forklift Co. Ltd. are acquiring 100% of UniCarriers Corp., a manufacturer of materials handling equipment based in Marengo, Ill.

The two companies say the acquisition will expand their global presence with a full line of product offerings and enhance their R&D capabilities.

The companies are acquiring Unicarriers' shares from Innovation Network Corp. of Japan, Hitachi Construction Machinery Co. Ltd., and Nissan Motor Co. Ltd.

MHI will have a 65% stake, and Mitsubishi Nichiyu Forklift 35%.

### EISELE'S NA DISTRIBUTOR

Murrelektronik Inc., a supplier of electronic and industrial automation products based in Suwanee, Ga., will be the master distributor of Eisele Pneumatics' Multiline and Multiline adaptive connectors in North America.

The German company's customizable connectors secure up to 40 lines, including bundling of air, vacuum, gas, fluid and electronic wires, into one connection. Adaptive connector inserts integrate different diameters, connection types and media.

# Primary cause

*Continued from page 27*

region appeared to have been properly done using a reasonable pre-heat and interpass temperature. No cracks were observed.

Optical examination found the core screw material had not been quenched fast enough during heat-treating to through-harden the full wall thickness. This was evident from the core, which consisted of a mixed rather than the desired, fully martensitic structure. As a result, testing of the core material found substandard yield and ultimate tensile properties.

Although considered a quality issue worth pursuing, the substandard core tensile properties were not the primary cause of the failure. The material exhibited adequate elongation for sufficient ductility to sustain significant deformation during a gradual straightening operation, but AISI 4140 may inherently not have adequate hardenability to fully through-harden a 4.5-inch wall using a water quenchant.

The mixed microstructure may have resulted in low material toughness, making it more susceptible to brittle fracture, but this was not deemed the primary cause of failure. The material did not have a toughness requirement and the part was already compromised by the introduction of the weld cracks prior to the brittle fracture.

## Brittle fracture

The primary cause of the feed screw failure was not following the proper procedure on all the welds. A small circumferential weld had not been sufficiently pre-heated and overlapping hot tear cracks spanned the 12-inch length of the weld. During straightening, the combined bending loading, hammering/impact loading and the stress concentration effects of the weld cracks caused the brittle fracture. The cracks were large enough that, had the feed screw not failed during manufacture, they may have caused failure later in service.

Looking at the region that was evaluated, the circumferential weld was the only one that had not been properly pre-heated. To reliably prevent AISI 4140 steel from cracking, all welding must be conducted according to procedure, including pre-heating and maintaining adequate interpass temperatures. Post-weld heat treatment may also be beneficial if the weld region is expected to sustain significant strain/deformation during manufacture or service.

The loading applied during straightening consisted of a sudden loading spike (impact loading). It was recommended that loading during bending/straightening of large components be applied gradually. If either manufacture or service conditions were expected to include sudden/impact loading, it was recommended a toughness requirement be included when purchasing the material.

Although not the cause of the failure, the feed screw had not been properly through-hardened during the quench and temper heat treatment. Low tensile properties may be due to the AISI 4140 steel's metallurgical constraint. Discussion with the mill was recommended so all efforts would be made to achieve the intended mechanical properties.

Given the subtle nature of the welding issues, details of the feed screw failure would not have been obvious without the analysis. The manufacturer is now in a much better position to ensure failures are avoided.

*Shane Turcott is the principal metallurgist at Steel Image in Dundas, Ont., which conducts metallurgical analysis to solve problems experienced by the manufacturing, oil, mining and energy industries. Visit <http://steelimage.ca>.*

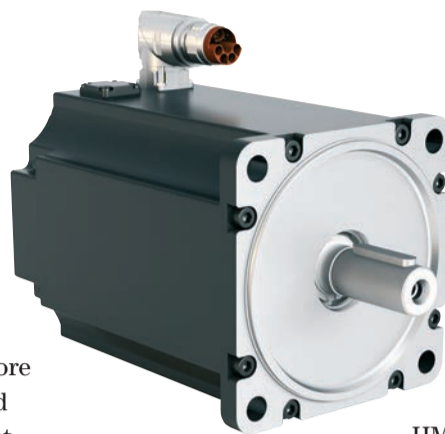
Comments? E-mail [jterrett@plant.ca](mailto:jterrett@plant.ca).

# Power transmission

## 8LS MOTORS GET A REVAMP

B&R's 8LS motors have been revamped. Size 2 and 3, with the same technical data, are now more compact for maximum compatibility with a higher power density. Size 5 and 7 come in additional lengths for more flexible dynamics and torque.

New inductive encoders deliver more precise data than predecessors. Used in combination with the digital EnDat 2.2 interface, the most common safety



*More compact and powerful.*

functions are used with hybrid motor cables where the encoder and motor cables are grouped together, reducing wiring effort.

The most commonly used 8LS motors are also available as preferred motors.

B&R Industrial Automation Inc., based in Atlanta, makes machine and process automation, motion control, HMI and integrated safety technology.

[www.br-automation.com](http://www.br-automation.com)

## JACK SYSTEMS ARE CUSTOMIZABLE

Nook Industries' ActionJac bevel gear screw jack systems deliver long-duty cycles and configurable solutions for a variety of applications.

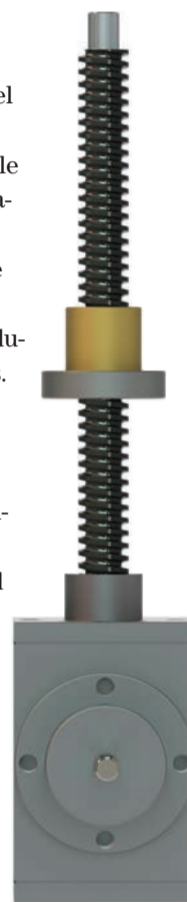
Machine and ball models have load-handling capabilities from 12.3 to 117 kN. Use them individually or in multiple arrangements. Because there are no standard travel lengths, each one is built to specification.

A trapezoidal acme screw conforms to DIN 103 standard with a low backlash between nut and screw and there are ball screw jacks for solutions requiring smoother motion, higher speeds or less torque.

ActionJacs can be arranged in three configurations: translating, rotating and keyed. This allows the load to be moved in different ways along the lift shaft, offering further options for customers.

Nook Industries, based in Cleveland, makes controlled motion solutions.

<http://nookindustries.com>



*Load-handling from 12.3 to 117 kN.*

*Shaft heights from 112 to 280 mm.*



## SIEMENS EXPANDS MOTOR LINE FOR STEEL

Siemens has developed industry-specific motors for steel plants based on its Simotics 1LE1 motor platform. The ventilated Simotics DP expands the range of roller table motors.

Various versions are optimized for use with Sinamics S120 converters. In network operation, the IE3 efficiency class delivers energy savings.

The mechanical design has been continuously tested in accordance to DIN EN60721-3-3 and exhibits a correspondingly high resistance to vibration and shocks, compliant with Class 3M4.

They're available in 4- and 6-pole designs with shaft heights from 112 to 280 mm and in torques range from 20 to 578 Nm.

Siemens is a global industrial technology company with plants in Canada.

[www.siemens.com](http://www.siemens.com)

## SEAL PROTECTS BEARINGS FROM HARSH CONDITIONS

SKF's Taconite Seal for bearings in split block housings protects against extremely contaminated or wet operating conditions.

The machined cast iron or steel seals consist of two rings (one stationary and one rotating) to form a very narrow labyrinth between them. The rotating labyrinth ring carries an internal, low-friction V-ring that seals against the stationary labyrinth ring, blocks contaminants from entering the bearing housing, and contributes to effective purging of grease. The rotating labyrinth ring, facing the bearing housing deflects and flings away water.

This compact seal has a shorter axial width compared with conventional types to offer space-saving advantages. Seals can be sup-



*Provides a practical barrier.*

plied to easily fit bearing housings in a range of shaft sizes from 50 mm (1-15/16 in.) to 450 mm (18 in.) as standard.

Smaller seal types will firmly secure to a shaft using three grub/set screws, and versions with larger diameters have been engineered for "bolt-on" mounting. Built-in fittings make re-greasing easy.

