

# PLANT

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CANADIAN  
MANUFACTURING

75  
YEARS

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brewing to  
a new level



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In the September issue of PLANT, Greg Galambos (yellow helmet) was misidentified as Domenic DiMondo. Greg is GreenMantra's technical services manager.

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# Achieving the next level

**A**s we creep up to the end of 2016, the prognosticators are hard at work analyzing economic fundamentals while the management experts provide guidance that will propel manufacturing forward, and there are some common threads running through their narratives: companies are overly cautious, holding back on investment; they're timid when it comes to venturing beyond Canada's borders; and they lack courage.

Indeed, **PLANT's** annual outlook survey (partnering with Grant Thornton and Syspro) has consistently gauged the mood of manufacturers year after year as being mostly "cautiously optimistic." A recent KPMG survey offers similar responses and Deloitte research of businesses gauges courageous companies to number about one in 10.

Boom. There it is. Canadian companies are a bit too risk-averse, which is holding them and the economy back.

Not that there isn't good reason to be careful. Manufacturers have sustained some damaging blows along the way, most recently arising from the financial crisis and economic downturn of 2008-09. RBC's CEO David McKay told Bloomberg TV that it could take 15 years for Canada's economy to reinvent itself after manufacturing and service industries began to shrink, noting more than 7,000 exporting companies were lost to the US when the loonie traded at par with the dollar.

The Business Development Bank of Canada (BDC) has also weighed in with some troubling news: small and mid-sized companies are experiencing difficulty scaling up. Dramatically fewer of them are expanding compared to 15 years ago. Only one in 1,000 grew past the 100-employee mark: more than a 40% drop from the 0.18% of small businesses that did so in 2001.

Mid-sized firms (100 to 499 employees) are also struggling. They account for 0.93% of the total number of manufacturers in 2013, down from 1.04% in 2001. Only 1.8% of them become large companies each year.

What's holding them back? KPMG's recent survey found nearly half see economic growth, currency fluctuations and pricing pressures impacting their growth over the next three years. They're most concerned about the possibility of another economic downturn, having to face new entrants or technologies, and the volatility of foreign exchange rates. Furthermore, the lack of confidence in the Canadian and global economies is limiting their investments in innovation and R&D, as well as new market strategies that include venturing beyond their current borders.

Despite its diminished state, manufacturing is key to Canada's economic foundation. It generates 10.5% of GDP (\$174 billion); it employs 1.7 million people (or 10% of the workforce); it accounts for 67% of exports; and it's responsible for 42% of private sector research and development.

It's vital to grow small manufacturers into mid-sized companies, which currently generate 12% of GDP and 17% of private sector R&D spending. They also lead in revenue growth at 43%, compared to 36% growth for large companies and 27% for small businesses.

Companies need to be more adventurous, and Deloitte points out why it pays. Sixty-nine percent of "courageous" businesses saw revenues rise last year compared to 46% of fearful companies, which are also twice as likely to see revenues fall. The characteristics of the courageous are simple enough: they're provocative and challenge the status quo; they take calculated risks; they take action that generates positive, long-term impacts; leaders have a strong moral compass, which they use to inform their organization's decisions and surround themselves with diverse thinkers from different backgrounds; and their leaders implement processes to solicit and incorporate feedback from all levels of their organizations.

Manufacturers have been advised repeatedly what is required to achieve the next level: invest in productivity, invest in fixed assets and diversify into new jurisdictions.

It's a matter of finding the courage to do so.

**Joe Terrett, Editor**

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

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# The Truth About Compressed Air!

If you think compressed air is too expensive and noisy - read this. The facts will surprise you!

## Compare these Blowoffs

There are a variety of ways to blow the water from the bottles shown in the photo below, but which method is best? To decide, we ran a comparison test on the same application using four different blowoff methods: drilled pipe, flat air nozzles, Super Air Knife (each using compressed air as a power source), and a blower supplied air knife (using an electric motor as a power source). Each system consisted of two twelve inch long air knives. The following comparison proves that the EXAIR Super Air Knife is the best choice for your blowoff, cooling or drying application.

The goal for each of the blowoff choices was to use the least amount of air possible to get the job done (lowest energy and noise level). The compressed air pressure required was 60 PSIG which provided adequate velocity to blow the water off. The blower used had a ten horsepower motor and was a centrifugal type blower at 18,000 RPM. The table at the bottom of the page summarizes the overall performance. Since your actual part may have an odd configuration, holes or sharp edges, we took sound level measurements in free air (no impinging surface).

### Drilled Pipe



This common blowoff is very inexpensive and easy to make. For this test, we used (2) drilled pipes, each with (25) 1/16" diameter holes on 1/2" centers. As shown in the test results below, the drilled pipe performed poorly. The initial cost of the drilled pipe is overshadowed by its high energy use. The holes are easily blocked and the noise level is excessive - both of which violate OSHA requirements. Velocity across the entire length was very inconsistent with spikes of air and numerous dead spots.

### Blower Air Knife



The blower proved to be an expensive, noisy option. As noted below, the purchase price is high. Operating cost was considerably lower than the drilled pipe and flat air nozzle, but was comparable to EXAIR's Super Air Knife. The large blower with its two 3" (8cm) diameter hoses requires significant mounting space compared to the others. Noise level was high at 90 dBA. There was no option for cycling it on and off to conserve energy like the other blowoffs. Costly bearing and filter maintenance along with downtime were also negative factors.

### Flat Air Nozzles



As shown below, this inexpensive air nozzle was the worst performer. It is available in plastic, aluminum and stainless steel from several manufacturers. The flat air nozzle provides some entrainment, but suffers from many of the same problems as the drilled pipe. Operating cost and noise level are both high. Some manufacturers offer flat air nozzles where the holes can be blocked - an OSHA violation. Velocity was inconsistent with spikes of air.

### EXAIR Super Air Knife



The Super Air Knife did an exceptional job of removing the moisture on one pass due to the uniformity of the laminar airflow. The sound level was extremely low. For this application, energy use was slightly higher than the blower but can be less than the blower if cycling on and off is possible. Safe operation is not an issue since the Super Air Knife can not be dead-ended. Maintenance costs are low since there are no moving parts to wear out.

## Facts about Blowers

Energy conscious plants might think a blower to be a better choice due to its slightly lower electrical consumption compared to a compressor. In reality, a blower is an expensive capital expenditure that requires frequent downtime and costly maintenance of filters, belts and bearings.

### Here are some important facts:

- Filters must be replaced every one to three months.
- Belts must be replaced every three to six months.
- Typical bearing replacement is at least once a year at a cost near \$1000.
- Blower bearings wear out quickly due to the high speeds (17-20,000 RPM) required to generate effective airflows.
- Poorly designed seals that allow dirt and moisture infiltration and environments above 125°F decrease the one year bearing life.
- Many bearings can not be replaced in the field, resulting in downtime to send the assembly back to the manufacturer.

Blowers take up a lot of space and often produce sound levels that exceed OSHA noise level exposure requirements. Air volume and velocity are often difficult to control since mechanical adjustments are required.

To discuss an application, contact:

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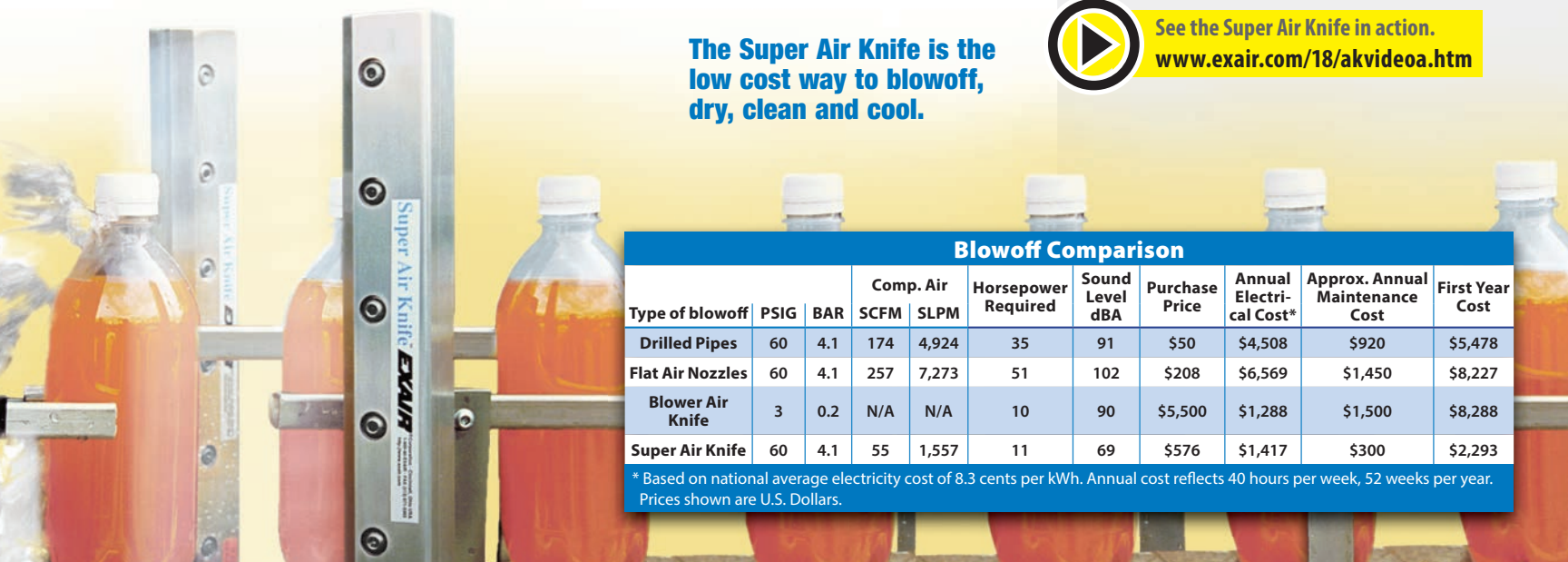
See the Super Air Knife in action.  
[www.exair.com/18/akvideoa.htm](http://www.exair.com/18/akvideoa.htm)

The Super Air Knife is the low cost way to blowoff, dry, clean and cool.

### Blowoff Comparison

Type of blowoff	PSIG	BAR	Comp. Air SCFM	SLPM	Horsepower Required	Sound Level dBA	Purchase Price	Annual Electrical Cost*	Approx. Annual Maintenance Cost	First Year Cost
Drilled Pipes	60	4.1	174	4,924	35	91	\$50	\$4,508	\$920	\$5,478
Flat Air Nozzles	60	4.1	257	7,273	51	102	\$208	\$6,569	\$1,450	\$8,227
Blower Air Knife	3	0.2	N/A	N/A	10	90	\$5,500	\$1,288	\$1,500	\$8,288
Super Air Knife	60	4.1	55	1,557	11	69	\$576	\$1,417	\$300	\$2,293

\* Based on national average electricity cost of 8.3 cents per kWh. Annual cost reflects 40 hours per week, 52 weeks per year. Prices shown are U.S. Dollars.



## BULLETINS

**Boralex Inc.** has been selected by the Innu Nation to develop the 200 megawatt Apuiat wind farm project in Port-Cartier, Que. The Kingsey Falls, Que.-based developer and operator of renewable energy projects will partner with Renewable Energy Systems Canada Inc. to develop and construct the project.

**Torstar Corp.** has found a buyer for its shuttered printing plant in Vaughan, Ont. The parent company of the Toronto Star has not released the identity of the buyer, but said the deal is worth \$54.2 million. The 675,000 square-foot plant north of Toronto opened in 1992 and cost approximately \$400 million. The move will cut the newspaper's printing costs by \$10 million per year. It signed a five-printing contract with Transcontinental Printing earlier this year.

**H2O Innovation Inc.** has released its new flexMBR technology for advanced wastewater treatment applications. The flexMBR is the first membrane bioreactor developed with an open-source design that allows it to operate with MRB modules from different suppliers. Users switch from one membrane to another without having to redesign the treatment plant. H2O is a developer of wastewater treatment systems based in Quebec City.

**Linamar Corp.'s** Skyjack division has partnered with Humber College's School of Applied Technology in Toronto to develop future scissor lifts and boom designs, including a terrain detection and new camera systems. The partnership was part of an industrial design practices course involving 27 students. Three teams were awarded a total of \$5,000 for their concepts.

**MacDonald, Dettwiler and Associates Ltd. (MDA)**, based in Richmond, BC, has signed a contract with a California's Via-Sat Inc. to repair, maintain and upgrade its Link 16 military communication terminals. The terminals are deployed across Canada by the Canadian Department of National Defence. Work will be completed at MDA's facilities across Canada, and the repair and maintenance service will grow into an intermediate maintenance facility as additional terminals and radios are deployed.

## CAE lands \$120M in military aerospace contracts

To supply training and simulator technology to US Air Force, Austrian Armed Forces



The US Air Force's MQ-1 Predator remotely piloted aircraft. PHOTO: US AIR FORCE

**MONTREAL** — CAE has won defence contracts valued at more than \$120 million to deliver training services and simulation product upgrades for global military customers.

The Montreal-based manufacturer of aerospace training systems and provider of services listed key contracts that include the US Air Force. It's exercising a contract option for CAE USA to provide training services for the MQ-1 Predator/MQ-9 Reaper remotely piloted aircraft (RPA).

The US Navy is exercising contract options on the MH-60 Tech Refresh and Procurement of Simulators program; and the Austrian Armed Forces awarding a contract to upgrade its CAE GESI command and staff training system.

CAE employs 8,000 people at 160 sites and training locations in over 35 countries.



Wendy Chen, an engineer and black belt (lean and Six Sigma) living in Woodbridge, Ont., takes PLANT along on a visit to Fundy National Park in New Brunswick in August.

When you go on a business trip or vacation, be sure to take a copy of PLANT with you. If we use your photo, you'll get \$75. Include name, title, company, address and phone number to Off-Site, PLANT, jterrett@plant.ca. Photos should be 300 dpi.

## Bedrock tapped to restructure US Steel

**HAMILTON** — The years-long saga surrounding the court-supervised restructuring of US Steel Canada may be nearing its end.

The Ontario government and Bedrock Industries Group, a US holding company focused on companies in the mining, metals and natural resources industries, have signed an MOU for the restructuring of the Ontario steel producer with operations in Hamilton and Nanticoke.

Terms of the agreement will remain confidential until released by the court, but the Ontario government says it has agreed to "a framework to support an acquisition proposal from Bedrock intended to protect pensions and assist in providing post-employment benefits."

The former Stelco filed for creditor protection under the Companies' Creditors Arrangement Act (CCAA) in 2014 and has been navigating a number of pension and asset-related issues during its restructuring. The province allowed it to split with its US parent company last fall after a few volatile years of US Steel ownership.

Bedrock committed to working with all stakeholders, including worker groups.

The deal remains subject to many conditions, including ratified labour agreements with numerous United Steelworkers (USW) union locals, as well as the approval of USSC, the court and other stakeholders.

USW officials said they were "encouraged" by the framework agreement, which has the potential to put an end to a "stressful and painful two years for our members and pensioners."

Throughout the restructuring process the union has been highly critical of US Steel's treatment of its workers and pensioners.

[Canadianmanufacturing.com](http://Canadianmanufacturing.com)

## D-BOX, Ubisoft collaborate on Rabbids centre

They'll combine motion systems with adventure scenario technology

**MONTREAL** — D-BOX Technologies and interactive entertainment provider Ubisoft have combined their technologies to create a virtual reality centre in Pointe-Claire, Que. (pictured).