The seal provides a practical barrier for conveyor pulleys, hoists and winches, pulverizers, fans, and similar equipment in the mining, cement, pulp and paper, steel, and marine industries, and other applications.

SKF is a global supplier of bearings, seals, mechatronics, lubrication systems and industrial services based in Sweden. SKF Canada has locations in Toronto, Dorval, Que., and Edmonton.

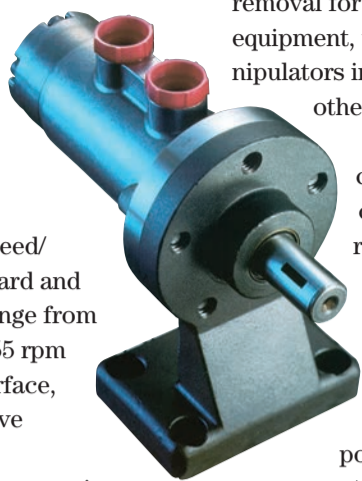
[www.skf.com](http://www.skf.com)

**GENERATE 4X THE TORQUE WITHOUT GEAR REDUCERS**

Dayton Lamina hydraulic motors produce four times more torque at one-quarter of the speed without gear reducers, saving size, weight and cost over larger similarly rated motors.

These low-speed/high-torque, high-speed/low-torque motors feature instant forward and reverse. Six motors provide a torque range from 0 to 656 in-lb. and speeds from 0 to 2,255 rpm and include a bronze-plated bearing surface, positive metal-to-metal sealing, a positive splined drive and a matched gerotor.

Only three moving parts ensure a longer service life for use in conveyor drives, hose reel extraction, fan drives, pipe valve openers, thread core



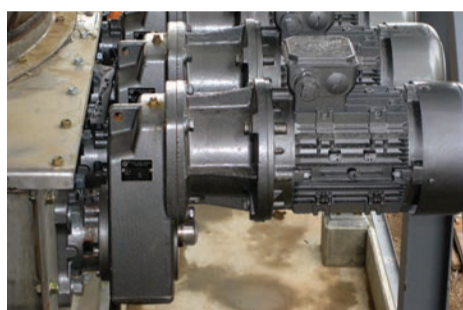
Three moving parts, longer service life.

removal for plastic injection moulding, box sealing equipment, undersea tool manipulators, camera manipulators in nuclear environments, EDM machines and other applications.

The main shaft is readily adapted using a chuck or collet to hold tools for rotary machinery operations, such as drilling boring, reaming and other tasks. They perform with flow rates from 1 to 8 gpm to deliver from 100 to 1,500 psi.

Dayton Lamina is a MISUMI Group company based in Dayton, Ohio that makes catalogue and special punches, die components, die details, punch blanks, and metal stamping tools. Dayton Progress Canada Ltd. manufactures in Woodbridge, Ont.

[www.daytonlamina.com](http://www.daytonlamina.com)



Easy system maintenance.

**SCREW CONVEYOR ALTERNATIVE MINIMIZES PARTS**

The NORD Screw Conveyor is an alternative to traditional screw conveyor drives. Closely stepped speed reduction ratios combined with a directly coupled gearmotor or NEMA C-face input design eliminates top motor mounts, pulleys, belts or guards.

Options include a UNICASE reducer housing, Quadrilip reducer shaft sealing and high capacity output bearings with CEMA standard flange mounting and CEMA drive shafts ranging from 1-1/2 to 3-7/16 in.

The package design is available for both CLINCHER Parallel Shaft gear units and Helical-Bevel Right Angle gear units.

The CEMA flange assembly protects against unwanted debris with its dual Viton seals (0.03 in. gap) on either side of the grease filled felt packing seal. A slight lead taper on the reducer shaft provides for easy mounting and removal, allowing for some screw pipe misalignment and reduced bearing loads.

NORD Gear Corp. USA is a manufacturer of drive systems based in Waunakee, Wis.

[www.nord.com](http://www.nord.com)

**COMPACT MOTOR PACKS HIGH POWER DENSITY**

The DB80 EC motor from Nanotec delivers high power density in a compact size. With a rated speed of 3,000 rpm and 48 V, this 8-pin motor is suited for applications that require a high degree of efficiency such as service robotics or automated guided vehicle systems.

Flange size is 80 x 80 mm with Hall sensors or encoders and it's supplied with a parallel keyway for quick and easy connection.

Four lengths cover a performance range from 280 to 940 W. Additional high-performance planetary gear systems can be mounted for high torques. Customer-specific versions are also available.

Nanotec, based in Feldkirchen, Germany, is a manufacturer of motors and controllers for high-quality drives.

[www.nanotec.de](http://www.nanotec.de)



Performance range from 280 to 940 W.

**TORQTAPER PLUS REDUCER SEALS OUT GRIT**

Regal Power Transmission Solutions' TorqTaper Plus helical shaft-mount reducers have a unique single tapered bushing for easy front or rear installations with short shaft lengths.

A three-layer barrier seal with grease-filled labyrinth V-ring and external flinger protect against abrasive grit.

They handle up to 500 hp input and feature carburized, ground AGMA-12 gearing and tapered roller bearings on all shafts, providing high horsepower ratings that allow downsizing in many applications. Larger diameter shafts also provide high overhung loads.

Regal-Beloit Corp. is a global manufacturer of motion control, air flow and power generation products based in Beloit, Wisc. with a Canadian office in Mississauga, Ont.

[www.regalbeloit.com](http://www.regalbeloit.com)



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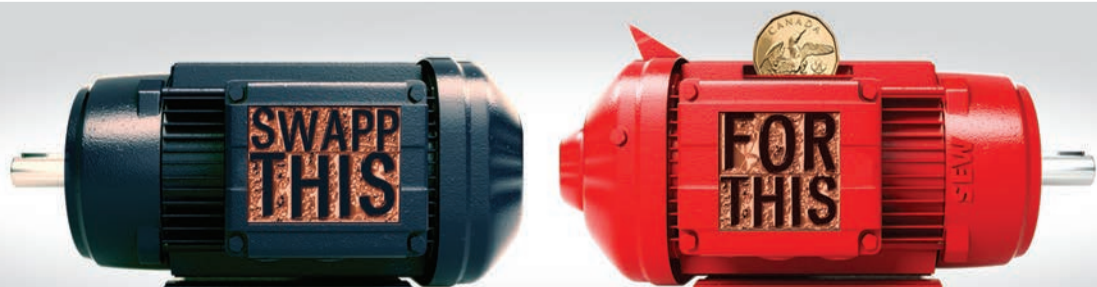
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## POWER TRANSMISSION



Diameters from 24 to 63 mm.

### PLG GEARBOXES DELIVER HIGH TORQUE QUIETLY

Pittman Motors has expanded its gearbox line. The PLG24, PLG42K, PLG42S, PLG52 and PLG63 come with Pittman brush and brushless DC motors.

These planetary gearboxes are small,

durable and quiet while delivering high torque loads.

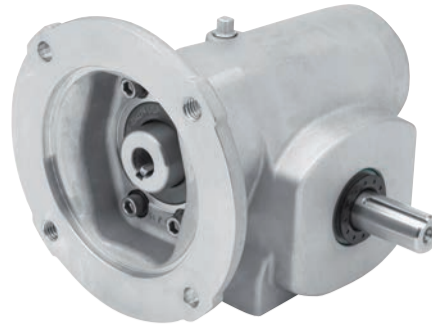
Applications include pan/tilt functions, indexing, pumping, conveying, and traction applications.

They come in diameters from 24 to 63 mm with output torques to 100 Nm (74 lb.-ft.). Reduction ratios range from 4:1 to 710:1 with more than 10 standard ratios in each size.

Typical versions include gears and ball bearings made of steel or engineered polymer. OEMs can specify custom output-shaft features, lubrication, and reinforced output-shaft assemblies for differentiated solutions tailored to specific application requirements.

Pittman Motors is part of the AMETEK Precision Motion Control division based in Harleysville, Pa.

[www.pittman-motors.com](http://www.pittman-motors.com)



Premium stainless steel.

### GEAR REDUCERS ARE 'ULTRA' CLEAN

Baldor Electric Co. has added the Ultra Kleen Tigear-2 to its enclosed gear reducers.

The all-steel reducers are completely sealed against high pressure, high temperature and caustic washdown environments.

They have a laser-etched nameplate for permanent, sanitary product identification, input ratings up to 5 hp, and come in five case sizes.

All Ultra Kleen reducers are made with premium stainless steel housings, have solid or hollow output shafts and are factory-filled with H1 food grade synthetic lubrication. And they're protected by a two-piece harsh duty output sealing system that includes an axial sealing lip for superior wear and contamination exclusion. A rounded housing prevents water pooling.

Baldor, based in Fort Smith, Ark., is a manufacturer of industrial electric motors, drives and mechanical power transmission products.

[www.baldor.com](http://www.baldor.com)

### EASY TO TOOL BEARING POLYMER

VescoPlastics' high-performance Vesconite bearing polymer is easy to tool on standard metalworking equipment, it's non-toxic and environmentally-friendly.

The internally-lubricated polymer is made of material that has 10 times the wear life of bronze and it's homogenous, so it can't delaminate. It works well in wet, dirty and corrosive environments.



Provides dimensional stability.

Because thermal expansion is low, load strength is high, it provides dimensional stability, and it doesn't swell or soften in water.

It's easy to machine on lathes and milling equipment, including CNCs, and Vesconite can be machined to 0.0005 in. It does not creep or deform. It cuts quickly and doesn't dull tools as do some plastics and metals. When a project calls for a non-standard bearing size due to shaft wear or housing damage, the material can be turned from hollow bar or tube stock.

There's no hazardous dust or fibrous waste in the machining residue and while proper safety equipment should be used when working with Vesconite, its clean shavings are not a health hazard.

VescoPlastics makes engineered plastics in Johannesburg, South Africa.

[www.vesconite.com](http://www.vesconite.com)



Includes timing pulleys and belts.

### POWER UP WITH SYNCHRONOUS DRIVE COMPONENTS

Change speed and torque while connecting mechanically rotating components with AutomationDirect's SureMotion synchronous drive components.

The XL timing pulleys made of aluminum or steel have a 1/5-in. pitch and 1/4 or 3/8-in. width, with or without hub and with smooth bore and setscrew.

The L version has a 3/8-in. pitch and 1/2 or 1-in. width. Both aluminum and steel pulleys are available with or without hub and are available with smooth bore and setscrew. The steel pulleys fit Taper-Lock or QD-style drive steel bushings.

Timing belts made of neoprene with fiberglass reinforcement have several pitches (0.200 to 0.375 in.) and widths (0.25 to 1 in.).

AutomationDirect is a distributor of industrial automation products based in Cumming, Ga.

[www.automationdirect.com/power-transmission](http://www.automationdirect.com/power-transmission)

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FRIEDHELM LOH GROUP

## NETWORKING

### MODULES SUPPORT POE CAPABILITY

Pulse Electronics Corp.'s 1x4 10GBASE-T Integrated Connector Module (ICM) platform exceeds IEEE 802.3an 10GBASE-T requirements over 100 metres and supports IEEE 802.3 for base stations, gateways, routers, and switches that require Power over Ethernet (PoE) capability and higher bandwidth.

EMI shielding between ports improves isolation and the units are tuned for flat insertion loss and excellent return loss performance over 10GBASE-T frequencies.



4- or 5-channel configurations.

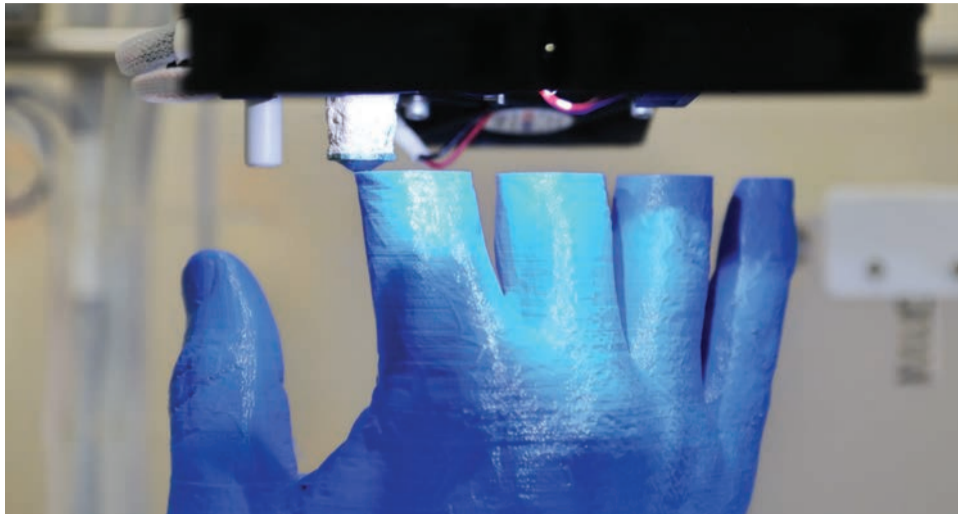
The RoHS compliant JT6 connector comes with and without PoE capability, in four- or five-channel configurations and with multiple LED options. A halogen-free option is also available.

Pulse Electronics is a developer of industrial networking products based in San Diego, Calif.

[www.pulseelectronics.com](http://www.pulseelectronics.com)

# TRENDING...

Gadgets, gear and the latest industry apps



## Hands UP for 3D printing

Guess what's taking off as a transformative technology? 3D printing/additive manufacturing, and in a big way (20% year-on-year global growth, according to A.T. Kearney and Wohlers Associates). Thinking about adding another dimension to your operation? A good place to start your research is the Senvol Database of machines and materials, which has topped 1,000 entries. Senvol, a New York-based 3D printing consultancy, offers the online tool free, providing more than 30 fields, such as machine build size, price, material type, or material tensile strength. And check out the RAPID Canada Conference at CMTS (Sept. 28 to Oct. 1 in Mississauga, Ont.) for the latest in additive manufacturing, rapid technologies, 3D printing and 3D scanning.  
<http://senvol.com/database>

**BOOST ASSET UPTIME**  
Honeywell Process Solutions (HPS) wants to change your processing plant from reactive to proactive with its Uniformance Asset Sentinel software ([www.honeywellprocess.com](http://www.honeywellprocess.com)). It continuously monitors, collects, organizes and analyzes process parameters, vibration data and alarms, then compares performance to an expected model. The software increases asset utilization by up to 10% and cuts maintenance costs by up to 15%.



**AIR SAMPLING GOES MOBILE**  
Keep track of several employees' air quality using a mobile device with the IP65-rated Apex2 sampling pump from Casella ([www.casellausa.com](http://www.casellausa.com)). It's equipped with Bluetooth 4.0 for up to 75 ft. away through a supporting Airwave app and monitors the breathing zone for particles such as lead, dust, asbestos or VOCs and other airborne contaminants. Run data is viewed easily and e-mailed with photos and notes directly to a PC.

**NO MAINTENANCE BATTERY POWER**  
Raymond lift trucks ([www.raymondcorp.com](http://www.raymondcorp.com)) is now installing (as of July) NexSys batteries and charger systems from EnerSys in its lift trucks through Raymond Sales and Service Centers. The batteries are no maintenance, recharge in less than three hours, allow for flex opportunity charging, they're resistant to extreme shock and vibration, and they have a shelf life of up to two years. If you're not using Raymond products check out EnerSys Canada Inc. in Bolton, Ont. ([www.enersys.com](http://www.enersys.com)).



**OUR DV SYSTEMS AIR COMPRESSOR IS POWERFUL, EFFICIENT & DEPENDABLE.**

**GLENN SINKE, OWNER & PRESIDENT, CAN AMERICAN STONE SPREADERS INC.**

When we asked **Glenn Sinke, Owner & President** of **Can American Stone Spreaders Ltd.**, an innovative manufacturer of stone spreaders in St. Catharines, Ontario, what he thought of their DV Systems rotary screw air compressor, he was pleased to say it's extremely powerful, dependable and efficient, always allowing his team to deliver and meet the demands of his growing production workload.