The Rabbids Amusement Center (located at the Mega Centre des Sources), based on the popular gaming franchise, combines technology, creativity and physical activity.



The collaboration between D-BOX Technologies, a manufacturer of motion systems for the entertainment, simulation and training markets based in Longueuil, Que., and Toronto-based Ubisoft offers a realistic world inhabited by Raving Rabbids. Users wear a virtual reality helmet while sitting in a high-fidelity chair that moves with the action.

The scenario involves Rabbids repairing an old submarine to get to the North Pole so they can be closer to the moon. To their surprise, the submarine starts to fly, and when they let go of the controls and started playing tag with each other, it crashed in Montreal.

Top researchers began observing these rabbits and concluded that only children could understand their language and behaviour.

The experience includes two virtual reality chairs; a submarine that includes three levels, with obstacles and slides; a water treatment plant with two ball pools, ball cannons and a climbing wall; a laboratory with a Pixel Art wall and giant-size building blocks; a farm for toddlers; themed rooms for birthday parties; a dining area; and a souvenir shop.

D-BOX has also opened its first motion-coding studio in Beijing, China, the company says will provide a new experience for the viewers of Chinese feature-length films.

Two films will apply the immersive technology. The first – My War – pays tribute to Chinese volunteer soldiers during the 1950s Korean War. The second film is Mission Milano, an action comedy movie directed by Wong Jing, which premiered on Oct. 1.

D-BOX also owns and operates studios in Burbank, Calif.

## \$45M in new federal funding for cleantech

14 projects across four provinces attract federal money



Hydrostor prepares to install one of the air accumulators in Lake Ontario. PHOTO: TORONTO HYDRO

**VANCOUVER** — The federal government is investing more than \$45 million in 17 cleantech projects in four provinces.

Funds from Sustainable Development Technology Canada (SDTC) include \$39.6 million for 14 new technology projects in Ontario, BC,

Quebec and Manitoba, as well as \$5.5 million for three companies that have previously received investments from the arms-length government agency.

Among the new funding recipients are DarkVision Technologies Inc., which is working on an imaging technology for use in Alberta's oil sands and Saltworks Technologies Inc., a BC startup working on a process to eliminate ammonia from wastewater.

Balloon-based energy storage company Hydrostor in Toronto and Mississauga, Ont.-based flywheel storage firm Temporal Power are among the three previously funded companies to receive additional investments.

## Tweed gets into weed genetics with new-breeding facility

**SMITHS FALLS, Ont.** — Tweed Inc. has completed construction of a cannabis breeding facility in Smith Falls, Ont.

It's believed to be a first-of-its-kind in the industry and is expected to form the foundation for new Canadian-bred cannabis strains. The company said it will now move on to the development of proprietary genetics by selecting male and female plants with desirable traits.

Tweed said its R&D capabilities have evolved to the point that its in-house researchers are able to select seeds based on genetic traits in a lab rather than growing them out and evaluating them as mature plants. Health Canada will be invited to inspect the new rooms before they are brought online.

The proprietary strains are to be finalized by early 2018, with Tweed medicinal patients getting early access to them in 2017.

The company, based in Smith Falls, Ont., is a Canadian, licensed marijuana producer housed in a former Hershey Chocolate factory. It's owned by Canopy Growth Corp., which operates through subsidiaries including Tweed, Bedrocan Canada and Tweed Farms.

The 168,000 square-foot Smith Falls production space also houses Canopy's head office, a data-driven, fully automated and lean operation production plant and an in-house lab.

## Magna to build BMW 5 in Austria

Production to be split with BMW plant in Germany

**GRAZ, Austria** — Magna International Inc. will manufacture the new 5 Series sedan for the BMW Group at its contract vehicle assembly facility in Graz, Austria.

The global auto parts giant based in Aurora, Ont. said production, to begin next year, will be split with BMW Group's manufacturing plant in Dingolfing, Germany.

No financial details were released.

The strategic partnership between Magna and the BMW Group began in 2001. Magna started manufacturing the BMW X3 in 2003, followed by the MINI Countryman in 2010 and the MINI Paceman in 2012.

The new BMW 5 Series will succeed the two MINI vehicles.

Magna says the Graz facility is expected to produce approximately 200,000 vehicles per year by 2018 with new business awards from BMW and JLR starting production in 2017, and get a contract extension on the Mercedes-Benz G-Class.



Magna's contract vehicle assembly facility in Graz, Austria. PHOTO: MAGNA

## CAREERS



Andy Nureddin, Jean-Christophe Gallagher.

Bombardier Business Aircraft has made some changes to its leadership team and organizational structure. The Montreal-based aerospace manufacturer has appointed **Jean-Christophe Gallagher** vice-president and general manager of customer experience. He was previously vice-president of strategy, marketing and innovation. **Andy Nureddin**, vice-president of customer support and training, will be responsible for worldwide field support and customer care. And **Peter Likoray**, formerly senior vice-president, sales, was named senior vice-president of the newly combined sales and marketing organizations.

Danfoss, a manufacturer of electronic and mechanical components for HVAC and refrigeration systems, has appointed **Jeffrey Flannery** as business development manager for its heating business in North America. Flannery will focus specifically on the growth of Danfoss's AB-QM pressure independent control valve in hydronic heating applications, and advancing solutions for efficient, resilient district energy systems in the US and Canada.

**Claude Goulet** has joined KSB Pumps as its new sales manager for installed base and aftermarket sales. He brings 30 years of experience in the pump industry, specializing in oil, gas, chemical and petrochemical industries. Goulet will be based in Ottawa and is responsible for aftermarket sales in Quebec. KSB is a pump manufacturer based in Mississauga, Ont.

**David Murray** has been appointed vice-president of Hydro-Quebec Distribution. He joined the company in 2015 as vice-president of information and communication technologies. Murray will be responsible for overseeing the energy transition of the utility's off-grid systems. He replaces **Daniel Richard**.

## CSA adds testing services in Montreal

**MONTREAL** — CSA Group has added a new environmental testing service at its Montreal facility that simulates conditions faced by industries ranging from automotive to aerospace.

This laboratory includes an Envirotronics AGREE environmental chamber for temperature and humidity testing. The lab covers large humidity (10-98 RH%) and temperature ranges (-70 degrees C to 180 degrees C) with a temperature rate variation up to 30 degrees C/min.

The Brüel & Kjær LDS electrodynamic shaker is capable of up to 8,000 lbf and goes up to a three inches displacement between 0-3,000 Hz.

CSA Group is a global provider of testing and certification services and a standards development organization with labs in Toronto, Edmonton, and Richmond and Langley, BC.

## Avcorp wins Boeing parts contracts

**VANCOUVER**—West Coast aerospace manufacturer Avcorp Industries Inc. has won a trio of new contracts with Boeing Co.

A long-time supplier of the US plane maker, the Delta, BC-based company has picked up new work for complex metal bond and multi-material structural assemblies for the 737 and 777 commercial aircraft programs.

Avcorp will build spoilers and doors for Boeing's 737 MAX as well as metal bond panels for the 777X.

The new orders raise the company's backlog to \$579 million.

## Vicwest opens new Alberta plant

**ACHESON, Alta.** — Vicwest Inc., a building products company that makes steel roofing, exterior trim and a range of other home building products, has officially opened a new 60,000 square-foot manufacturing plant in the Edmonton suburbs.

The new facility will create 45 jobs in Acheson, Alta. and include a range of automated processes designed to optimize floor space in the plant.

Vicwest, which was taken over by Irish building materials firm Kingspan Group for \$224 million last year, said it chose the Edmonton area after two years analyzing the Western Canada building market. The company shut down its manufacturing operation in Delta, BC at the end of last year to make way for the new plant.

Vicwest, now operating as a subsidiary of Kingspan, did not release the cost of the new facility.

## Wall's approval hits new low following Sasktel privatization

BC Premier Clark gets a 7 point bump



Canada's premiers at a summit in Whitehorse earlier this year.

PHOTO: QUEEN'S PRINTER FOR ONTARIO

**TORONTO** — Saskatchewan Premier Brad Wall dropped nine points in the most-recent Angus Reid Institute poll gauging Canadians' approval of their provincial heads of government. But the long-serving Saskatchewan Party leader still has a four-point edge over the second place premier premier.

The pollster reported on its website Wall's approval rating took a hit during the summer over the privatization of telecommunications company Sasktel. His approval rating sits at 57% – a new low, and the first time in five years that less than three in five of his constituents support him.

Brian Pallister, the relatively newly-elected Manitoba premier, occupies the second position, with 53% of respondents saying they approve of the new Conservative government.

In Ontario, Premier Kathleen Wynne now has the support of just 20% of Ontarians. There are several issues in play driving down her approval rating, including the privatization of public utility Hydro One.

Newfoundland and Labrador's Dwight Ball has the support of 21% of the province's citizens. In Nova Scotia and New Brunswick, Premiers Stephen McNeil and Brian Gallant saw statistically insignificant declines in their approval over the summer months. McNeil has a 38% approval rating, while Gallant sits at just 24%.

In Quebec, Premier Phillippe Couillard saw his approval rating erode by 5% last quarter; it now sits at 28%.

Alberta Premier Rachel Notley and BC Premier Christy Clark are headed in different directions.

Angus Reid pegs Notley's job approval at 31%, down just one percentage point since the spring.

Clark enjoyed a seven-point bump as a result of her 15% tax on foreign homebuyers in the Metro Vancouver area, although nearly two in three people in BC oppose her.





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CARBON NANOTUBES

GROWING NUMBER OF COMMERCIAL APPLICATIONS GROWS MARKET

As the commercial applications of carbon nanotubes (CNT) accelerate, so too will the market, growing to \$560 million by 2025, while lagging adoption in energy storage will slow graphene to \$305 million, according to Lux Research.

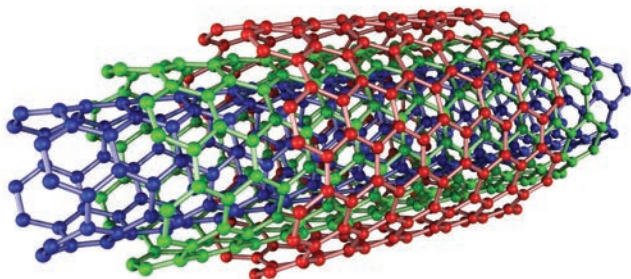
The Boston research firm attributes the success of the advanced materials to the multiwalled nanotube (MWNT) as a superior replacement for carbon black, rather than as a super-strong material or for ultra-fast electronics.

The analysis points to the CNT market supporting a few pure-play materials suppliers, but the overall state of the market remains oversupplied.

Lux says developers finding ways to ease adoption with more convenient form factors and intermediates has been key. The less a product resembles a nanomaterial, the more likely it is to succeed.

Analysts found MWNTs are tapping the lithium-ion market as an alternative to carbon black in conductive composites with applications in fuel lines and packaging for electronics; and as an additive for lithium-ion battery electrodes. Continued growth to 12,500 tonnes in 2025 will come from price reductions.

Composites applications will be the largest user of graphene through 2025, as the market grows to 7,500 tonnes amid a slowdown in energy storage. Emerging areas of growth include sensors and water, where companies such as G2O Water have used graphene derivatives.



Multiwalled carbon nanotube.

PHOTO: ERIC WIESER



Tighter environmental regulations around water.

PHOTO: SHUTTERSTOCK

WATER PURIFICATION

ENVIRONMENT ISSUES PUSH ADVANCED OXIDATION

Advanced oxidation technologies have gained interest in recent years because of their outstanding technical characteristics for eliminating a variety of pollutants in water and wastewater.

As environmental regulations tighten around water resources, industrial sectors such as oil and gas, food and beverage, mining, and municipalities are expected to implement oxidation technologies in water and wastewater treatment, says BCC Research.

The market research firm based in Wellesley, Ma. says advanced oxidation technologies use ozone, or combinations of ozone, UV light and hydrogen peroxide, to degrade compounds such as pharmaceutical and personal care byproducts and endocrine disrupting compounds, while also providing disinfection.

BCC Research projects the global market will reach \$4.4 billion and \$6.5 billion in 2016 and 2021, reflecting a five-year compound annual growth rate (CAGR) of 8% from 2016 to 2021. The hydrogen peroxide segment should reach \$2.1 billion by 2021, up from \$1.3 billion in 2016, demonstrating a five-year CAGR of 10.8%. The ozone technology segment will hit \$897 million and \$1.3 billion in 2016 and 2021 on a five-year CAGR of 8.5%.

Key market drivers include new environmental legislation imposed across the globe, advanced industry needs for water treatment and recycling, new innovation technologies used for product development (such as nanotechnology), the use of renewable energy, and innovative technologies that increase flexibility of application and enable economically viable small scale solutions.

Population growth, climate change, stricter regulations for drinking water and groundwater, and the need for emergency preparedness present high-growth opportunities.

The use of advanced oxidation technologies remains limited, generally to sites challenged by organic compounds that resist biological treatment, or which are inefficiently removed via adsorption or volatilization, or are toxic and hazardous (such as radioactive waste).

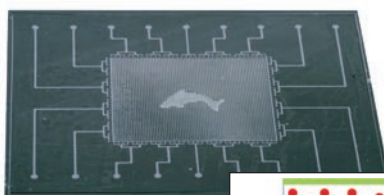
POLYMERS

GREAT COMMERCIAL POTENTIAL

BCC Research forecasts a double-digit growth rate for inherently conductive polymers (ICPs) in the near term, leading the global electroactive polymer market.

The Wellesley, Ma. research firm says ICPs with their conjugated electron backbones display unusual electronic properties such as low energy optical transitions, low ionization potentials and high electron affinities. It projects the market for electroactive polymers to reach 725.8 million pounds by 2021, up from 484.9 million pounds in 2016, reflecting a five-year compound annual growth rate of 8.4%.

ICPs possess a wide variety of potential applications that include



High-resolution tactile display based on stimuli-responsive hydrogels.

PHOTO: GOSWIN2000

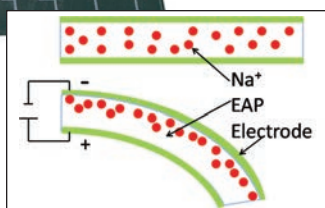


Diagram of an EAP composite.

PHOTO: CHEM538W10GRP7

electrostatic dissipation (ESD) control, light emitting displays, capacitors, electrostatic paintable plastics, antistatic packaging and corrosion-resistant paints/coatings. They're also penetrating the traditional conductive plastics market in electrostatic coatings, mostly as packaging.

More esoteric markets include rechargeable batteries, smart windows and electronic membranes. Capacitors are currently the largest ICP application, followed by ESD, solar cells, sensors, OLEDs, textiles, corrosion protection, organic transistors and batteries.

BCC Research notes high prices of ICPs have been a major deterrent to their more extensive commercial development.

## Tough time for SMEs

Fewer growing to next level

Canadian small and mid-sized companies are experiencing difficulty scaling up, and compared to 15 years ago, dramatically fewer of them are expanding in size, says a Business Development Bank of Canada (BDC) study.

The Crown-owned bank for entrepreneurs says only one in 1,000 companies grew past 100 employees – more than a 40% drop from the 0.18% that did so in 2001.

Mid-sized firms (with 100 to 499 employees) are also struggling, making up 0.93% of the total number of Canadian companies in 2013, a drop from 1.04% in 2001.

Only 1.8% of mid-sized businesses become large companies each year, exceeding the 500-employee mark.

Mid-sized companies generate 12% of Canada's GDP and 17% of private sector R&D spending. They lead in revenue growth at 43% (from 2001 to 2013) – greater than the 36% growth for large companies and 27% growth for small businesses.

## Economically free!

A global report ranks Canada in the top five of the most economically free countries, reports the Fraser Institute.

But the rightish-leaning think tank, which produces the annual Economic Freedom of the World report with the Economic Freedom Network, says growing government, substantial tax increases and encroaching regulations threaten Canada's ranking in the coming years.

The report measures levels of personal choice, ability to enter markets, security of privately owned property and rule of law by analyzing the policies and institutions of 159 countries and territories.

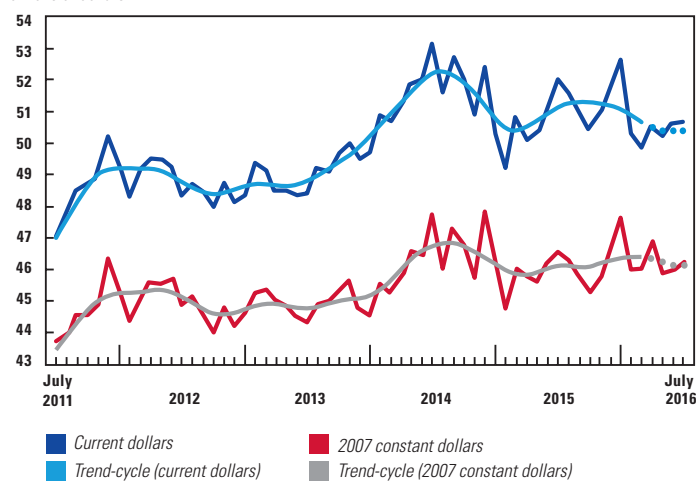
Canada tied fifth overall in the 2016 report (based on 2014 data). But since then, the Fraser Institute notes the Ontario, Alberta and federal governments have increased taxes "significantly" and introduced what it labels "stifling" regulations on industry and business.

This year's report ranks Hong Kong first, followed by Singapore, New Zealand and Switzerland. The US is ranked 16th.

# PLANT PULSE

## ECONOMIC DEVELOPMENTS AND TRENDS

### MANUFACTURING IS REBOUNDING

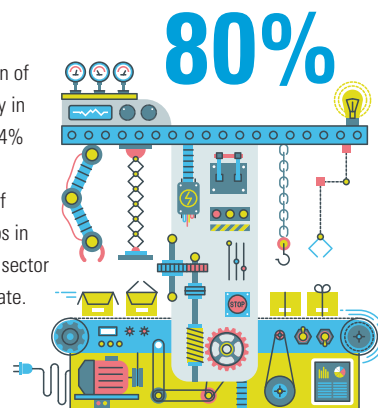


July's manufacturing sales edged up in nine of 21 industries for a 0.1% increase overall to \$50.7 billion, reports Statistics Canada. Higher sales in food, petroleum and coal products, and primary metals were offset by a decline in aerospace products and parts, and machinery. A TD Economics report welcomes the June-July rebound but says sales have yet to make up all the ground lost earlier this year, with volumes 2% below January levels.

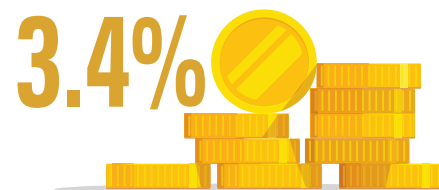


Job gains in manufacturing during August – a 0.2% increase. But year-to-year, jobs are down 0.1%, according to Statistics Canada's Labour Survey.

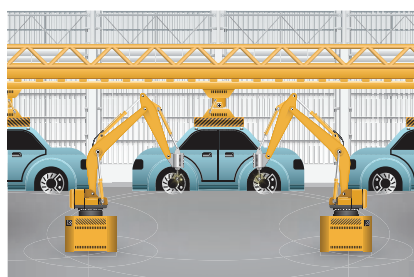
Industry's utilization of production capacity in Q2, down from 81.4% in Q1. Statistics Canada noted 19 of the 21 major groups in the manufacturing sector recorded a lower rate.



Percentage of SMEs who support a federal Liberal election promise: waiving EI premiums for employers hiring youth between 18 and 24 in 2016, 2017 and 2018. Didn't happen in 2016 but the Canadian Federation of Independent Business would like to see the promise fulfilled in 2017.



July's rebound in merchandise exports, the highest monthly increase since December 2015, reports EDC. A marginal 0.1% decline in imports has narrowed the trade deficit to \$2.5 billion, down from the record \$4 billion in June.



## \$26 BILLION

The short-term loss to GDP if – worst-case (based on 2015 numbers) – the Detroit Three pulled out of Canada, according to a study by the Centre for Spatial Economics. There would also be a 150,000 jobs lost and a decline in government revenues of up to \$4.7 billion a year. Ontario's economy would take a \$21 billion hit and lose 38,000 jobs, plus a reduction in government revenues of up to \$3.9 billion. Average labour income would be reduced by up to \$1,600 a year.

IMAGES: THINKSTOCK

# Welcome to **SAWDUST CITY**

## A CRAFT BREWING SUCCESS IN ONTARIO'S COTTAGE COUNTRY

Sales are strong and export markets beckon pending added capacity to meet demand.

BY JEFF BROWNLEE

If you were going to write a classic Canadian story in this modern age, you would likely start with two regular guys having a conversation over their favourite brew and decide that they want to make a living out of their shared passion for beer. They figure Ontario's cottage country, specifically the shores of Lake Muskoka, would provide the right inspiration and be the perfect setting for their craft brewery. With larger square-footage facilities at a premium in small towns, they stumble across a decommissioned 20,000-square-foot Canadian Tire store and take a year transforming it into a brew house and saloon to realize their dream.

Millions of litres of beer and just as many growing pains later, the rest you could say is history. In fact, for Rob Engman, that's his story behind Gravenhurst's Sawdust City Brewing, which began five years ago fittingly with a conversation over a beer with

Sam Corbeil, brewery co-founder and brewmaster.

The duo, along with Engman's wife Karla Dudley, embarked on a brew mission that started out in 2011 contract-brewing their specialty recipes out of Niagara College and then at Etobicoke's Black Oak Brewing before establishing their bricks and mortar facility in the Muskoka region two years ago.

Originally, they had planned to build a facility on the shores of Lake Muskoka, but after some number crunching, realized the brewery would quickly outgrow the facility.

Luckily, there was a vacant Canadian Tire store in the town that would become the future home of Sawdust City – the original name of Gravenhurst dug out of the public library by Corbeil.

"It was the perfect fit," says Engman. "We thought that with 20,000 square-feet, would have lots of room for many years."

(L-R)

*Sawdust City's brewmaster, Sam Corbeil.*

*Corbeil takes a sample from the fermenter.*

*Brew hand Brendan Woods manages Sawdust's small batch system.*





Sawdust City's brew team at its Gravenhurst, Ont. headquarters.

PHOTOS: EMILY COLLINS

But as he learned, many years in the craft brewing industry can be measured in months. The company has already completed two capacity expansions at that facility with a third one well into the planning stages. The latest expansion will convert the old retail garden centre on the property into another fermenter tank farm.

"Storage is the bottleneck of any brewery operation," says Engman. "You can have your brewhouse running 24/7, but if you don't have anywhere to brew the beer into, it's a problem."

What isn't a problem for the company is the demand for its product. Currently, Sawdust City brews six core brands that are inspired by the local area, including its Lone Pine, West Coast IPA and its Ol' Woody – in reference to Muskoka's heritage of wooden boat builders – Alt beer. However, the brewery loves to experiment with many other brews including seasonal brands. Over its five-year history, it has brewed more than 140 different varieties.

### Wide distribution

A few of Sawdust City's products can be found in 90 Beer Stores across the province and approximately 200 LCBO outlets. It also sells to more than 300 licensees. Outside of Ontario, its products are found on liquor store shelves in New Brunswick and Manitoba. So far, interprovincial trade barriers have been non-existent.

Depending on the day, Sawdust City will brew between 4,500 to 7,000 litres.

Expanding to Canada's west coast is on the radar, and internationally, beginning with the US followed by the EU and Japan. The brewery has distributors already committed to selling its product in those markets. But that expansion has been thwarted due to capacity issues and increasing local demand.





Top: Wet hops are added to Sawdust's Terroir project brews.

Centre: Corbeil checks out the brew and temperature management system.

Bottom: Corbeil adds dry hop pellets to a craft brew.

PHOTOS: EMILY COLLINS

"WE WANT TO PUT A STORY INTO EVERY BRAND SO IT'S NOT JUST ABOUT THE FLAVOURS, THE TASTES AND THE SMELL. WE WANT TO GIVE PEOPLE AN OUTLET TO RELAX..."

"We could be doing a much more robust export business, but we simply don't have the capacity right now. We are in the steep growth trajectory portion of our life cycle and we anticipate that will last another three years or beyond," says Engman. "Managing growth is very difficult as we are constantly under construction. We finish one expansion and then have to start looking at engineering drawings for the next. It's not that we are saying a definitive no, we are saying just not right now."

Over the past year, the brewery has seen sales figures for some products increase by 100%. The increase in demand from licensees is well into the double digits while LCBO orders are also increasing. The company has rapidly grown into a 53-person enterprise.

Successfully managing this growth hinges sticking to the business plan of expanding to new markets when, and only when, the company is in a position to successfully meet the demand.

"You better be sure you've got a good product and the ability to fulfill that demand," says Engman. "That's a huge problem for a lot of craft breweries."

He would know. For the past 10 years, he has published TAPS, Canada's beer magazine in addition to owning and operating the Canadian Brewing Awards. Both have provided valuable insight in the evolution of his own brewery.

"We've learned a lot about craft brewing in Canada. We know all the players and we've seen people make some very wise choices and others make not-so wise choices," Engman adds. "We've had the benefit of sitting on the sidelines and looking at what works and what doesn't. As result, we came into the business with more knowledge than the average person."

The key piece of knowledge was to align with a talented and passionate brewmaster.

"Sam is definitely that," says

Engman. "He's very well regarded in craft brewing circles."

Corbeil, who is from the Muskoka region, was in advertising before he decided to follow his passion for crafting beer. He graduated from the highly touted VLB Berlin brewmaster course, which is the inspiration for a few of Sawdust City's German-style brews. He worked at other breweries including Toronto's Mill Street before Sawdust City.

"I feel that as brewers, we are entertainers," Corbeil says. "We want to put a story into every brand so it's not just about the flavours, the tastes and the smell. We want give people an outlet to relax and enjoy themselves. Beer is our way to do it."

### Brewing creatively

Corbeil's storyboard is a four-vessel brewhouse that feeds the brew team's creativity and builds their versatility.

"The brewing process takes about four hours to move from vessel to vessel," explains Engman. "Brewmasters don't need a gym membership – it's a very physically-demanding job."

The process begins by creating a mash in the mash tun where barley is transformed into useable sugar. The sugary, converted mash tun is moved to the lautering tun that separates sugary water from the grain using a sieved false bottom on the tank. The grain stays behind while the sugary water passes through. That sugary water is now called wort.

Once separated the wort heads to the work kettle, where the hops are added and it's boiled for approximately an hour. After the boil, the wort is transferred to the whirlpool where it spins at a high rate for 15 minutes. Then it's transferred to the fermenters and then yeast is introduced to start the fermentation process. Depending on the type, the beer stays in those tanks from seven to 14 days.



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Corbeil transfers beer from a fermenter.



Corbeil takes a sample of a brew aging in an Ontario wine barrel.

PHOTOS: EMILY COLLINS

**SAWDUST CITY GOES WET WITH UNIQUE HOPS**



For the first time Sawdust City will brew a craft beer made from wet hops (pictured) that haven't gone through any drying processes, to deliver a beverage that's unique.

Wet-hopped brews have a very short season, typically lasting through the fall. Sawdust City is working with a supplier in Collingwood, Ont. for its wet hops, which look like little green acorns.

"The hops growers tell us when their product is at its best, and when we can come pick them," says Sam Corbeil, the company's brewmaster. Sawdust City had to open a precise window of time at its brew house to accept the freshly-picked hops.

"We're talking a matter of hours."

In fact, Corbeil was able to coordinate this season's pick to process the hops within five hours.

The craft brewer also ventured to Tillsonburg, Ont. to visit another hops farmer to examine difference in soils and climate.

The wet hop brew requires up to five times the amount of dried hops used to make the other craft varieties, but Corbeil says each batch produces different colours, aromas and flavour profiles.

Most wet hop varieties are processed within 24 to 48 hours to deliver more aroma and flavour. Corbeil says they produce a "fresh, grassy, almost minty-lemony" aroma with flavour profiles the drinker wouldn't normally find in dried hop-brewed varieties.

Once fermentation is complete, the brew team reduces the temperature of the glycol-cooled fermentation tanks to around 0 degrees C and the yeast is removed. The beer is then pumped into bright beer tanks where it's carbonated and ready for packaging.

Sawdust City packages in 473-ml cans and 750-ml bottles as well as kegs sold to bars and restaurants.

"It's a complex process that includes a lot of microbiology and chemistry," Engman says.

Another lesson learned is good equipment makes all the difference.

"A lot of guys figure they can buy used equipment and then upgrade to new when they can afford it," Engman adds. "You can spend a lot of time putting duct tape on stuff – it ends up being more headache than it's worth."

That being said, once the initial investment is made, the equipment will be viable for decades.

"Stainless steel is stainless steel. There isn't a technology crunch in brewing," he says.

Sawdust City's machinery is bought from a brewhouse manufacturer in PEI and Engman says that a well-kept secret is Canada's stature as a global leader in brewhouse manufacturing.

Competing with the large, foreign-owned, mega beer companies that have approximately 95% of the current beer market, Engman

admits it's an uphill battle.

However, the craft beer market's recent surge in popularity is the story behind the beer as well as the passion that goes into making it. Today, there are more than 140 craft breweries in Ontario.

"Craft breweries are run by passionate and creative people, not by accountants and that's a big distinction," Engman says. "There's a lot more customer engagement on the craft side. We want people to come and visit our brewery; show them how our beer is made, especially the attention to detail and the quality ingredients we use."

For Corbeil, brewing his next success story involves research and development – visiting other breweries to spot the latest consumer trends.

"We see what people are trending towards, then we do it the Sawdust City way and hope the people will come along for the ride," he says. "It's a fun time to be in craft beer as Ontario has so many great breweries."

And the beer drinker is the real winner.

*Jeff Brownlee is an Ottawa-based communications specialist and business writer. E-mail jeffsbrownlee@outlook.com.*

**Comments?**  
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Urinalysis is used to detect drugs. PHOTO: THINKSTOCK

# DRUGS and ALCOHOL

## ALBERTA COURT OPENS THE DOOR TO RANDOM TESTING

Pending a Unifor appeal, it may become easier for an employer to introduce a valid testing policy.