**DVCOMPRESSORS.COM**



BUILT BETTER

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High Precision Drive Components

**Quality**

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**BRECOflex CO., L.L.C. is the pioneer and world leader in the polyurethane timing belt industry. We offer our customers the widest range of timing belts, drive components, metal pulleys and accessories designed and manufactured with the highest priority given to quality and precision.**

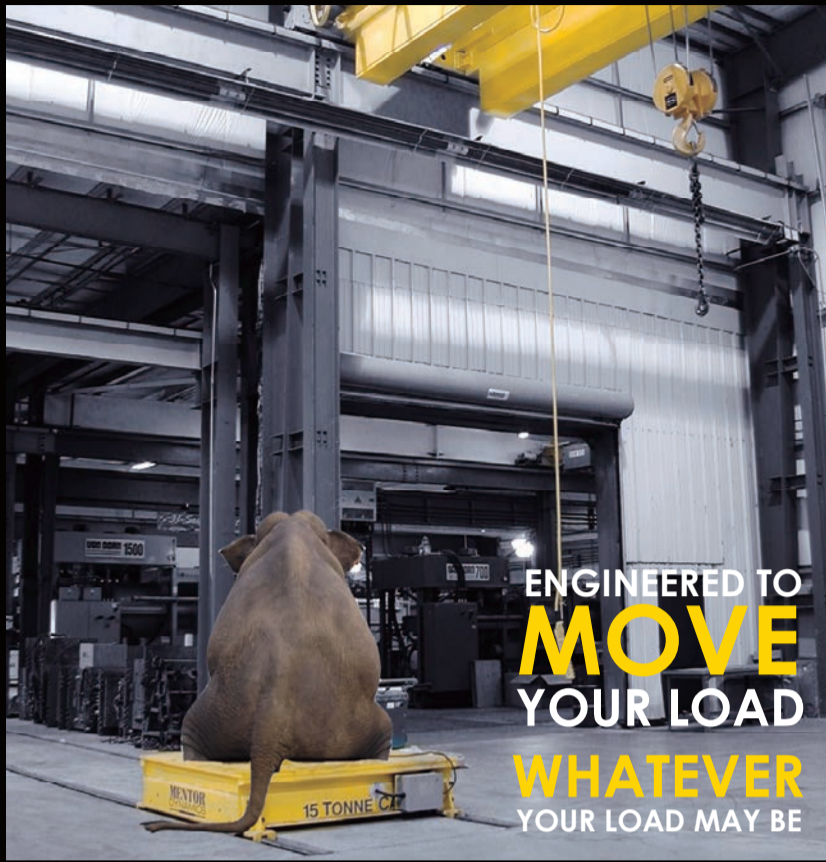
**Whether you are looking for a standard product from our inventory or a custom design tailored to your requirements, your application will benefit from our perfectly matched timing belts and pulleys. We take pride in our rapid customer response time and industry-leading product delivery and quality.**

**For additional information regarding our products and technical support services, visit our website at: [www.brecoflex.com](http://www.brecoflex.com) or call 732-460-9500.**



## TRANSFER CARTS

Transfer carts are **moveable platforms** used for the horizontal movement of materials, assemblies and other items.



ENGINEERED TO  
**MOVE**  
YOUR LOAD  
WHATEVER  
YOUR LOAD MAY BE

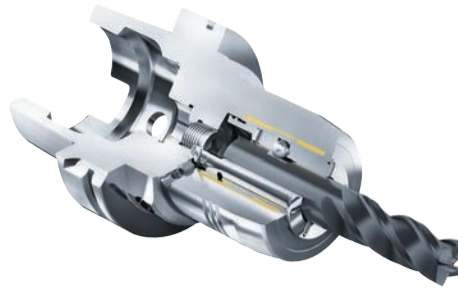
Compact in design, transfer carts can handle upwards of 60 ton and work well in areas with limited floor space. On-rail, towed, steerable and **100% custom-made** to your specifications.

Transfer carts can reduce labour costs, optimize manufacturing processes and reduce capital costs associated with forklift systems.

[www.engliftsystems.com](http://www.engliftsystems.com)

## CIEN

### MACHINING



Anti pull-out mechanism.

### TOOLHOLDER MAKES MACHINING EASY

SCHUNK's Tendo Aviation toolholder makes easy work of demanding aerospace applications thanks to a hydraulic expansion technology that improves run-out accuracy and vibration damping.

The toolholder, which is available for the HSK-A63, HSKA 100, CAT 40 and CAT 50 interfaces, has a balancing grade of G 2.5 at 25,000 min-1 and tool changes are made quickly with an Allen key.

An integrated anti pull-out mechanism keeps the tool in proper orientation and form-fit clamping when using a Weldon shank. The mechanism holds positional tolerances so the tool and machine can be used simultaneously.

Run-out accuracy and vibration damping minimizes cutting edge wear, extends tool life and keeps surfaces smooth.

A uniform load profile enhances spindle and spindle bearing service life.

SCHUNK is a manufacturer of clamping technology and gripping systems based in Lauffen am Neckar, Germany. It has a Canadian sales operation in Mississauga, Ont. [www.schunk.com](http://www.schunk.com)

### SERVO DRIVES MANAGE MULTIPLE AXES

B&R Automation has updated the safety functions for its ACOPOSmulti servo drives to include Remanent Safe Position (RSP) and Safely Limited Acceleration



Transfers safety parameters to HMI.

(SLA) functions, and machine options for SafeMOTION parameters that improve system availability and user-friendliness.

RSP allows SafeROBOTICS SLS, SLP and SLO functions to be used without homing after every power-on cycle.

SLA monitors the acceleration or deceleration of an axis. If the limit being monitored is exceeded, the SafeMOTION module goes into an acknowledgeable error state.

The SLA safety function reduces the maximum remaining distance coupled axes move if an error occurs. The speed limit set in the SLS SafeROBOTICS function is configured closer to the point, where there is real danger.

Machine options transfers safety parameters to a SafeMOTION module, which updates parameters via the HMI application on the operator panel.

B&R is a manufacturer of industrial automation technologies based in Atlanta. [www.br-automation.com](http://www.br-automation.com)



Completely automated.

### CONTINUOUS TUBE AND BAR PROCESSING

BLM Group USA's BC80 integrated CNC end machining centre is fully automated, simplifying cut to length, chamfering, facing, boring and tube threading processing.

The unit manages continuous, 24-hour production and high-volume bushing production, processing tubes up to 3.15 in. in diameter and in lengths from 0.4 to 13 in.

It's smaller than previous BLM models, but is highly productive thanks to completely automated operation, managing chip removal and scrap handling separately.

Tube changeover adjustments are handled from a single location. The bundle loader is filled without interrupting production and handles lengths up to 40 ft.

A pendant-mounted operator console saves floor space and pivots to maximize efficiency.

It operates in several stages. The first position cuts the tube or bar to length, while the second stage is for chamfering

### CONTROLLERS

### CONTROLLERS COMBINE MULTIPLE DEVICE FUNCTIONALITY

Watlow's F4T temperature process controller, with its 4.3-in., capacitive, high-resolution colour touch panel and graphical user interface, provides customized control for demanding applications.

Intuitive navigation and screen personalization allows channels, alarms, inputs and outputs to be programmed with user-defined specifications.

The UL, FM, CE, RoHS, W.E.E. and NEMA 4X/IP65- certified controllers combine temperature PID, over/under temperature limit, power switching, math, logic, timers and counters into a single integrated system.

Watlow's accompanying COMPOSER graphical configuration PC software connects easily via ethernet to speed up and simplify commissioning and archives, while documenting controller setup.

Watlow is a St. Louis-based manufacturer of industrial heaters, sensors and controllers. [www.watlow.com](http://www.watlow.com)



NEMA 4X/IP65-certified.

## A SOUND INVESTMENT IN SAFETY

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### REDUCE THE DANGERS OF AN ELEVATED OPEN GATE WITH THE EDGEALERT™ OPEN GATE ALARM

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and facing operations. The third stage handles boring, tapping or measuring.

There are large access doors on both sides for quick saw blade or tooling changes and routine maintenance.

The control is easy-to-use with menu guides for programming part dimension, material type, tooling and processing steps to optimize cutting conditions and maximize productivity.

BLM Group is a manufacturer of tube processing equipment based in Cantu, Italy.

[www.blmgroup.com](http://www.blmgroup.com)

## COMPRESSED AIR

### AIR CONVEYORS FIT IN TIGHT SPACES

EXAIR's aluminum 3/8 NPT and 1/2 NPT Threaded Line Vac air operated conveyors convert ordinary pipe into a powerful conveying system for parts, scrap, trim and bulk materials in scrap trim removal, material conveying, part transfer, fibre tensioning, filling and sampling applications.

They fit into the cramped spaces of production lines and attach to plumbing pipe couplers, making it easy to build a complete system using ordinary pipe and fittings.

They move small parts easily with compressed air to produce a vacuum on one end and high output flows on the other. Regulating compressed air pressure provides infinite control of the conveying rate.



The Line Vacs are CE-compliant and available in larger sizes up to 2 NPT and smooth end models for hose up to 5 in.

Exair is a manufacturer of compressed air products based in Cincinnati.

[www.exair.com](http://www.exair.com)

## ACTUATORS

### ACTUATORS CONFORM TO ETHERNET/IP

Tolomatic's ACS actuator control solution is an easy-to-use servo or stepper driver and controller for electric actuators that meets ODVA requirements over EtherNet/IP networks.

Tolomatic, a manufacturer of actuators based in Hamel, Minn., says the motion solution replaces pneumatic cylinders to automate manual processes.

The servo and stepper drives are controlled from a PLC or master controller via 24 VDC digital I/O, 0-10 VDC or 4-20 mA analogue I/O, Ethernet or Modbus RTU over RS-485 (EtherNet/IP or Modbus TCP protocols).

The servo and stepper driver and controller have 24 V brake output for brake



Servo and stepper control technologies.

control, which allow both products to control any 24 VDC external brake through Tolomatic's Motion Interface software.

They support EcoMode, which reduces motor current in the motion complete interval to allow a slight increase of position error while increasing electrical efficiency.

[www.tolomatic.com](http://www.tolomatic.com)

## PUMPS

### MULTITEC PUMP HANDLES HIGH CAPACITIES

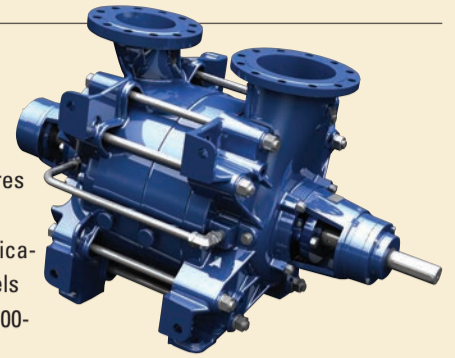
KSB has extended the capacity of its Multitec pumps to deliver flow rates of up to 850 cubic metres per hour and delivered heads as high as 390 m.

The multi-stage, multi-purpose pumps – for applications where pressure requirements are above levels typically delivered by single-stage pumps – have 200-mm outlet diameters.

Sizes range from DN 32 to DN 200 and the pumps are built with anywhere from two to 15 stages (up to five stages for the DN 200 models), to provide a customizable pump option for water supply systems, power stations and industrial pressure washing systems.

KSB Pumps Inc., based in Mississauga, Ont., is a member of the KSB Group, a global manufacturer of pumps and valves.

[www.ksb.ca](http://www.ksb.ca)



Sizes from DN 32 to DN 200.



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#### Festo CPX: the star of electric & pneumatic control

Ideal as an automation platform, valve terminal partner or remote I/O, open and direct. The unique function integration features and diagnostics will increase your productivity significantly. Exactly what you need when you demand the best from your automation solution.

[www.festo.ca](http://www.festo.ca)

## VALVES



Voltages are 5 to 12 V and 24 VDC.

### VALVES MAKES EASY WORK OF HIGH FLOW RATES

VUVG valves from Festo handle flow rates from 100 to 1380 l/min with threaded connections M3 to 1/4 in and are equipped with a mechanical spring return for vacuum and safety applications.

The direct wired directional control valves come with multiple pressure zones, are easy to assemble or are or-

dered fully assembled. They're mountable in inline or manifold configurations.

The valves come in three sizes with flow rates up to 1,300 l/min and are equipped with a fixed restrictor vertical pressure supply plate and exhaust plate. Multiple voltages are 5 to 12 V and 24 VDC.

IP40 or IP65-rated, they're housed in an E-box enclosure with M8, flying leads, grommet or cable outlet connection options, in both horizontal and vertical orientations and exchange with a single click.

Festo is an industrial control and automation manufacturer based in Esslingen am Neckar, Germany. It has a Canadian office in Mississauga, Ont.

[www.festo.com](http://www.festo.com)

### CONTROLLER AUTOMATICALLY POPULATES MOTION PROFILES

Haydon Kerk Motion Solutions' IDEA PBL4850E programmable 3-phase brushless motor drive motor controllers replicates the functionality of stepper-based drives for its brushless counterparts as the two drive types share a common graphical user interface.

The interface automatically populates motion profile parameters based on entry of just a few motor characteristics to prototype applications.

Accompanying IDEA software makes programming motors easy through intuitive, on-screen buttons instead of complicated command sets or proprietary programming languages.

The 4-quadrant brushless controller applies sinusoidal commutation to produce smooth motion and minimize torque ripple. It refines motion by incorporating trapezoidal and s-curve motion profiles to eliminate jerk caused by rapid



Up to 80 m per minute.

input voltage of 12 to 48 VDC.

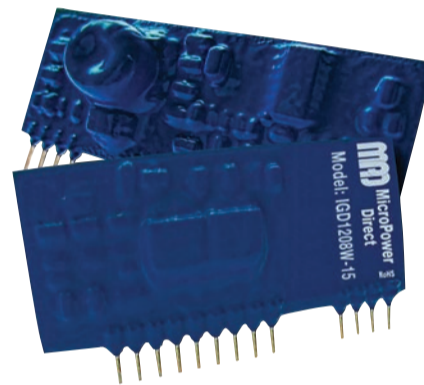
The drive, which communicates via a USB to mini USB, provides programmable current control of up to 5.6 A peak with an optional current boost during ramping of up to 6.5 A peak. With an input voltage of 12-48 VDC, the drive accommodates a range of brushless motors.

Hall cell signals are used for phase initialization, and an encoder provides positional feedback. There's eight opto-isolated general purpose inputs and outputs. Inputs rated for 5 to 24 VDC, 8 mA maximum per input. The outputs are open collector, 5 to 24 VDC, 200 mA maximum per output.

Haydon Kerk is a manufacturer of motion control technologies based in Waterbury, Conn.

[www.haydonkerk.com](http://www.haydonkerk.com)

## POWER SUPPLY



Isolated 3,750 V control signal.

### CIRCUITS PROVIDE GATED POWER PROTECTION

MicroPower Direct's IGD1208W hybrid integrated circuits for drive N-channel IGBT modules provide the I/O isolation, high speed, drive voltage stability and fault protection required to control most MOS gated power devices.

Typical applications include high frequency welding systems, solar converters, uninterruptible power supplies and automotive/appliance motor drives.

The circuits convert TTL compatible input signals into a fully isolated +15 V/-8 V Gate drive with a peak drive current of 8 A. An internal, high speed opto-coupler provides an isolated (3,750 V) control

signal with a CMR ratio of 30 kV/μs for precise switching at high speed.

A built-in "desaturation detector" provides short circuit protection, and a fault signal is generated if the detector is activated. The timing of the fail signal is variable, allowing users to tailor the unit to specific application requirements.

It's powered by a 15 VDC connection and an internal, dual output DC/DC converter provides isolated gate drive power.

The IGD1208W comes as a compact single-in-line (SIP) package to minimize board space. It handles temperatures between -40 to 70 degrees C.

MicroPower Direct is a supplier of industrial power supply and conversion products based in Stoughton, Mass.