BY ANDREW EBEJER

In June 2013, a 6-3 majority of the Supreme Court of Canada struck down as unreasonable a program of random breathalyzer alcohol testing for safety sensitive positions at Irving Pulp and Paper Ltd. (*CEP, Local 30 v Irving Pulp and Paper, 2013 SCC 34 [Irving]*). It found a dangerous workplace was not an automatic justification for random testing. Such testing would only be justified if an employer could show there was a “general problem with substance abuse in the workplace.”

The question the Supreme Court didn’t answer was: What constitutes a workplace problem and how significant or widespread a problem must there be before random testing will be permitted?

Recently, the Alberta Court of Queen’s Bench examined a random drug and alcohol-testing program adopted by Suncor Energy Inc., clarifying the extent of a workplace problem required to justify such testing for safety-sensitive positions.

Suncor’s Alberta oil sands operations are, by their nature, dangerous. Heavy equipment, high voltage power lines, chemicals, radiation sources, explosives, and flammable liquids and gases are all prominent characteristics of the work environment.

For years, Suncor had concerns about the safety hazards posed by alcohol and drug use at its operations. To address these concerns, it adopted a comprehensive strategy that covered employee and supervisor training, post-incident and reasonable cause testing,

treatment for employees with dependencies and an alcohol-free lodging policy.

In June 2012, Suncor announced additional measures that included a Canada-wide alcohol and drug policy with random drug (urinalysis) and alcohol (breathalyzer) testing of employees in safety-sensitive position – the same processes used by Suncor since 2003 following a workplace incident or near miss.

One month later, Unifor (the union representing some of Suncor’s employees) filed a policy grievance alleging the random testing unreasonably interfered with the privacy interests of its member-employees.

Unifor’s grievance advanced to arbitration and was heard by a three-person panel over 23 days in 2013. Ultimately, a 2-1 majority of the panel found in favour of Unifor and ordered Suncor’s random testing program not be implemented.

### Privacy issue

The majority noted breathalyzer testing “effects a significant inroad” on employee privacy. Suncor did not demonstrate a “significant” or “serious” alcohol problem within the bargaining unit and a causal connection between alcohol use and the bargaining unit’s accident, injury and near miss history. The majority was not persuaded by the 2,276 alcohol and drug related incidents identified by Suncor during the arbitration, noting it was unclear whether those incidents involved members of the Unifor bargaining unit or other Suncor employees and contractors. Throughout the entire arbitration, the majority remained focused exclusively on the bargaining unit – 3,383 of the 10,000 employees and contractors on site – and not the broader Suncor workplace.

The majority also criticized the inability of urinalysis to demonstrate current impairment by drugs since it only shows a drug is



A breathalyzer, used to detect alcohol. PHOTO: SHUTTERSTOCK

present in the body, which could be a trace amount from several days or weeks prior, with no impairing effect. In light of the limited use of this information, and the absence of specific data regarding a “serious drug issue among employees in the bargaining unit”, the majority concluded random drug testing was an unreasonable interference with employee privacy interests and could not be implemented.

In a judgment released earlier this year, the Alberta Court of Queen’s Bench overturned the arbitration decision, finding the majority had incorrectly applied the legal test set out in Irving and failed to consider relevant evidence.

First, the court found the majority added more difficult requirements than those set out by the Supreme Court. While the Supreme Court indicated random testing might be justifiable where there was evidence of a “general problem with substance abuse in the workplace”, the majority incorrectly elevated this standard by requiring evidence

## SAFETY HAZARDS



PHOTO: SHUTTERSTOCK

of a “significant” or “serious” problem.

The majority also made the legal test more difficult by requiring Suncor to prove a “causal connection” to the bargaining unit’s accident, injury or near-miss history. The Alberta court held that this too was an incorrect application of the Irving test, and no general requirement to prove a causal connection existed.

Second, the Alberta court found the majority erred when it only took into account evidence tied directly to Unifor’s bargaining

unit members. The Irving test related to a workplace problem of alcohol or drug use, and was not limited to specific evidence of a problem within any particular bargaining unit. The majority should have considered workplace safety more broadly, instead of narrowly focusing on the members of the Unifor bargaining unit.

Third, the court concluded the majority failed to carefully consider all the evidence. For example, the majority minimized the significance of the 2,276 drug and alcohol

incidents raised by Suncor was because it was unclear how many of those incidents involved bargaining unit members. With such a narrow focus, the majority ignored relevant evidence pertaining to two-thirds of the workers at the energy company’s operations.

In the end, the Alberta court held the majority acted unreasonably and overturned the arbitration decision. However, it did not make an ultimate determination on whether Suncor’s random testing standard was permissible. Instead, it sent the case back to a new arbitration panel for a fresh look and decision.

In overturning the arbitration award the Alberta court may have made it a little easier for an employer to introduce a valid random testing policy. In clarifying and restating the Irving test, the court set out two clear requirements: the workplace must be dangerous; and there must be a general problem with drug or alcohol use in that workplace.

However, before employers get too excited about this judgment, know that immediately following the court’s decision, Unifor announced its intention to appeal. As such, the issues raised may still be unresolved.

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

## TRAINING

### Are your trainers qualified?

Ensure they have the skills to do the job

BY HUGH ALLEY

As a supervisor or manager, it’s likely you’ve asked one of your staff to train someone on a new task. That’s a dangerous thing to do. You’re putting one of your people – a resource that could easily cost millions over his/her time with the company – in the hands of someone who may know nothing about how to instruct. The downside is huge risks to safety and productivity.

Would you want an unqualified instructor training a new pilot? Or a new crane operator? It’s not that your instructor isn’t a good forklift operator, but the skills needed for the job are not the same as the skills needed to instruct someone on how to master the vehicle.

What is a manager to do? No plant can afford to have qualified instructors for specific skills that are needed at a particular moment. The trick is to have a proven methodology for the trainers. There are lots available, but one of the best is the Job Instruction program that was developed by the Training Within Industry Service in 1941-1943.

The methodology is still sound despite being over 70 years old. It’s geared to plant supervisors, it takes only 10 hours to learn, it’s public domain and it works.



Learning how to master a forklift.

PHOTO: THINKSTOCK

Studies have shown using this approach reduces instruction time by at least 25% with no increase in errors.

Download a pdf at [http://chapters.sme.org/204/TWI\\_Materials/TWI\\_Manuals/TWI\\_Job\\_Instruction\\_Manual.pdf](http://chapters.sme.org/204/TWI_Materials/TWI_Manuals/TWI_Job_Instruction_Manual.pdf).

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Keep intruders out of your network with a vendor management program.

PHOTO: THINKSTOCK

# Securing the SUPPLY CHAIN

## HACKERS MAY TARGET VENDORS TO ACCESS YOUR NETWORK

With the push towards automation and digitization of the supply chain, cyber risks can be significant.

BY IMRAN AHMAD

Even when your company implements appropriate cybersecurity protocols and policies, provides ongoing “cyber hygiene” training to employees, and takes out appropriate cyber insurance coverage, there’s still a significant risk posed by supply chains. Hackers will gain access by targeting your network-connected vendors who may have weaker cybersecurity measures in place.

The best way to address risk is by having an effective vendor management program (VMP). It’s based on four simple steps: identify your most important vendors; specify the contact for each vendor; establish guidelines and controls to ensure consistent processes; and integrate with the business’s overall audit practices.

The first step is to define the most critical vendors and rank them based on their criticality day-to-day that, if breached, will

have a significant impact on the revenue generation, disrupt business, or adversely affect clients. Such vendors would include important partners, financial or legal services and hard-to-replace software vendors.

Next, identify a primary contact within your business for each vendor. This individual, who serves as a liaison between the security, risk and compliance teams and the vendor, is tasked with:

- Co-ordinating due diligence on vendors and reporting to senior management using a risk-based approach.
- Maintaining knowledge of and compliance with policies and reporting requirements.
- Filing documentation and paperwork with the legal and contracting team to ensure there’s a central repository and audit trail.
- Coordinating communication with those who can add value through vendor oversight, such as conducting on-site and/or remote audits, reviewing vendor policies and procedures, and monitoring vendor-related litigation or regulatory issues.

The VMP establishes clear guidelines and controls to ensure consistent processes and

sufficient oversight of key vendors are in place. At a minimum, it should include the following:

- A right to audit and test the security controls of vendors annually.
- Require vendors to adhere to security monitoring requirements.
- Require periodic reports from vendors demonstrating security service level attainment.
- Require vendors to provide timely notification of any security breaches or incidents that may impact the business. Integrate the VMP within your business’s audit practices. It should form part of the broader audit best practices.

### Vendor contract

Ensure everyone has a clear understanding of their obligations and agree to what’s included in the vendor contract. While not an exhaustive list, contracts should include the following representations and warranties:

- No recent undisclosed security incidents.
- No legal claims or regulatory action threatened or pending as a result of a security incident or vulnerability.
- No processing, storage or transmission of information by third parties not disclosed to business.
- Vendor has an information security program in place that’s regularly updated and maintained.
- Vendor employs personnel qualified to maintain the information security program (include vetting employees through appropriate background checks).

The contract should grant audit rights and outline penalties for not meeting specified audit standards (or maintaining a certain type of certification, such as ISO 27001 or NIST). It should also include cyber incident reporting requirements that specifically identify an “incident”, the timing, content and method of delivery of notice.

Supply chain partners offer attackers a potential back door into the networks of host companies. Those responsible for supply chain security need to be vigilant and aware of what is happening with vendors and keep up with the security controls in much the same manner as they monitor controls internally.

*Imran Ahmad is a lawyer at Miller Thomson LLP in Toronto, where his work focuses on strategies related to cyber threats and dealing with cybersecurity incidents. Visit [www.millerthomson.ca](http://www.millerthomson.ca).*

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



Clearwater Seafoods' Belle Carnell, the world's most technologically advanced shellfish harvester.

PHOTOS: CLEARWATER SEAFOODS

# Clearwater at 40

## SEAFOOD EXPORTER NETS 2015 SALES OF \$500 MILLION

A humble storefront lobster business has grown into Canada's largest publicly-funded seafood operation.

Clearwater Seafoods Inc. has something to celebrate as it marks its 40th anniversary.

Indeed, the Halifax-based seafood giant has come a long way since 1976 when the company consisted of two 28-year-old Nova Scotian entrepreneurs with a very limited knowledge of the lobster business.

John Risley, selling real estate during a slump, and his brother-in-law Colin MacDonald, a Dalhousie University graduate with a BSc. degree, decided to try their luck selling the large marine crustaceans, a business that evolved

from the back of a pickup truck into a storefront in Bedford, NS.

Their gamble certainly paid off.

Ten years on they were running one of the biggest seafood operations in the world, specializing in lobster and other premium fare such as scallops, clams, cold water shrimp and crabs, all shipped by air freight to international markets. Today, Canada's largest publicly funded seafood company employs 2,000 people worldwide and hauled in 2015 sales of almost \$505 million.

Clearwater has operations in Canada, the US, UK, Europe Asia and Argentina. It runs nine factory vessels that harvest, process and freeze seafood products at sea; and operates eight land-based processing plants plus two distribution facilities.

It sells 85% of its annual 45

million kilogram catch to export markets in more than 40 countries. North America accounts for almost 28% of sales, Europe just over 36% and Asia almost 36%.

The cofounders are wealthy, although an internet search failed to find a net worth for MacDonald; but *Canadian Business* magazine last year listed Risley's net worth as \$2.35 billion. He lives in a 32,000-square-foot home on 300 acres in Chester, NS.

MacDonald is chairman of the seafood company and executive vice-president and co-owner of Clearwater Fine Foods Inc., the privately-held holding and investment company. It invests in the seafood business and has a stake in Cable and Wireless PLC, a British telecommunications company. Risley is president and CEO.

Last year Clearwater invested \$65 million in a 73.4-metre clam vessel, the company's biggest ship investment in its history.

The Belle Carnell, named after MacDonald's late mother, harvests Arctic surf, cockle and propeller clams year-round, primarily in the Grand Banks area. The molluscs are automatically shucked and individually quick-frozen within an hour of being harvested using the vessel's proprietary processing technologies. Products are sold almost exclusively into the in-



Co-founders John Risley and Colin MacDonald in Clearwater's early days.



Clearwater co-founder Colin MacDonald with the company's mainstay product in the late 1970s.



Clearwater's original storefront.

ternational, high-value sushi and sashimi markets.

Last October's US\$132 million acquisition of Macduff Shellfish Group Ltd., a Scottish seafood enterprise, expanded Clearwater's supply of wild seafood by 20%, most of which is directed to the European market.

Looking ahead, the company says it will continue to invest in its fleet, plants, information systems and people, with innovation continuing to play a key role in harvesting and product development.

**Comments?**

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## INVESTMENT

The 450,000 square-foot plant will streamline production using data, analytics and software.

**G**E's Distributed Power business broke ground for its first "brilliant" factory in Canada Aug. 26, a multi-modal plant in Welland, Ont. that will combine digital technology and lean manufacturing to produce power generation machinery for global markets.

The global industrial company is spending US\$165 million on the first phase of the project. Its state-of-the-art plant will optimize efficiency and streamline production using data, analytics and software. The Ontario government estimates the full investment to be about \$240 million.

The project will create 220 jobs when the 450,000 square-foot plant is fully operational in 2018, said Scott Parent, senior general manager technology and operations for GE's Distributed Power business. "[The plant] should be producing by early 2018 and at full load by the end of 2018."

The plant, on a property that runs one kilometre in length, will manufacture GE Power's reciprocating gas engines; components for compression, mechanical drive and power generation; and components for GE transportation diesel engines, but the multi-modal design will also accommodate future production expansion for other GE global businesses including power, oil and gas and transportation.

Parent said production capacity would be about 500 engines a year.

GE has scaled back its plans since announcing the move in 2015 because of slow demand from the oil and gas industry, but executives at the Welland site said GE is planning ahead for a recovery in that market.

The work is being moved out of the Waukesha, Wis. plant, which will cost 350 people their jobs, but 200 engineering and non-manufacturing personnel will be unaffected by the change.

The global, industrial company attributed the



A depiction of GE's planned multi-modal plant in Welland.

PHOTO: PLANT

# GE'S BRILLIANT MOVE

## A SUPER-MODERN \$240 MILLION PLANT FOR WELLAND

move last year to its need for access to credit services from Export Development Canada (EDC), but more pointedly, to the absence of an export credit agency in the US.

### Export financing

The company has bids on \$11 billion of projects that require export financing. Congress let authorization for the Export-Import Bank lapse as GE and other manufacturers called for its reauthorization, stressing that many customers require the financing for GE to bid on their projects.

When Congress finally did reauthorize the credit agency in December 2015, GE elected not to change course.

Welland was chosen for its proximity to the US border, the Welland Canal's access to the St. Lawrence Seaway, its skilled workforce and proximity to education facilities.

Heiner Markhoff, president and CEO of GE's Water and Distributed Power Business, said during a roundtable at the Welland site the company would maintain R&D and engineering in Waukesha.

"[Welland] will run three-dimensional

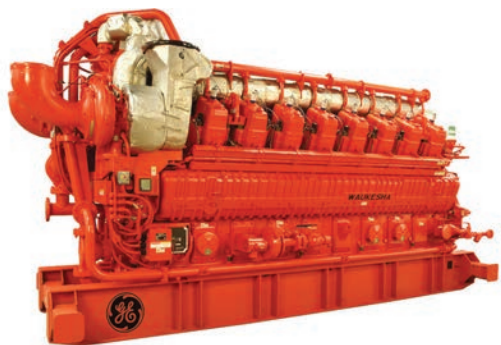
machining simulations for CNC programs, gain real-time analytics to better understand the operating conditions of a machine or a test cell, install lights-out machining, and combine all with advanced lean manufacturing practices," he said in a release.