[www.micropowdirect.com](http://www.micropowdirect.com)

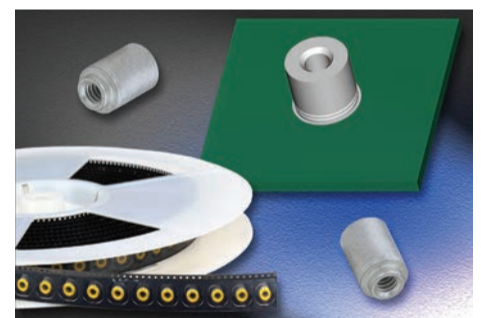
## FASTENERS

### FASTENERS INSTALL ON PCBs PERMANENTLY

PEM ReelFast brass surface mount fasteners from PennEngineering install permanently on PC boards. The fasteners have higher corrosion resistance and conductivity than steel counterparts.

The tin-plated Type SMTSOB brass nuts and spacers/standoffs install at the same time as other surface mount components prior to the automated reflow solder process for space or stack boards, mount boards, and/or attach components.

They also reduce damage to boards by minimizing the number of loose parts and related handling issues.



Reduces damage to boards.

The fasteners are supplied on tape and are compatible with existing SMT automated installation equipment. A polyimide patch at the end of the fastener allows vacuum pickup.

Lengths range from .065 to .375 in. and 2 to 10 mm. They install on boards of any hardness and as thin as .060 in.

Threaded versions are available in sizes #2-56 through #8-32 and M2 through M4 and thru-hole (non-threaded) types can be specified in sizes 0.116 and 0.143 in., and 3.6 and 4.2 mm.

PennEngineering is a fastener manufacturer based in Danboro, Pa.

[www.pemnet.com](http://www.pemnet.com)

## CABLES

### CABLE BLOWER FITS IN SMALL PLACES

General Machine Products' has added the Whisper micro cable blower to its line of fibre optic cable-placing equipment for 4 to 18 mm diameter microducts.

The unit will place cable between 2 to

## Power Meets Profitability Guaranteed.

The Model 1020 is not only incredibly powerful—recovering up to 5 tons of even the heaviest materials per hour—it's also uniquely portable, so it goes almost anywhere. With a 99% efficiency rating, noise levels below OSHA standards, and a performance guarantee, it's more than a cleaning system; it's a business asset.

### VAC-U-MAX 1020MFS 10 & 15 HP Continuous Duty Vacuum

- 50% more vacuum power than other industrial vacuums
- Move mountains of material through hundreds of feet of hose
- Vacuum rates up to 10,000 lbs per hour
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## CONNECTORS

### SPEEDLOCK CONNECTORS INSTALL QUICKLY

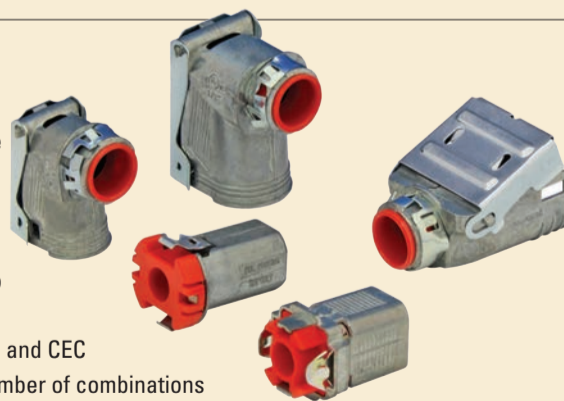
Appleton Electric's Speedlock double snap connectors quickly connect armored and metal clad cable or flexible metal conduit to steel boxes and enclosures because there are no tools or locknuts.

They're cULus listed for use in NEC and CEC governed locations and come in a number of combinations including straight, straight for old work, duplex (for installing two cables in a single KO) and 90 degree. They simply snap onto the cable and into the knock-out.

Zinc connectors are reusable and terminate 3/8 or 1/2 in. flexible conduit in 1/2 in. steel box KOs or enclosures in dry locations. Insulated throats create a smooth pulling surface to protect wire insulation from damage.

Appleton Electric, an Emerson Industrial brand, is a manufacturer of industrial electrical products based in Rosemont, Ill.

[www.appletonelec.com](http://www.appletonelec.com)



cULus listed.



Speeds up to 80 m per minute.

8.5 mm in diameter at speeds up to 80 m per minute. Ideal for smaller jobs where traditional, field-size blowing machines are not suitable.

Microfibre is propelled into the microduct by a conventional, variable speed drill (available separately). The unit is also engineered to provide fast, on-site adjustments to accommodate multiple cable or duct sizes.

An electronic monitoring system produces digital read-outs of speed and distance.

General Machine Products Co. Inc. is a manufacturer of cable construction and cable placing equipment based in Trevese, Pa.

<http://gmptools.com>

## TEST AND MEASUREMENT

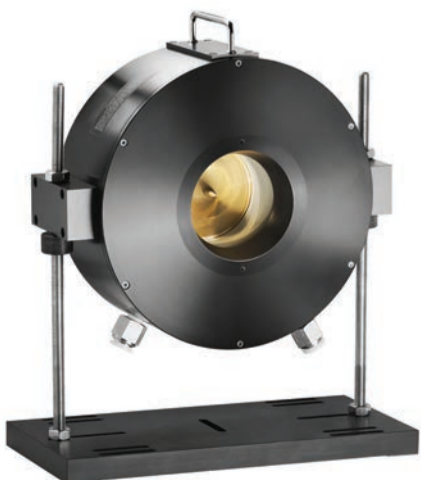
### SENSORS MEASURE HIGH POWER LASERS

Ophir Photonics Group's three latest high power laser sensors and scatter shield accessories measure large and divergent laser sources, such as diode stacks and arrays.

The 6000W-BB-200x200 is a very large aperture (200 x 200 mm), water-cooled laser power/energy sensor that measures sources from 100 to 6,000 W. The L2000W-BB-120 (120 mm aperture), measures up to 2,000 W. Both models have a broad spectral response of 0.19-20 µm.

The L2000W-BB-120 includes a "Smart Connector" interface that operates with the company's StarLite, Nova II, and Vega smart displays, and Juno PC interface. It also connects directly to PC via RS232.

For high peak power, high energy measurements over a 0.15-20µm spectral range, the L100(500)A measures single shot energy of high peak power and short pulse lasers at up to 3J/cm<sup>2</sup>. It also measures high power lasers for short



Reduce backscatter by 70%.

(~1 s) exposures at up to 6,000 W and continuously measures up to 100 W (500 W with heat sink).

The 30 K-W and 10 K-W scatter shields reduce the heating effect of backscatter on surrounding sensor surfaces when measuring high power lasers and reduce the backscatter by 70%.

Ophir Photonics, a Newport Corp. company, is a developer of test and measurement technologies based in North Logan, UT.

[www.ophiropt.com/photonics](http://www.ophiropt.com/photonics)

## METALWORKING



Zirconium grain formulation.

### CUTTING WHEELS HANDLE HEAVY-DUTY WORK

Walter Surface Technologies' iZIP+ XTRA cutting wheels easily handle steel or stainless steel in heavy-duty applications thanks to a rib design that reduces friction on the material's surface for cooler and faster cutting.

The wheels, available in 4 1/2- and 5-in. diameters, are 1/16 in. thick. A new formulation of zirconium grains improves the wheel's durability against tough materials and produces less dust.

Walter Surface Technologies is a developer of metalworking and cutting tools based in Montreal.

[www.walter.com](http://www.walter.com)

## MATERIAL HANDLING

### HOIST MEETS HARSH CONDITION REQUIREMENTS

Columbus McKinnon Corp.'s Yalelift 360 ATEX hand chain hoist makes easy work of tough lifts in harsh conditions.

The manufacturer of material handling products based in Amherst, NY says the hoist handles most explosive environments and meets ATEX requirements. Its hand chain cover rotates 360 degrees to lift loads from most angles.

The unit meets EU Directives 2014/34/EU and 99/92/EC and has the Ex II 2 GD c IIC T4 classification. Copper-coated suspension and load hooks, stainless steel load and hand chain, and bronze trolley wheels are all spark resistant.

An enclosed stamped-steel housing features MKS micro-corrosion protection for harsh environments. A precision four-pocket liftwheel and chain guide enhance chain fit and alignment.