Was there a concern about the high cost of energy in Ontario? Apparently not. Markhoff said the plant would go off the grid during peak periods and produce its own power.

The Ontario government provided a conditional grant of almost \$26.6 million through its Jobs and Prosperity Fund, and the city provided some additional comfort by waiving some industrial charges and providing tax relief.

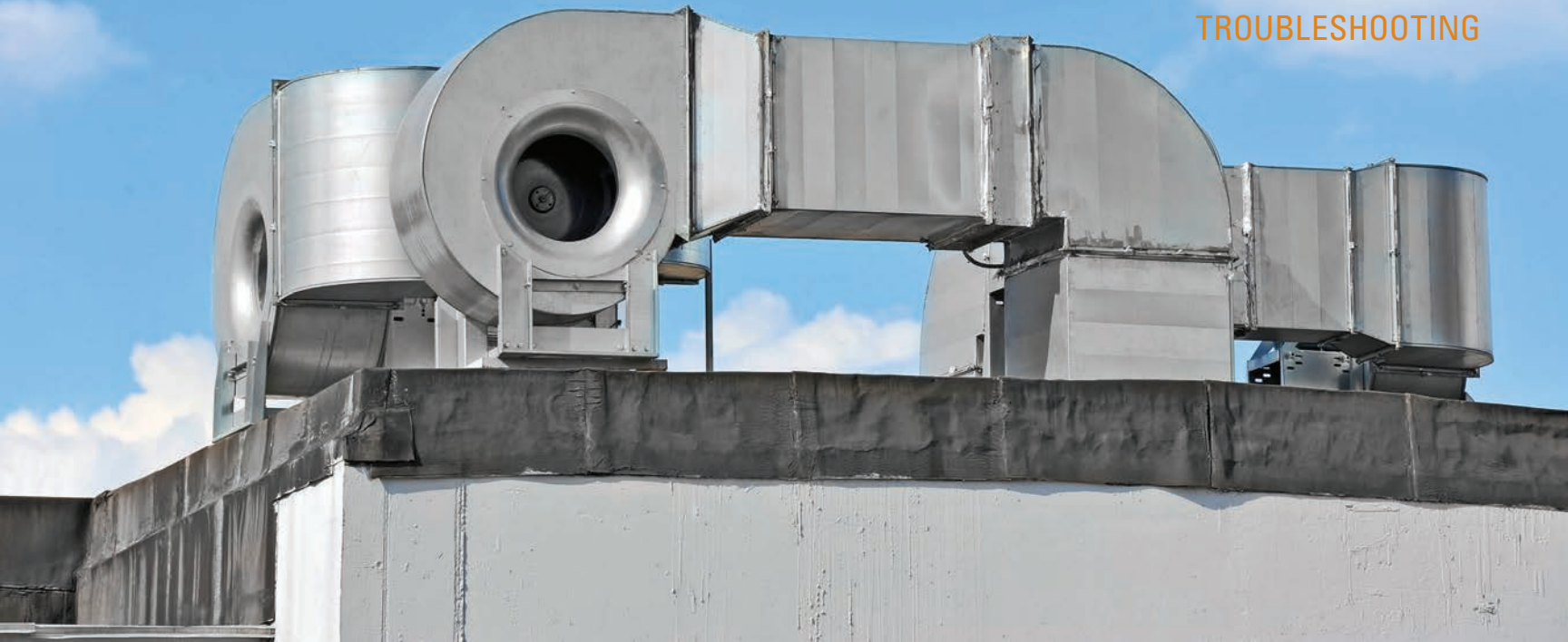
Premier Kathleen Wynne, among a contingent of politicians on hand for the event, said providing a single point of contact that handled matters between the company and the various levels of government was key to GE selecting Welland for the investment. She announced a Strategic Investment Office would be launched in the fall to provide companies planning to invest in Ontario with the same services.

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



A GE reciprocating engine.

PHOTO: GE



An industrial HVAC fan system.

PHOTO: FOTOLIA

Marcel Kamutski gets into the causes of fans and systems malfunctioning.

Centrifugal fans and fan systems used in industrial HVAC applications can fail in many ways. To fix failures it's useful to know what causes them. Engineering manager Marcel Kamutski from fan and blower manufacturer Daltec Canadian Buffalo Manufacturing Ltd. in Guelph, Ont. detailed five malfunctions and their symptoms during a workshop for maintenance pros in Hamilton.

**1. Fan is too noisy.** When an impeller hits the inlet or housing, it's likely not centred; the inlet or housing is damaged; the impeller is crooked or damaged; there's a loose shaft or loose bearing; a shaft is bent; or there's a misaligned shaft and bearing.

If the impeller is hitting the cut-off, the cut-off is not secure in the housing, it's improperly positioned, or it's damaged.

There are numerous causes if the problem is the belt drive: the sheave is not tight on the shaft; the belts are hitting the belt tube; belts are too loose or too tight; belts have the wrong cross section; belts are not matched in length on multi-belt drives; variable pitch sheaves are not

# Fan FAILURES

## FIVE TYPICAL PROBLEMS AND WHAT CAUSES THEM

adjusted so each groove has the same pitch diameter; the sheaves are misaligned or the belts are worn; the motor anchoring, base or fan is not secure; improper drive selection; loose key; or oily and dirty belts.

Probable causes of coupling problems are a loose key or an unbalanced, misaligned, loose or wrongly lubricated coupling.

Noisy bearings are caused by a defect, loose support, inadequate lubrication, loose shaft, misaligned seals, foreign material, or fretting corrosion between the inner race and the shaft.

When the shaft seal squeaks, the culprit may be inadequate lubrication, misalignment or a bent shaft.

Impeller noise can be caused by a defect, looseness on the shaft, unbalance, excessive wear as a result of abrasive or corrosive material moving through flow

passages, or blades rotating close to a structural member.

Motor symptoms are an insecure lead-in cable, an AC hum in the motor or relay, starting relay chatter, noisy motor bearings, the cooling fan striking a shroud, or low voltage and single-phasing of a three-phase motor.

If the symptom is high air velocity, probable causes are ductwork that's too small for the application or the fan is too large, the registers or grilles are too small, or the heating or cooling coil has an insufficient face area.

When obstructions cause a rattle or whistle, the reasons may be dampers, sharp elbows, a sudden expansion or contraction in ductwork, leaks in ductwork, turning vanes, or fins on coils.

Pulsation or surge traces to a restricted system that causes a fan to operate left of the peak, a fan that's too large for the appli-

cation, ducts that vibrate at the same frequency as fan pulsations, distorted inlet flow, inlet vortex surge or rotating stall.

Rattle or rumbles are caused by vibrating ductwork, vibrating cabinet parts, or vibrating parts not isolated from the building.

**2. Fan is too quiet.** When the fan is not operating at all, it's likely straightforward mechanical and/or electrical problems routinely analyzed by service personnel. Reasons include blown fuses, broken belts, loose pulleys, wrong voltage and/or excessive line drop or inadequate wire size, a load inertia that's too great for the motor or a seized bearing.

**3. Fan performance is wrong.** Causes of inadequate airflow to the fan include a backwards installed or running impeller, improper blade angle setting, missing cut-off, an impeller not centred with inlet collars, slow fan speed, dirty or clogged inlet, improper running clearance or improper inlet cone-to-wheel fit.

Not enough airflow to the duct system indicates the actual system is more resistant to airflow than expected. Other probable causes are closed dampers or registers, loose insulating duct liner or leaks in the supply ducts.

If airflow to the filters or coils is inadequate, look for dirty or

## TROUBLESHOOTING

clogged filters, replacement filters with greater than specified pressure drop, or install a replacement coil with tighter fin spacing.

Airflow issues arising from poor inlet conditions may be elbows, cabinet walls or other obstructions. Inlet obstructions cause more restrictive systems but don't cause increased negative pressure readings near the fan inlet. Increase fan speed to counteract the effect of restricted inlets, but not beyond the manufacturer's recommendations.

Poor airflow due to poor outlet conditions results from a sudden



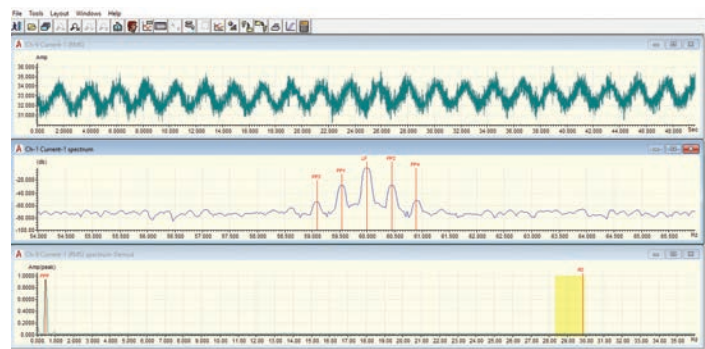
Industrial air conditioning and ventilation.

PHOTO: FOTOLIA

### TECH TIP

## Belt frequency

How to perform an analysis



Electrical frequency analysis.

PHOTO: MOTORDOC

Evaluating belt frequency is straightforward. Accuracy will depend on your measurements, including the belt.

First measure the centre-to-centre length of the shafts of the driver and driven equipment. Second, take the diameter of the sheaves and identify which one is which (motor and driven). This allows you to calculate the belt length and conveyor speed, then the belt frequency.

**Belt length** = (c-c length x 2) + ½ [(diameter1 x pi) + (diameter2 x pi)].

**Conveyor speed** = running speed x (diameter1 x pi).

**Belt frequency** = conveyor speed/belt length.

For example, a signature shows a c-c length of 1,610 mm, the diameter of the motor shaft is 460 mm, the driven equipment is 380 mm and the running speed is 16.571 Hz. So....

$(1,610 \text{ mm} \times 2) + \frac{1}{2} [(460 \times \pi) + (380 \times \pi)] = 4,540 \text{ mm}$ .

$16.571 \text{ Hz} \times (460 \times \pi) = 23,947 \text{ mm/sec}$ .

$(23,947 \text{ mm/sec}) / 4,540 \text{ mm} = 5.27 \text{ Hz}$

In this case, the sidebands around 50 Hz on the above signature are +/-5.2 Hz, indicating an issue with the belts.

Source: *Motor Diagnostics and Motor Health News* by MotorDoc LLC. Visit [www.motordoc.org](http://www.motordoc.org).

expansion or contraction at the fan outlet, or a duct bend. If it's not practical to install a straight section of duct at the fan outlet, increase the fan speed to overcome the pressure loss, but don't increase fan speeds beyond the manufacturer's recommendations.

Too much airflow is caused by oversized ductwork, damper set to bypass, filters not in place, too fast a fan speed, low system resistance or an open access.

Remember pressure density will be less with high temperature gases or at high altitudes.

High airflow indicates the system has less resistance to flow than expected.

When airflow is low, the impeller is likely installed backwards or it's running backwards. Other probable causes are improper blade angle setting, missing cut-off, too slow fan speed, dirty or clogged impeller or inlet, improper running clearance, or improperly set inlet vane or damper. It's also possible that the system is more resistant to flow than designed, dampers are closed, coil fin spacing is too close, or replacement filters are too restrictive.

**4. Fan is vibrating.** Ask yourself whether the fan impeller is properly balanced, motor and sheaves are balanced, key lengths are correct, fan shaft seals are rubbing, and does the motor have the right bearings.

If the fan foundation is inadequate, are isolators properly sized and levelled; shims properly installed; anchor bolts properly sized, intact and installed on all anchor points; and is ducting twisting or rubbing?

Check bearings: are they upgraded for a higher load capacity? Do you use the correct type and amount of grease? Is one bearing free to float?

Finally, check for changes in the system such as higher or lower pressure. Have expansion joints or dampers failed? What's the duct loading?

**5. When the fan fails.** This is the worst-case scenario. Higher trending vibration and rapidly increasing bearing temperatures indicate bearing ring failure. Other reasons include failing belt drive or coupling, shaft failure and impeller failure due to abrasive or corrosive wear.

Knowing the reason for fan failures and making required repairs correctly in the first place will ultimately save you time and money.

*This article is condensed from a technical paper presented at an education workshop convened by the Hamilton section of the Society of Tribologists and Lubrication Engineers (STLE).*

**Comments?**

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## THINK LEAN

A new McDonald's employee is taught to never be idle. If there's a lull, start cleaning. The same principle applies in your plant.

BY RICHARD KUNST

Many lean practitioners replicate and implement methodologies used extensively by Toyota. The Japanese automaker's Toyota Production System (TPS) is about sourcing and assembling parts into a completed vehicle at a high velocity by identifying and eliminating any and all waste. Toyota is also extremely loyal to its employees and embraces them as lifetime stakeholders.

At Toyota, manufacturing is simple and much like other automotive assembly plants. You have a line that runs at a fixed speed and each station is loaded with a prescribed amount of work. Variability is minimal and easily absorbed with the production schedule, such as two- and four-door models going down the same line.

In essence, the TPS is all about continuous flow and all methodologies support this process. The key enabler and measure is the capability of refreshing material conveyance.

### LEAN TRANSLATOR

#### 5S

Workplace organization method (sort, set in order, shine, standardize, shine).

#### Jidoka

Highlights what causes problems by stopping work immediately to determine the root cause.

#### Andon

A system to notify management, maintenance and other workers of a quality or process problem.

#### Kamishibai

Boards or T-cards used as visual controls for performing audits within the manufacturing process.



Toyota RAV4 production in Woodstock, Ont. TPS at work!

PHOTO: TOYOTA

# Going with the FLOW

## HOW TPS AND MCDONALD'S ARE CLEANING UP

5S is there to support the increased velocity along with most of the other tools lean practitioners love to promote. If you focus on improving material conveyance first the other tools make sense.

The guiding philosophy of TPS is the attribute of jidoka, which empowers team members to stop the line if they detect a problem, and is communicated typically through an andon system (signal lights) or an andon board (lighted overhead display).

Toyota is the creator of many lean methodologies, but let's look at another great lean organization ... McDonald's.

The global restaurant chain highly respects its people too, but the economics of the business mean wages are lowish, so turnover is high. How does it respond? By leaning out its processes.

McDonald's is more of a job shop with minimal customization capability. Deviate from the menu and the process quickly goes awry. Why? Because of the high turnover, McDonald's has spent years engineering every process, done great breakdown analysis work and error-proofed with bells, chimes and lights.

### Cleaning time

This engineering has even crept into the supply chain. Fries, for example, are cut to an exact shape and a specific amount (by weight) goes into a plastic bag. Anyone at the restaurant who knows how to open a bag just places them in deep fry basket, drops it into the oil, presses the timer and waits, but not idly: not even for a few minutes. That's cleaning time.

When the timer beeps, the operator removes the fries and

dumps them into the serving tray where they are salted and ready to be served.

We see the application of 6 Sigma reduces and controls variability within a process that's error proofed and capped with a good dose of 5S. But for the process to be successful and repeatable, it has to be engineered with exacting standards.

McDonald's doesn't have consistent predictable volume or continuous flow so flexibility has to be integrated within the kitchen, which has several workflows that use different andon systems and colour coding to control the process.

But there's still potential downtime for leaning on equipment so McDonald's uses "T-Cards" or kamishibai to provide team members with mini-assignments that need to be completed on a daily, weekly or monthly basis.

Incorporate kamishibai cards into your 5S repertoire, because if you have time to lean, you have time to clean!

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

### Comments?

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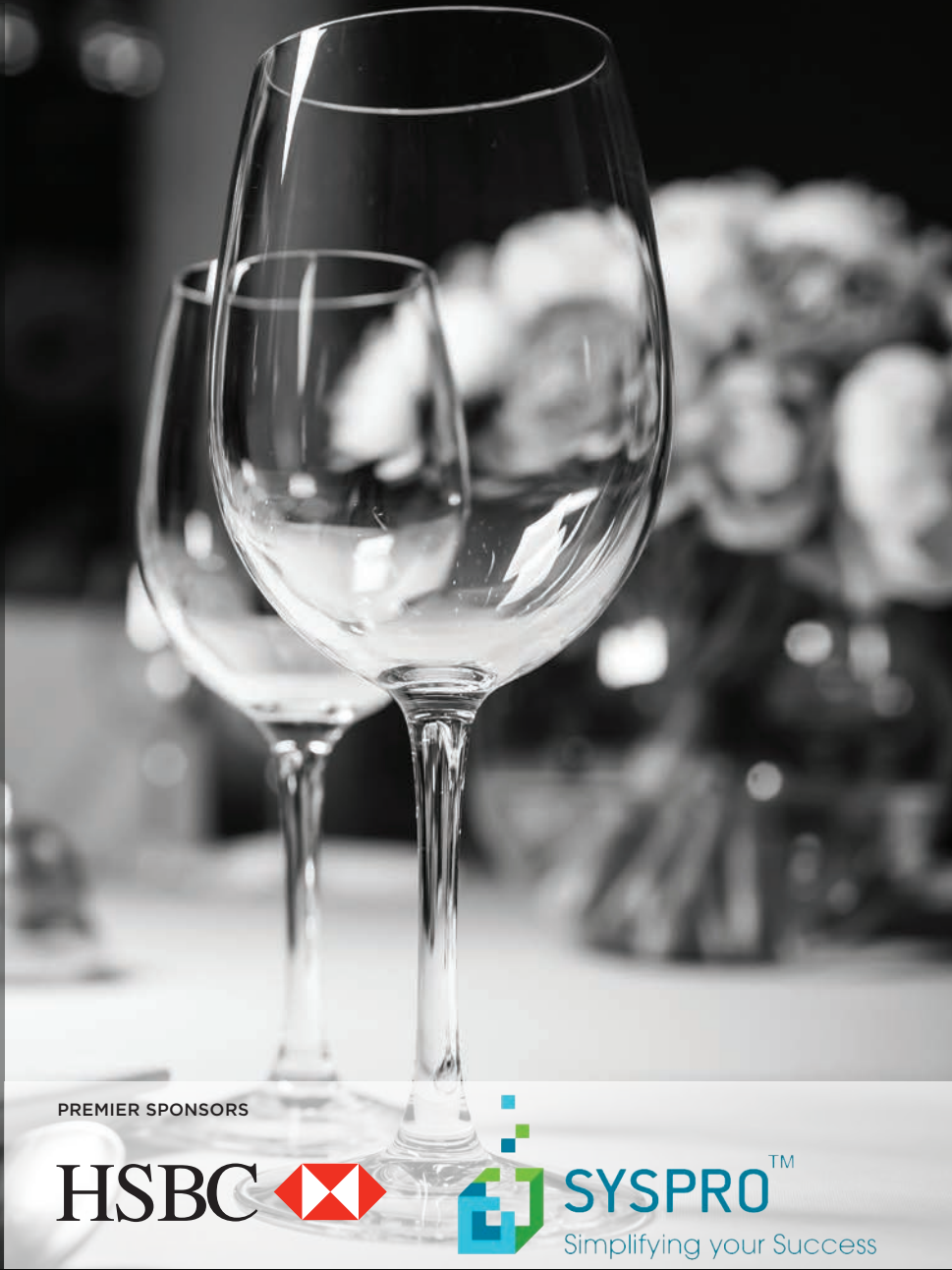
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# How's your SAFETY PERFORMANCE?

## MEASURE IT USING LEADING AND LAGGING INDICATORS

*Measuring safety indicators forms the basis for continuous improvement.*

PHOTO: THINKSTOCK

One set tells you how you've been doing, the other helps to eliminate risks and hazards.

Looking closely at how you measure safety performance is an important step toward improving it. Using leading and lagging indicators is an effective way to prevent workplace incidents. This process involves measuring both your bottom line safety results and how well your workplace is doing at accident and incident prevention. Controlling leading indicators, such as the amount of safety training you provide, controls lagging indicators, such as injury rate.

Lagging indicators measure performance by tracking accident statistics, which tells you how many people got hurt and how badly. Examples include:

- injury frequency and severity,
- lost workdays,
- incidents and near misses, and
- workers' compensation costs.

There's a downside to using only lagging indicators: they don't tell you how well your company is preventing incidents and accidents. For example, a low number of lost workdays suggests there are no safety issues, which creates a false sense of security. There could be issues that contribute to a future increase in lost workdays.

Lagging indicators show when a desired safety outcome has failed, or when a health and safety objective has not been achieved. The learning comes from recognizing a past mistake and results in reactive rather than proactive action. Yet it's important to monitor this data because evidence of an increasing number of injuries or incidents of illness signals improvements are needed in the safety system. However, it's also worth noting many workplaces have too few injuries to distinguish real trends from random occurrences, and all injuries may not be reported.

### Eliminating risks

Leading indicators are proactive, preventative, and predictive measures that identify and eliminate the risks and hazards that cause incidents and injuries. Examples include:

- percentage of managers with occupational health and safety training;
- percentage of workers with health and safety training;
- frequency of health and safety meetings;
- frequency of ergonomic assessments; and
- frequency of safety audits.

It's important to base your leading indicators on impact. For example, don't just track attendance at safety meetings and training sessions. Measure the impact of meetings and training by determining the number of people who met key learning objectives.

Why use leading indicators? They're proac-

tive, focusing on future safety performance and continuous improvement. They also report regularly on what employees and management are doing to prevent injuries. Leading indicators help identify and understand the factors affecting the risk of injury, which helps to identify ways of preventing injury and illness.

Leading indicators connected to specific occupational health and safety program goals introduce a real level of accountability, but they also measure and monitor the importance of health and safety within the organization.

Using them complements more traditional outcome-based measures of lagging indicators and balances out some of their limitations.

Measurement is an important part of any management process and forms the basis for continuous improvement. Combining lagging and leading indicators provides a clearer picture of what is and isn't working.

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*This article was contributed by the Canadian Centre for Occupational Health and Safety (CCOHS), Canada's national resource for the advancement of workplace health and safety. It promotes the physical, psychosocial and mental health of working Canadians by providing information, training, education and management systems that advance health and safety. Visit [www.ccohs.ca](http://www.ccohs.ca).*

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

## EMISSIONS

Canadians for Clean Prosperity and Deep Decarbonization shows emissions can be reduced without harming growth.

BY PLANT STAFF

Canada is in a position to significantly decarbonize while protecting, and even enhancing, economic performance, according to modelling completed by a Toronto-based decarbonization think tank.

Canadians for Clean Prosperity and Deep Decarbonization analyzed what would happen if Canada adopted one of two carbon pricing models: either a straight carbon tax similar to policy deployed by BC, or a hybrid carbon pricing model similar to the system proposed by the Alberta NDP, but at the national level.

The research shows both models would significantly reduce Canada's greenhouse gas emissions (16% to 17% below 2005 levels by 2030), while the hybrid model actually boosts economic performance nationwide and in most regions. For energy-producing provinces, an Alberta-style model at the national level would boost GDP by 1.43% and 4.23% in



Putting a price on carbon.

PHOTO: THINKSTOCK

# How decarbonizing PAYS

## RESEARCH SCOPES BENEFITS OF PRICING MODELS

Saskatchewan, compared to the results under the current set of federal and provincial policies.

The think tank also compared two options for recycling carbon tax revenues – either recycling

all revenues as tax reductions, as done in BC, or allocating the revenues to increased spending on emissions reductions programs. Results showed cutting taxes would lead to slightly better GDP

performance while increased environmental spending would lead to slightly increased emissions reductions. Neither recycling option was as significant for the environmental or economic outcomes as the type of carbon pricing system adopted.

The modelling concluded Canada would be best served to reduce CO<sub>2</sub> emissions and maintain economic performance by adopting Alberta-style hybrid pricing and BC-style revenue recycling, which reduces personal and corporate income taxes.

**Comments?**

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## EXPANSION

## Modernization mode

Lafarge upgrades Exshaw cement plant

Lafarge Canada Inc. has completed a major modernization and environmental upgrades at its Exshaw, Alta. facility.

The project focused on kiln upgrades, which are critical to Lafarge's cement-making process. The company invested \$20 million in Exshaw's kiln 5 to meet new emissions targets by retiring less efficient gravel-bed filter technology. It has also constructed a new kiln 6 with a state-of-the-art baghouse to collect particulates. The installation of a vertical raw mill, an EcoDome storage facility, pre-heater tower and vertical cement mill completed the expansion.

Lafarge projects the plant's production capacity to increase from 1.3 million tonnes per year to 2.2 million tonnes. Technology upgrades will reduce sulphur dioxide emissions by 60%, nitrogen oxide emissions by 40%, and reduce fugitive dust and noise coming from the plant's equipment. The facility has also achieved zero water discharge from its operations.



Lafarge's expanded Exshaw facility.

PHOTO: LAFARGE

Lafarge, which has Canadian headquarters in Calgary and Montreal, is a manufacturer of construction materials and part of the Paris-based building materials giant LafargeHolcim group. The conglomerate operates in 90 countries and employs more than 10,000 people.

## TRENDS

### SECURITY

Data encryption tools used by businesses and government could soon be obsolete.

BY PLANT STAFF

The development of quantum computing technologies will threaten to undermine even the most sophisticated cybersecurity systems deployed by both businesses and government, according to a report by the Global Risk Institute (GRI).

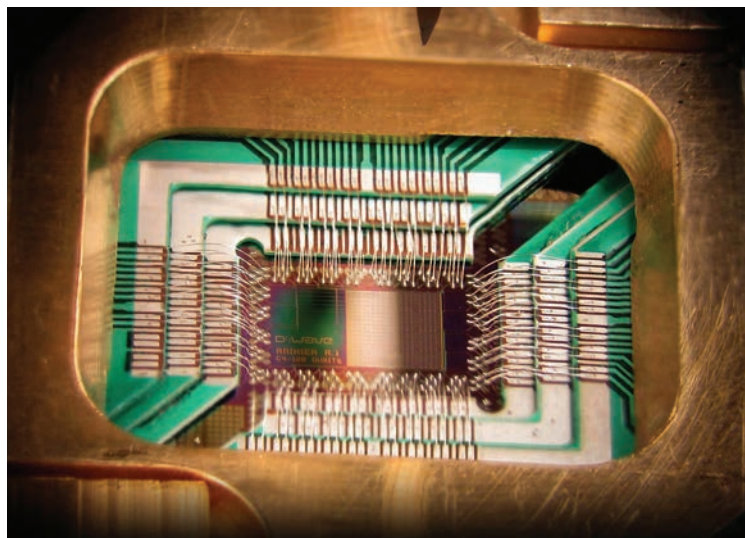
Within 10 years, the report purports there is a one-in-seven risk that advanced quantum computing will undermine critical public-key cryptography tools, and a 50% risk that most of them will be obsolete by 2031.

Public-key cryptography is an encryption scheme that uses two mathematically related keys. A public key encrypts while a private key is used to decrypt important data. The practice is the foundation of digital commerce and used by many large global organizations, such as financial institutions, online retailers and government agencies.

The report was authored by Michele Mosca, a special advisor on cybersecurity to the GRI, co-founder of the Institute for Quantum computing at the University of Waterloo and a founding member of the Perimeter Institute for Theoretical Physics.

Mosca believes the threats stem from the power of quantum computing to execute tasks beyond the reach of conventional computer, which typically use long strings of bits that encode either by a 0 or a 1. Quantum computing permits the bit to embody both the 0 or 1 states simultaneously. Manipulating a large collection of quantum bits, known as qubits, allows a quantum computer to process an infinite number of 0s and 1s at the same time.

Quantum computing has largely been a branch of fundamental physics and computer science,



A D-Wave Systems chip using 128 superconducting logic elements that exhibit controllable and tunable coupling to perform operations.

PHOTO: D-WAVE

# Threat-level QUANTUM CYBERSECURITY SYSTEMS ARE AT RISK

but it's working its way into newer technologies with the potential to support groundbreaking and creative applications, such as high precision measurements and medical imaging.

### Exploring applications

D-Wave Systems Inc., a Vancouver-based developer of quantum computing technologies, has worked with Lockheed Martin to explore how the aerospace and defence manufacturer could use the technology to create and test complex radar, space and aerospace systems, and speed-up complex computation tests.

Another application is digital signatures, a fundamental requirement for online security, which allow a verifier such as a user's browser to confirm that a piece of code comes from a trusted source and has not been tampered with.

Mosca's report cautions "when the cryptographic foundations on which a cyber system is built are fundamentally broken, the system will crumble with no quick fixes."

And fail-safe replacements would take years to develop.

"It is very important that we are not caught off-guard and forced to firefight a threat that takes years of preparation to properly defend ourselves against," Mosca adds.

The report is part of the Toronto-based Global Risk Institute's funding of research into quantum computing, which focuses on medium and long-term implications that are likely to have a profound impact on the financial services industry.

Recently, the federal government invested \$76.3 million in the University of Waterloo's Institute for Quantum Computing to accelerate the development of technologies including a universal quantum processor, quantum sensors and long-distance quantum communications.

The money was made available through the Canada First Research Excellence Fund, which deployed \$900 million in funding across 13 research initiatives nationwide.

### Comments?

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

## HUMAN RESOURCES

### Who are the workplace flight risks?

An ADP Canada survey breaks it down

Almost two thirds (65%) of Canadian workers are prepared to leave their current employer, and Canadian businesses need to be paying particularly close attention to those who would jump ship for the right offer, according to an ADP Canada Sentiment Survey.

The Toronto-based provider of employment services called the research is a wake-up call for employers who are at risk of losing key talent. The survey reveals three types of flight risks:

**Uninspireds:** Under-achieving clock-punchers to bored superstars make up 33% of the workforce and feel no great loyalty to their current employer.

**Casual daters.** They represent 16% of the workforce who haven't kicked their job search into high gear, but they're keeping tabs on job boards and professional networking platforms such as LinkedIn.

**Disseed.** The dissatisfied, disengaged and disaffected represent 16% of the workforce and actively looking for a new role.

Compensation is the main reason employees leave, according to 66% of workers, but there are a variety of reasons related to better work/life balance/fewer hours, less stress and better location/shorter commute, say 56% of respondents.

The desire for a higher position is also a key motivator, mentioned by 30% of employees although there are significant age and gender differences: 36% of men would leave their current job for a better position compared to less than a quarter of women.

And four in 10 employees ages 18 to 34 said they might leave their position for a more lucrative opportunity as would those in the 35 to 44 cohort. The numbers drop for the 45 to 54 (21%) and 55 to 64 (7%) segments.