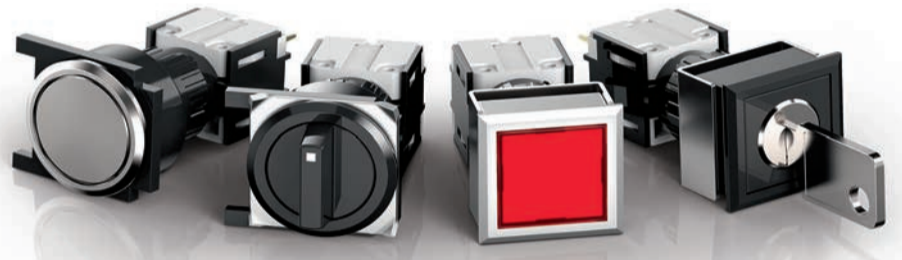
A Weston-style braking system provides positive load control and reliable performance, while heat-treated steel internal gears and pinions enhance strength and extend product life.

[www.cmworks.com](http://www.cmworks.com)



ATEX-approved.

## SWITCHES



IP65 sealing capabilities.

### SWITCHES FLUSH MOUNT EASILY

EAO Corp.'s Series 71 flush mount switches attach to any PCB quickly thanks to a locking pin located on each switching contact block to provide tactile feedback and IP65 sealing capabilities.

PCB soldered contact blocks and a twist and lock fixing mechanism make assembly easy without mounting studs.

When the contact block is mounted to the PCB, each switch contains a locking pin that, when removed, easily separates the switch actuator from the PCB assembly.

Illuminated pushbuttons, keylock

switches, selector switches and indicators are combined in any arrangement and mounted on the same PCB level, ideal for machinery and control cabinet engineering applications.

A modular structure enables a range of configuration options and efficient storage. Flush-mounted construction protects the control devices from damage and the round, square or rectangular lenses have a large area for text/symbols and bright LED illumination.

EAO Corp. is a manufacturer of switches and HMI panels based in Shelton, Conn.

[www.eao.com](http://www.eao.com)

# LEADING THE INDUSTRY THROUGH INNOVATION & QUALITY



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## » Show Time

Canada's largest trade show returns with industry's newest technology, machinery and equipment, plus useful educational sessions, keynotes and special events.

There are many ways for manufacturers on both the buying and supplying sides to make contact, but trade shows have a unique ability to bring all the players to one place for some focused face-to-face networking.

In Canada, the place to be for this kind of interaction is the Canadian Manufacturing and Technology Show (CMTS), held every two years in Mississauga, Ont.

Canada's largest manufacturing trade show presented by SME with complementary events, runs from Sept. 28 to Oct. 1 at the International Centre, featuring more than 500 exhibitors representing some 700 companies.

"We're expecting more than 8,000 visitors over the four-day event," says Julie Pike, event manager for CMTS. "[The show] occupies about 375,000 square feet so there's lots for folks to see and discover as they get up close to the technology, and learn from the experts."

What's new in 2015? The RAPID Canada Pavilion & Conference co-located with CMTS (inside the Advanced Manufacturing Hall 1) focuses on additive manufacturing, 3D scanning and imaging.

"Plus we're introducing a 3D playground in our SME Booth for attendees to get up close and personal with additive manufacturing and see how this technology applies to their businesses," says Pike.

Attendees will see live demonstrations of filament recycling by ReDeTec, and there will be 3D-printed edible goodies by Genius IE.

She also notes the floor layout has been slightly redesigned to align technologies by hall including machine tools, tooling and metalworking equipment, along with the Advanced Manufacturing Hall that highlights additive manufacturing, automation, software and other leading technologies and applications.

"Our targeted technology zones allow attendees to easily navigate the show floor and find related technologies nearby," she says. "This is very useful for folks who are looking at different types of equipment and solutions. They're able to compare equipment and technology being demonstrated side-by-side."

For those seeking enlightenment, there will be education sessions and demonstrations in the Tech Talk Theatre on the show floor. For example, watch for Festo's BionicOpter to make a daily fly-by. This mechanical dragonfly masters the real insect's complex characteristics, flying in all directions, hovering and gliding, but it also provides insight into innovations that will be useful to manufacturers.

And be sure to check out Innovation Alley, featuring the latest advancements in R&D, including NRC's soft tissue replication by additive manufacturing. It demon-



Festo's BionicOpter mimics a dragonfly.

PHOTO: FESTO

# Manufacturing the future at CMTS

## SME EVENT TO HOST 700 SUPPLIERS AND 8,000 VISITORS

strates how to create tissue that mimics the real thing. The advanced machining capabilities of the McMaster Manufacturing Research Institute will also be featured.

"As part of our ongoing efforts to build tomorrow's manufacturing workforce, we're also introducing a student competition," says Pike.

The Wind Turbine Challenge will engage competing students who will design, 3D-print and test turbines to determine which one generates the most power.

### Star power

There's also something special for job shop owners and employees who are hockey fans. An evening networking event will feature new technologies and innovations, plus an opportunity to meet Toronto Maple Leaf hockey legend Darryl Sittler.

And the Medical Manufacturing Innovation series returns providing technology information and education sessions for medical and dental manufacturers.

Automotive industry manufacturers will pick up strategies and best practices at the Automotive Parts Manufacturers' Association (APMA) Automotive Outlook Conference, co-sponsored by Export Development Canada (EDC) on Sept. 28.

The keynote speaker is Linda Hasenfratz, CEO of Linamar Corp., the Guelph, Ont.-based automotive parts giant that runs 48 plants globally and had sales of \$4.2 billion last year. Her topic is market expansion catalysts, challenges, opportunities and how leadership is paramount.

APMA sessions include an automotive industry outlook and forecasts; industry panels consisting of Tier I suppliers; tooling and mould making suppliers; and human resource development.

Pike notes the opening keynote by Hasenfratz is complimentary with CMTS registration and urges visitors to save the \$50 admission by pre-registering at <http://CMTS.ca>.

## CMTS at a Glance



International Centre, 6900 Airport Road, Mississauga, Ont.  
<http://cmts.ca>

### SHOW TIMES

Sept. 28: 10 a.m.-5 p.m.      Sept. 30: 10 a.m.- 8 p.m.  
Sept. 29: 10 a.m.-5 p.m.      Oct. 1: 10 a.m.-4 p.m.

### KEYNOTES AND PANELS

**Market Expansion Catalysts, Challenges, and Opportunities and How Leadership is Paramount**

Linda Hasenfratz, CEO, Linamar Corp.  
Sept. 28, 9:00 a.m.-9:40 a.m.



Linda Hasenfratz

**How Technology Continues to Shape our Lives and Businesses**  
Sept. 29, 9:00 a.m.-10:30 a.m.

Jeffrey DeGrange  
Chief Commercial Officer, Impossible Objects

**Medical Additive Manufacturing – The Canadian Conundrum**  
Sept. 30, 9:00 a.m.-10:30 a.m.

Dr. Gord Campbell, National Research Council Canada

### TECH TALK THEATRE

**Sept. 28**

- How to Specify the Correct Type of Custom Automation
- Lean and Six Sigma in Manufacturing and Service Industries
- Developing a Company Specific Skills Development Program

**Sept. 29**

- The Technological Shift
- Sorting Through Additive Manufacturing Technologies
- Industry 4.0 and the Internet of Things (IoT) – The Heart of Advanced Manufacturing

**Sept. 30**

- "You can't drill a curved hole"
- Government funding for SMEs

**MODEMS EXTEND ETHERNET NETWORKS**

Weidmuller's two new licensed frequency data modems provide powerful long-range communications (up to 40 miles) to extend ethernet networks into difficult-to-access locations.

Unique design features optimize the network and provide intelligent routing for high reliability, lower latency and deterministic power management. They support 360 to 512 MHz and 928 to 960 MHz configurations; operate in access point/client configuration; function as a network bridge/router; or serve as a serial server (RS232/485).



Long-range communications.

Node-to-node deterministic mesh network repeatability extends range, and multiple channel spacing options increase network scalability. They're optimized for throughputs of up to 25.2 kbps, providing secure wireless communications in challenging outdoor environments and over obstructed paths. With the Modbus server, integrating smart sensors, RTUs or I/O expansion through the use of expansion modules is seamless.