# 75 YEARS

Canadians were divided on the benefits of free trade with the US when NAFTA was signed and about to be implemented.

BY JOE TERRETT, EDITOR

The 1990s was a decade consequence for Canada. In 1990 Manitoba and Newfoundland failed to pass the Meech Lake Accord, crafted to get Quebec to sign on to the amendments to the Constitution of Canada in 1982 (patriating its control from Britain to Canada). This led to a second Quebec referendum on sovereignty in 1995 that the “no” side just won by a 50.6% majority.

Economically Canada sank into recession in the early 1990s and ushered in a period of high unemployment. But on the trade front, the North American Free Trade Agreement (NAFTA) between Canada, the US and Mexico, signed in 1992 and came into force on Jan. 1, 1994, was symbolic of the global movement to reduce barriers and open up international trade.

The Jan. 20, 1992 issue of **PLANT**, *Canada's Industrial Newspaper*, reported in *Big changes '92 outlook* that the job situation was bleak by the end of 1989. Canada's industrial sector had lost 305,000 jobs, or 15% of the manufacturing force, reducing the total to about 1.8 million.

More than 2,000 manufacturers had closed over the previous three years and the Canadian Manufacturers' Association (CMA) predicted 1,000 more closures and the loss of another 100,000 jobs.

The trade focus wasn't all global. In *CMA push on earlier date to breach trade barriers* (same issue), the trade group representing Canada's manufacturers called for an end to interprovincial trade barriers by 1993. Indeed, such a move made sense. At that time, Canada absorbed 72% of domestically produced goods and services.

International Trade Minister Michael Wilson, speaking at a CMA conference on internal trade, stressed that it was imperative the country remove “the hundreds of artificial trade barriers that are costing Canadian customers billions of dollars every year.” CMA estimated that cost to equal about 1% of GDP or \$1,000 a year for a family of four.



NAFTA's three partners: Canada, the US and Mexico.

PHOTO: THINKSTOCK

## NAFTA: WHERE IT BEGAN

### HIGHLIGHTS FROM PLANT IN THE 1990s



PLANT's Jan. 20, 1992 issue.

It took almost a quarter of a century for the provinces to agree on an internal free trade deal. In July this year, the premier signed the Canadian free-trade agreement (CFTA) covering most goods and services. How effective it will be depends on how many exceptions are agreed to.

As for NAFTA, the Sept. 22 issue of **PLANT** notes in *Battle lines drawn on new free trade fight* that business and labour were on opposite sides of the agreement. Signed in August, it set the stage for a federal election that followed in October.

NAFTA had the support of the CMA. “The best terms of trade are free trade, said CMA president Stephen Van Houten. “NAFTA means more opportunities and greater potential wealth for Canadian manufacturers and businesses in general.”

Most other business groups supported the deal, which would create a free trade zone encompassing 360 million people and US\$6 trillion in goods and services per year.

**PLANT** reported in its Jan. 18, 1993 issue that Canada was doing all right under free trade. Canadian manufacturers increased their share of the combined \$3.16 trillion market with the US to 7.3% from 6.6% in the 1985-87 period, and 6.7% in the 1981-83 period, even as their share of the domestic market slipped from 66.3% in 1981-83 to 59.3% in the 1989-91 period. But Canadian producers more than made up for the drop by grabbing 11% of the new business that came along since the FTA was signed.

NAFTA's opponents feared jobs would flow to low-wage Mexico. CMA's chief economist Jayson Myers warned Canadian companies would have to compete with Mexican producers regardless of whether or not NAFTA was ratified. “Just because we're facing competition, we can not put our tails between our legs.”

Wage differences only offered Mexican plants a 4% advantage, but wage costs represent just 12% of the total cost of Mexican-made goods. He said Canadians can make up that gap by taking advantage of their productivity, which was “much higher” than Mexico's.

Ironically, Jean Chretien won the 1993 election for the Liberals, who were against the FTA with the US under John Turner. Chretien had even campaigned not to pass NAFTA unless changes were made. The US refused to make changes, but Chretien's government implemented the deal anyway.

Today NAFTA is under attack by both the US Democratic and Republican candidates. Both want to reopen it.

Donald Trump, the more militant Republican nominee, has called it “... the worst trade deal maybe ever signed anywhere, but certainly ever signed in this country.” And he's threatening to renegotiate it or tear it up.

Whether or not NAFTA survives the US election whirlwind will depend on the winner.

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



PHOTO: SUNCOR

# Needed: NEW PIPELINES

## DEMAND FOR OIL SANDS OUTPUT IS GROWING

The Canadian Association of Petroleum Producers forecast an urgent need for new energy infrastructure.

**A**nticipated growth in Canadian oil production points to an urgent need for new major oil pipelines that can deliver energy to domestic and world markets, says the Canadian Association of Petroleum Producers (CAPP).

*CAPP's 2016 Crude Oil Forecast, Markets and Transportation* report makes its case.

Canada's pipeline network can move about 4 million barrels per day (bpd), which closely matches the 2015 average supply. But more

than 850,000 additional barrels per day of oil sands supply will be available in five years.

Between 2021 and 2030, oil sands supply is forecast to grow by another 700,000 bpd, which means current capacity will soon be "greatly" exceeded, says the Calgary-based group that represents Canada's petroleum energy companies.

"The need to build new energy infrastructure within Canada is clearly urgent," said Tim McMillan, CAPP's president and CEO.

There's also a huge global market Canada isn't reaching. The International Energy Agency (IEA) forecasts global demand for energy driven by emerging economies in Asia will grow by 32% by 2040, and more than a quarter of total energy demand will be from oil.

With 171 billion barrels of oil, Canada has the third-largest reserves in the world and as of 2015 is the sixth-largest producer, yet according to the National Energy Board, less than 1% of that oil is shipped overseas.

CAPP estimates Canada's production (before imported diluent is added) will increase 28% over the next 15 years to 4.9 million bpd, up from 3.8 million bpd in 2015.

Supply (after diluent is added) is to increase 37% over the next 15 years, growing to 5.5 million bpd by 2030. This will require rail and pipelines operating in all directions to get the oil to new and existing markets.

By 2030 the oil sands are expected to produce 3.7 million bpd, down from last year's forecast of 4 million bpd by 2030, but that still represents more than 1.5 million bpd.

Conventional oil production in Western Canada, including condensates, will be relatively stable to 2030, but dropping from 1.3 million bpd in 2015 to 1.1 million bpd by 2018. CAPP says conventional and in situ oil sands have "notable upside potential."

IEA forecasts a significant growing demand for oil in China and India – more than 10.8 million bpd by 2040. These two markets represent almost 84% of the total increase in world oil demand from 2014 to 2040.

Closer to home, CAPP offers another reason why pipeline infrastructure is needed. Canada spent \$17 billion last year importing oil from the US, Saudi Arabia, Algeria, Angola and Nigeria. For Quebec and Atlantic Canada, that's about 600,000 bpd imported to meet their refinery needs.

Visit <http://capp.ca/publications-and-statistics/crude-oil-forecast> for a copy of the report.

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

### PIPELINE PURGATORY

Four major pipeline projects are dealing with opposition and challenges from environmental groups, First Nations, governments and citizens, while inching their way through approval processes or dealing with lawsuits and appeals.

Kinder Morgan's Trans Mountain pipeline expansion to BC's west coast has a green light from the National Energy Board (NEB) but it's facing opposition from various sources as it awaits federal approval in December.

TransCanada Pipeline's Energy East project is heading into hearings with the NEB, but it also faces opposition from environmental groups and municipalities, and hurdles to clear from Ontario and Quebec.

Federal approval of Enbridge's Northern Gateway pipeline from Alberta to Kitimat in BC has been overturned following the Federal Court of Appeal's quashing of the permit issued by the Harper Cabinet two years ago. The reason: failure to consult First Nations prior to issuing the cabinet order.

US president Barack Obama denied TransCanada's Keystone XL pipeline in November 2015, which was to extend south to Nebraska. The company is challenging the decision under NAFTA and has initiated litigation against the US Administration.



## SKILLS

Plants are applying a tiered approach that brings together varying skill levels to get the job done.

BY LEAH FRIBERG

It's a song that North American manufacturers have been singing for some years now: "I can't find enough qualified people to do the work." In particular, we have a shortage of mid-level maintenance technicians, foremen and engineers who have enough field experience to problem-solve on the fly.

It used to be that people handling equipment installation, commissioning, regular maintenance and emergency troubleshooting stayed the same, for a long time. But that changed during the 2008-09 recession as baby boomers retired, too few technicians and manufacturing engineers were entering the workforce, while job descriptions and expectations of maintenance productivity evolved.

Now when researching what kind of problems a customer is looking to solve using a test tool, Fluke surveys up and down the decision-making chain, takes productivity metrics into account, and carefully evaluates skills requirements.

In 2012, as the recession began to lift, Fluke surveyed its North American customer base on the skills gap. Ninety-three percent of respondents said it was very difficult to find entry-level workers with acceptable skills, and more than half said candidates lacked enough years of on-the-job experience to effectively perform in their positions.

Things that took a beating during the recession include:

- on-the-job mentoring
- apprenticeships
- specialization
- going home on time



Retiring baby boomers are among key demographics that are impacting maintenance performance.

PHOTO: FLUKE

# Bridging the GAP

## HOW INDUSTRY ADAPTS TO A SHORTAGE OF MID-LEVEL MAINTENANCE PROS

A study posted in 2016 by the AED Foundation indicates the North American skills gap has persisted even as the economy has recovered. US manufacturing may still be "foregoing 11% of earnings and 9% of revenue due to the skills gap and the inability to hire qualified workers." In the same study, 59% of Canadian executives

surveyed struggled to find qualified candidates, 60% said they had lost customers as a result of the technician shortage and 40% said the shortage increased costs and decreased productivity.

Happily, some of the "counter-measures" initiated during the recession are starting to yield returns. Manufacturers have

## SUPPLY LINES



DustTamer wind fencing at a gypsum plant. PHOTO: DUST SOLUTIONS

## DUST IN THE WIND

Wajax has been named the exclusive distributor of Dust Solutions Inc.'s dust suppression products in Ontario, Quebec and Atlantic Canada.

The Montreal-based industrial distributor will be handling the Beaufort, SC manufacturer's Dust-Tamer wind fencing.

Its fabric barrier exerts a drag force on oncoming wind velocity and reduces its speeds by up to 75% within the sheltered area. This helps to control particulate matter in the air.

## MOTOR ACQUISITION

The Danfoss Group is now the major player in hydraulic motors following its acquisition of White Drive Products Inc. The company, based in Hopkinsville, Ky., manufactures hydraulic drive products.

White Drive's business, with its strong presence in North America and China, will be integrated with Danfoss Power Solutions.

Danfoss, based in Denmark, has a Canadian sales office in Mississauga, Ont.

## CHEMICAL CLEANING

Envirosystems Inc., a provider of industrial and environmental services based in Dartmouth, NS, has acquired Rocky Mountain Industrial Services in Denver, Colo.

The full service company provides proprietary chemical cleaning processes, consulting, and analytical services to customers in the power generation, cogeneration, mining, petrochemical, pulp and paper, and pharmaceutical industries.

## SKILLS

partnered with local colleges and universities and with each other to re-create the apprenticeship. It's often by industry segment – automotive manufacturers, oil and gas – that have similar skill-set needs in specialized areas such as mechatronics. These training associations often develop their own curriculum, in addition to the on-the-job training that comes with the apprenticeships. The first graduates from these programs joined the workforce a couple years ago, and the numbers are increasing annually.

Another shift is occurring around continuing education for the current working population that is adapting to ongoing change. Workplace safety remains at the top of the list for company trainers, but a whole host of other technical and soft skills training has fallen on the internal trainer to supply. Hands-on training remains among the hardest needs to fill.

### Leaping barriers

Lastly, many employers are excited about the new skills that millennials bring to the table. Together with the Industrial Internet of Things (IIoT), the millennial workforce offers facilities the chance to leapfrog over long-standing barriers to progress around not enough time, money or resources to get the job done. Millennials tend to embrace change, technology and collaboration while the IIoT is improving maintenance technology accessibility in terms of cost, complexity and scale.

Tiered maintenance is one example of how all of this comes together by enabling regular maintenance technicians to do what had historically been considered higher-level work: predictive maintenance inspections. Using prescribed tasks and entry-level thermal, vibration and ultrasound tools, technicians inspect critical equipment and collect, save and upload data for the less-numerous more-skilled people on the team to review.

The specialist's job is made easier by having the larger team data map the plant so he/she maintains

awareness of operational health and prioritizes time on complex issues while providing direction on less complex issues the team can resolve.

Meanwhile, the maintenance technicians build additional skills, including an awareness of the key equipment failure indicators. If the engineer uses a work order system, the technician stays involved, learning by doing as a problem is detected, diagnosed, and addressed.

The setup creates a new collaboration, with small changes to the role of the specialist and the maintenance tech that are natural extensions and usually of interest. At the same time, the conversion to proactive maintenance gradually shifts the balance of the team's workload from emergencies to planned maintenance.

When all team members save data to a central source, knowledge is transferred from the individual to the team. The IIoT makes this aspect of it much easier than pen-and-paper or spreadsheets by leveraging the cloud and WiFi networks to bypass IT gridlock. And the prevalence of smart devices and laptops make it easier for technicians as well as engineers to share data on the fly. Ease of implementation is not lost on management: IIoT solutions are often scalable, meaning a plant can pilot a maintenance software system with a core team of early adopters, document successes and expand.

On a day-to-day basis, the best approach for optimizing the workforce and its productivity levels in the face of a skills shortage is multidisciplinary: a combination of adaptive management techniques for team deployment, training, roles/responsibilities and technology.

*Leah Friberg is a training manager with Fluke Corp., a manufacturer of test and measurement instruments based in Everett, Wash. The Canadian headquarters is in Mississauga, Ont. Visit [www.fluke.com](http://www.fluke.com).*

### Comments?

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

## PRODUCT FOCUS DUST, FUME EXTRACTION

### CAPTURE EXPLOSIVE METALS

The Eurovac II wet mix dust collector from Eurovac captures explosive metals at the source to create a clean and safe environment for technicians.

The system, which meets NFPA 484-15 regulations, sands and grinds with source capture hand tools or connects to stationary equipment ports. Water filtration eliminates the risk of fire and explosions.

Eurovac is a supplier of dust and fume extraction systems with offices in Toronto.

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



Uses water filtration.

### FILTER INDUSTRIAL DUSTS

The SV-700 and SDC portable filter units from Sourcetec Industries handle welding, grinding, dry chemical and flour dusts, among others.

The arms come with mounting bracket, support, hose, hood and four-way swivel. A 360-degree swivel is available for some models.

Sizes range from 4 to 35 in. (SourceArms), and 4 to 14 in. (Solid Tube Arms). Standard diameters range from 4 to 8 in., and larger diameters are available.

Mini Arms that come in various lengths and diameters mount in areas where space is limited.

The 250F PVC-based hose is flexible and smooth for greater air flow. Different hoses adapt to the arm to accommodate high-temperature or chemical applications.



360-degree swivel.

Each mini arm comes with support, 360-degree swivel rotation, wall and bench nozzle and mounting bracket, hose and bell hood.

The standard mini arm is 3 in. x 5 ft. long, plus fans and portable units are available.