The modems integrate with Weidmuller wireless and wired networks to connect remote sensors, actuators and instrumentation to mission critical monitoring and control systems for the oil and gas, water and wastewater, mining and power generation industries.

They operate in an extended temperature range of -30 to 60 degrees C, provide secure industry standard encryption of 128 bit AES, 802.11i with CCMP, WEP, WPA2, and include ATEX/IECEX hazardous area approval. DIN-rail or wall-mount options are available for easy installation.

The Weidmuller Group, based in Richmond, Va., makes power, signal and data products for industry.

[www.weidmuller.com](http://www.weidmuller.com)

**SOFTWARE ENHANCES PHOENIX II**

Next-generation software for the Phoenix II XRF analyzer from AMETEK Process Instruments enhances data management, statistical calculations and productivity enablers such as:



For benchtop elements analysis.

- archived data compatibility with LIMS, Excel;
- statistical analysis options that allow a single sample to be run multiple times and generate an analysis of the spectra along with metrics on noise levels and peak shape position reproducibility;
- overlay of stored spectra on current spectrum;
- display of calibration correlation plots;
- copy/import/export methods and data from unit to unit;
- ability to apply terms and factors to data results;
- display in real time, counts per second; and
- interactive Spectra Viewer such with markers indicating keV and/or elements.

An onboard PC makes use of the Windows 7 operating system through a touch-screen display, making analysis easy for non-technical operators, but advanced enough for more experienced users.

Options for the Phoenix II include a polarized X-ray source, a movable secondary target and a rugged gas-filled proportional counter detection system for the measurement of low atomic number elements such as Al and Si as well as S and Cl.

It doesn't require an external mouse or keyboard, yet offers USB, VGA and ethernet connections for networking and connecting to external devices.

AMETEK, based in Pittsburgh, manufactures online analytical instrumentation for industry.

[www.ametekpi.com](http://www.ametekpi.com)

**TOOLING AND FIXTURING**

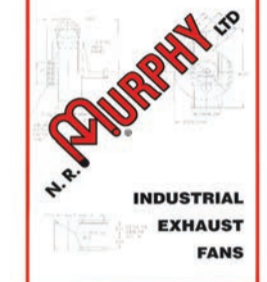


Carr Lane Mfg.'s 720 page catalogue provides clamps, pins, knobs, plungers, supports, locators and more. Featured items include nickel-plated hoist rings, modular Tiny Vise edge clamps, CL5 5-axis tooling, and the Carr Lock system for fast fixturing on horizontal and vertical machining centres.

[www.carrlane.com](http://www.carrlane.com)

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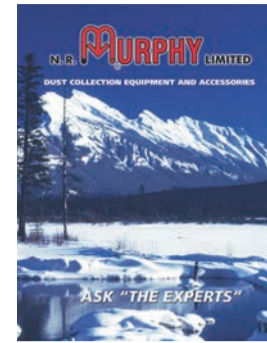
**POWER WORKHOLDING DEVICES**



This 192-page power workholding catalogue provides specs, photos, charts, drawings and detailed descriptions of hydraulic clamps and cylinders, work supports, precision vises, zero point mounting, power units, valves, and assembly and handling devices. Find out the best uses of each product, maximum clamping forces, dimensions and more. Click CNC Machining at [www.clrh.com](http://www.clrh.com).

**Carr Lane Roemheld Mfg. Co.**

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**N.R. Murphy Ltd.**

**MOST POPULAR VACUUM CUPS**



Vi-Cas Manufacturing's new 16-page, full colour brochure details the company's most popular vacuum cups. In addition to dimensional information (including lip diameter, height and mounting holes), the new literature shows photos of each cup to guarantee accuracy. Vacuum cups and accessories are used extensively in all types of packaging and labeling operations. [www.vi-cas.com](http://www.vi-cas.com)

**Vi-Cas Manufacturing**

**THE NEW COXREELS® CATALOG IS HERE!**



COXREELS newest 60-page catalogue showcases refined features and helpful selecting tools for the most comprehensive and innovative industrial grade reel line. The new catalogue includes new models and the addition of specialty product lines such as the EZ-Coil safety reel line which retracts 80% slower than conventional spring driven reels. [www.coxreels.com](http://www.coxreels.com)

**COXREELS**

**Index of Advertisers**

Advertiser .....	Page #
Automation Direct.....	OBC
Ackland Grainger.....	13
BrecoFlex.....	31
Conductix .....	16
Coxreels .....	35
DV Systems.....	31
EMC .....	22
Engineered Lifting System .....	32
Exair.....	7
Festo.....	33
Flir Systems .....	IBC
Hamond Mfg. Co. ....	18
IESO.....	IFC,26
IGUS Inc.....	29
Imagewear .....	20,21
KSB.....	19
N.R. Murphy.....	22
Rittal .....	30
Sullair.....	6
SCA Tork.....	8
SEW-Eurodrive .....	29
SME CMTS.....	38
SSI Schaefer System International Inc.....	15
Scott's Directory .....	37
Vac-U-Max.....	34
Vi-Cas .....	29
Wildeck .....	32

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**SCOTT'S**  
DIRECTORIES



# Rate cut highlights economic challenges

BY JOCK FINLAYSON

What are we to make of the Bank of Canada's recent decision to trim its short-term policy interest rate by another 25 basis points, taking it to a near record low level of 0.5%?

The Bank is frankly acknowledging the magnitude of the energy-related downturn in capital spending and exports has been greater than expected and the pain is likely to persist. Canada is facing difficult economic adjustments stemming from a less rosy future for oil and gas

**“A 25 basis point reduction in the bank rate is too small to have any appreciable macroeconomic impact...”**

markets and many other commodities.

This is unwelcome news. Natural resource industries supply more than half of Canada's exports and helps to drive business investment in many regions of the country. A world of lower prices for energy and other commodities is a world of significantly slower growth in incomes than we enjoyed during the global commodity upcycle that began in 2002-03.

At a time of considerable macroeco-

nomie weakness, the Bank of Canada has fallen on monetary policy to shoulder the burden of supporting aggregate demand. Fiscal policy is largely missing in action as the federal government prioritizes deficit avoidance and several provinces struggle to contain debt/GDP ratios.

Given current economic conditions and Canada's rather uninspiring near-term growth prospects, the existing monetary/fiscal policy mix seems far

from optimal, at least at the federal level.

Finally, the latest cut in the central bank's (already low) benchmark rate signals that the conventional monetary policy tool box is now almost empty. A 25 basis-point reduction in the bank rate is too small to have any appreciable macroeconomic impact, other than to put more downward pressure on our increasingly enfeebled currency. With the policy rate set at 0.5%, the central bank has little capacity to respond to additional shocks.

It's remarkable that, six years after Canada's economy hit bottom at the tail end of the 2008-09 recession, the central bank's benchmark rate sits perilously close to zero, and "real" after-inflation market interest rates are negative (or nearly so) for bank savings accounts, GICs and some other fixed income products. Few Canadian forecasters imagined, circa mid-2009, that interest rates would remain at such exceptionally low levels this far into the future considering Canada has posted several years of decent economic growth and sizable employment gains.

### The way forward

While the central bank is working with the tools at hand to deliver on a mandate centred on managing inflation, trouble is being stored up as a consequence of year after year of rock bottom interest rates. Frothy housing markets and the accumulation of unprecedented household debt levels are the two most visible features of our present economic situation. It's worth asking whether sticking with a macroeconomic policy framework that has encouraged leverage and borrowing on an epic scale while punishing thrift and prudence may be doing subtle but real damage to the long-term foundations of a productive economy.

Too large a fraction of the scarce capital and entrepreneurial talent has been directed into relatively less productive sectors and activities (housing-related investment, financial engineering, and consumer spending), while too little has been deployed to building products, technologies, skills, enterprises and infrastructure. Perhaps such a misallocation of capital and talent is the price that must be paid in exchange for relying so heavily on sustaining demand and spending during a period of sluggish global growth.

It's too early to know how this will play out, but policy-makers would be wise to pay a lot more attention to the downside risks inherent in today's unbalanced economy in which consumers, businesses and governments have become used to the comforts of astonishingly cheap money.

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