Sourcetec Industries, based in Mississauga, Ont., is a manufacturer of industrial air cleaners and clean air solutions.

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

### CAPTURE LIGHT TO MEDIUM DRY DUST

The Nederman's Auto M-Z mechanically cleaned baghouse dust collectors handle applications that generate light to medium volumes of dry dust.

The compact, unobtrusive dust collector is made of robust, weather-proof welded steel.

Air volume range is 850 to 10,000 m<sup>3</sup>/hr. (500 to 6,000 cfm). Access for maintenance is at the front of the unit. There's no need for compressed air and the unit is ATEX-certified for explosive dust in categories St1, St2 and St3.

Typical industry applications include metalwork grinding, fettling, sanding and polishing; woodwork, and dust extraction from small and medium workshops; and bulk powders, chemicals, sack tipping, weighing and bagging.

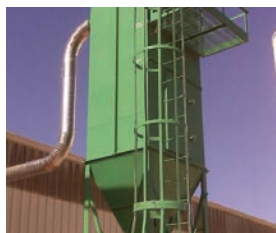
Nederman is a manufacturer of air filtration systems with an assembly operation in Mississauga, Ont.

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

**COLLECTORS FOR A RANGE OF INDUSTRIES**

N.R. Murphy Ltd.'s four dust collector series with different designs and functions serve a wide range of industries.

The FB Series features cylindrical design tube style filters with mechanical cleaning. HE dust collectors provide continuous duty automatic self-cleaning. MK units have square or rectangular design tube style filters with mechanical cleaning. And the C Series is designed for fine dust applications requiring large filter areas.



Four series, different functions.

Other designs for specific applications include cyclones for almost any industry as primary separators ahead of dust collectors for added collection, or even as standalone units. Portable MRX collectors handle one or more nearby machines and are suited for equipment that produces smaller quantities of larger sized particles. Self-contained downdraft workbenches and dust collectors have built-in filters and fans.

N.R. Murphy is a manufacturer of dust collections systems based in Cambridge, Ont.

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

**CAPTURE LIGHT, AIRBORNE DUST**

Movex flexible dust extraction arms capture light airborne dust at the source to protect the operator's breathing zone.

The easy to clean extractor arms are made of 316L stainless steel with food grade hoses that comply with chemical washdown procedures.

Models are available in 4, 5 and 6 in. Ø with 5, 7, 10 and 14 ft. lengths, including a telescopic version.

Typical applications are weighing stations, mixers and bag and tote dumping stations.

Lev Co is a supplier of extraction and exhaust ventilation systems based in Port Perry, Ont.

[www.lev-co.com](http://www.lev-co.com)

**PUMPS**

**RETROFIT SYSTEMS CUTS PUMPING COSTS**



Longer equipment life.

Armstrong Fluid Technology's vertical-in-line retrofit system allows building owners to replace the moving parts of an installed, constant speed pump while retaining the existing pump casing, insulation and piping to reduce equipment, shipping, scrap and labour costs.

The retrofit system cuts energy use up to 70% by upgrading to variable speed, and accommodates future changes in flow requirements. Variable speed operations lengthens equipment life by up to 30%.

Pressure sensors, wall-mounted drive or additional wiring aren't required because the system reuses the existing pump casing to eliminate pressure tests after installation.

Armstrong is a manufacturer of fluid handling technologies based in Montreal. [www.armstrongfluidtechnology.com](http://www.armstrongfluidtechnology.com)

**PUMP ADAPTERS INSTALL EASILY**



Held in place by gravity.

KSB's mounting adapters make it easy to install Amarex N submersible pumps in facilities as a drop-in replacement.

Submersible pumps used in wastewater treatment facilities are typically installed on a duckfoot and claw arrangement. The duckfoot, also referred to as a discharge elbow, is a fitting located at the lower end of the outlet pipe, normally at the bottom of the tank or well.

When the pump is lowered onto place, a claw adaptor mounted at the outlet nozzle of the pump engages with fittings on the duckfoot to ensure that the pump is properly aligned with the outlet pipe.

The pump is held in place by gravity. When access is required to clear a blockage or for service, the pump is hoisted to the surface.

KSB is a pump manufacturer based in Mississauga, Ont. [www.ksb.ca](http://www.ksb.ca)

**METALWORKING**

**PUNCHER GENERATES 11 TONS OF FORCE**

Hougen Manufacturing's battery-powered 76000PR Punch-Pro handles on-site punching applications where power isn't available or it's hard to access.

The electro-hydraulic portable unit packs enough punch to generate 11 tonnes of force and punches

round or oblong holes from 19 to 32 in. in 1/4 in. mild steel. Throat depth is 0.98 in. and it punches flat bar or angle iron.

The tool positions easily in narrow or awkward areas by rotating the motor 360 degrees in either direction. The punch is jogged down to the centre mark to confirm accuracy.

A "power retractable" system reverses out of the hole to improve productivity when handling harder, more elastic materials that grip the punch.

Powered by an 18 VDC lithium-ion battery, it reaches a full charge in 22 minutes to produce up to 150 holes.

Hougen is a manufacturer of portable magnetic drills and annular cutters based in Schwartz Creek, Mich. [www.hougen.com](http://www.hougen.com)




Produces 19 to 32 in. holes.

Murphy means MORE.

more Value

No one gives you more.


Feature for feature:  
Murphy packs more in  
Get it done right the first time.



**N.R. MURPHY LTD.**

**DUST COLLECTORS**

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## PRODUCTS AND EQUIPMENT

### VISION

#### CAMERA SHOWS WHERE PROBLEMS LINGER



Identifies thermal sensitivity less than 0.10 degrees C.

FLIR's C2 thermal camera finds hidden heat that signals energy waste, structural defects and plumbing issues in industrial buildings.

An MSX real-time image enhancer, high sensitivity, wide field of view (41 by 31 degrees) and fully radiometric imagery show where problems are and verify the completion of repairs.

The IR sensor is 80 x 60, with 4,800 measurement pixels and thermal sensitivity of less than 0.10 degrees C. Minimum focus distance for thermal imagery is 0.15 m (0.49 ft.). Images are displayed on a 3 in., 320 x 240 pixel colour screen.

Flir is a manufacturer of industrial imaging systems based in Wilsonville, Ore. It has a Canadian office in Mississauga, Ont. [www.flir.com](http://www.flir.com)

### LIGHTING

#### LED LUMINAIRES CONSUME LESS ENERGY



NEMA 3R-, 4- and 4X-rated.

Appleton Electric's low-profile Mercmaster LED luminaire consumes 65% less energy than standard HID fixtures, while increasing worker safety when greater clearance levels are required.

The LEDs deliver up to 5,000 lumens of uniformly distributed light to maximize productivity. They suit areas with ceiling heights

up to 15 ft. or where OSHA regulations limit the use of ladders.

The lights, which come in four replaceable globe alternatives (clear glass, clear polycarbonate, diffused polycarbonate and prismatic glass refractor), use the same housings and mounting hoods as Appleton's HID versions.

They're certified for Class I, Div 2 and Zone 2, and Class II, Div 1 & 2 applications, wet and marine outside conditions (NEMA 3R, 4 and 4X) and IP66. Ordinary location models are deployed in wet and marine conditions and other harsh areas such as storage areas and food/beverage processing that aren't subject to hazardous gasses and dusts.

Appleton is a manufacturer of industrial lighting technologies based in Rosemont, Ill. [www.appletonelec.com](http://www.appletonelec.com)

### MATERIAL HANDLING

#### VACUUM IMPROVES BLOW-OFF FUNCTIONS



Integrated valve boosts efficiency.

Piab's piCOMPACT 23 vacuum generator platform has improved blow-off functions, a split unit design, and a self-adhesion control that delivers optimal vacuum generation for material handling applications.

It's stackable, allowing up to four units to share the same manifold and pneumatic connections, such as a common feed pressure and exhaust.

The ejector can be separated from the control unit to provide flexibility where space is limited or to minimize weight carried by robot arms.

An integrated valve boosts efficiency and energy savings to speed up production cycles. It's also used to float suction cups while positioning them in ergonomic lifting aids or to clean them in dusty environments.

Blow-off is automatically

switched off when the vacuum isn't present to deliver additional energy savings. The feature is also compatible with the bi-stable (latching) on/off valves used in systems prone to emergency stops or that handle expensive objects. Self-adhesion control recognizes and eliminates any vacuum created in suction cups when the ejector is not engaged.

Piab is a manufacturer of industrial vacuum technologies based in Taby, Sweden.

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

#### PALLETIZER AUTOMATICALLY RAISES, LOWERS LOADS



Unobstructed access.

The P3 spring level loader from Presto Lifts Inc. makes loading and unloading of 400- to 4,500-lb. loads more efficient.

Heavy-duty springs automatically lower or raise the pallet as weight is added or removed. This maintains the top layer of boxes at an easy to access position. A turntable ring on top of the unit rotates the load so the operator can remain in the same position without having to walk around the pallet.

The compact base allows unobstructed access to loads. All of the P3 spring components fit within the diameter of the turntable ring, so the operator can be close to the unit at any position around the ring.

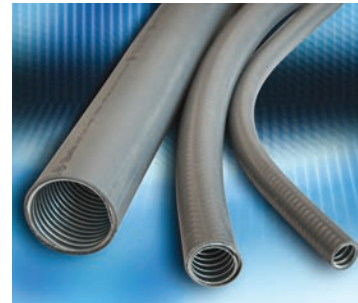
The unit requires no power and is virtually maintenance-free. Fork pockets at the base allow for easy relocation.

Presto, based in Norton, Ma., is a supplier of material handling equipment.

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

### POWER SUPPLY

#### CONDUITS HANDLE WET, OILY CONDITIONS



Flexible inner core.

AutomationDirect's Liquatite liquid-tight, flexible electrical conduits come in steel and non-metallic styles and in 3/8- to 2-in. sizes for motors, lighting, electric signs, elevators and enclosure connections.

The conduits protect against wet and oily conditions and are used in exposed or concealed locations. A flexible inner core is made from a spiral-wound strip of heavy-gauge, corrosion-resistant, hot-dipped galvanized steel.

The Type LA conduit suits dry working temperatures of -30 to 80 degrees C, wet applications of -30 to 60 degrees C and in oily conditions from -30 to 70 degrees C. They come in 25-, 50-, and 100-ft. rolls.

Type ATLA versions handle extreme hot or cold environments. A PVC jacket remains flexible at low temperatures, it's flame retardant and resists aging at elevated temperatures. They're rated for Class I, Div. 2 and Classes II and III hazardous locations.

The flexible inner core is constructed from a spiral-wound strip of heavy gauge, hot-dipped galvanized steel. Type SLA flexible shielded liquid-tight conduit is meant for wiring applications that require the protection of sensitive electronic circuits in communications, radar and data transmission applications.

Automation Direct is a supplier of industrial automation technologies based in Cumming, Ga.

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

**MACHINING**

**TOOLHOLDER GETS A GRIP**

Schunk's TENDO Platinum toolholder delivers precise milling, drilling and reaming capabilities in advanced machining applications.

The toolholder is equipped with improved brazing technology through a unique hardening process that works in the same cycle to deliver rigid and durable tool clamping.



Run out accuracy of less than 0.003 mm.

Vibration dampening and precise run out accuracy is less than 0.003 mm at 2.5 x clamping diameter. The tool works in configuration with the machine spindle and the cutting tool to reduce wear and damage.

Schunk is a manufacturer of clamping tools and gripping systems based in Lauffen am Neckar, Germany. The company has Canadian sales operations in Mississauga, Ont.  
[www.us.schunk.com](http://www.us.schunk.com)

**TRUMATIC 6000 PACKS A PUNCH**



Solid-state laser processing.

Trumpf's Trumatic 6000 fibre punch laser combination machine delivers high-speed solid-state laser processing with punching and forming technology.

The machine rapidly laser cuts, punches, forms and engraves sheet metal up to 0.25 in. thick. A laser output control system boosts quality when cutting deli-

cate curves and tight radii.

A TruDisk 3001 solid-state laser delivers 20 tons of punching force at 1,000 strokes per minute. When cutting galvanized mild and stainless steels, processing speeds are up to six times faster than a CO2 laser at the same power.

The solid-state laser also processes non-ferrous metals, such as copper and brass. The TruDisk laser resonator shares its laser as part of a network to support additional processing operations, such as laser welding.

The smart punch monitoring function determines whether a punch has broken and will stop the machine to notify the operator. The smart load function automatically aligns the sheet on the machine while the smart unload function optimizes the removal process.

Trumpf is a manufacturer of fabricating machinery and industrial lasers based in Ditzingen, Germany. The company has Canadian operations in Mississauga, Ont.

[www.us.trumpf.com](http://www.us.trumpf.com)

**INSERTS DELIVER HIGHER FEED RATES**



Two-sided to double cutting edges.

Walter Tools' double-sided ISO indexable inserts with RP7 geometry deliver maximum process reliability in rough turning applications by combining a ground contact surface with an optimized profile.

A protective chamfer guards against fracturing and chipping. A centre curve for the extra cutting edge adds strength and a deeper chip groove for higher feed rates.

It suits applications such as heavily interrupted cuts or forged parts with variable machining depths and for roughing steel materials.

The inserts' Tiger-tec Silver coating extends tool life. Inserts are two-sided, doubling the number of cutting edges. They come in four basic shapes: CNMG, SNMG, TNMG and WNMG; and in grades WPP10S, WPP20S and WPP30S.

Walter is a manufacturer of metalworking tools based in Waukesha, Wis.

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



Resolution of 1 µA.

**TEST AND MEASUREMENT**

**MEASURING WITHOUT POWERING DOWN**

Leakage current causes unnecessary downtime and intermittent GFCI and RCD tripping of circuits, so quantifying it is an important part of a preventive maintenance program.

Fluke's 368 FC and 369 FC leakage current clamps assist industrial electricians and maintenance technicians identify, document, record, and compare leakage current readings to

prevent problems before they happen, without shutting down critical equipment.

The meters have large diameter jaws (40 mm for the 368 FC; 61 mm for the 369 FC) for work with oversize conductors. The clamp jaws are fully shielded and designed to capture very small leakage current signals (as low as 10 µA) and minimize external electromagnetic interference. They measure complex signals, with a resolution of 1 µA and an upper measurement range of 60 A.

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## PRODUCTS AND EQUIPMENT

A forward-facing LED worklight illuminates dark wiring cabinets, while a backlit display is equipped with auto-off, and auto-power-off for extended battery life.

The meters are part of Fluke's Connect system of more than 40 wireless test tools that communicate via the Fluke Connect app, or Fluke Connect Assets software, which gathers data in a cloud-based system to record and share thermal images and electrical measurements in real-time via smartphone or tablet.

Fluke is a manufacturer of electrical test and measurement equipment based in Everett, Wa. [www.fluke.com](http://www.fluke.com)

### GENERATORS PRECISELY MEASURE PULSES



Single- and dual-channel models.

Saelig Co. Inc.'s TGP3100 pulse generators produce precision pulses from 1 to 50 MHz with width and delay resolutions of 100 psec.

Single and dual channel models have large graphic LCDs for simultaneous text and waveform information.

The TGP3100 uses all-digital techniques, but also acts as a high performance noise generator and as a function/arbitrary generator.

It has a dedicated architecture that delivers higher resolution of pulse width and delay, and asynchronous operation with minimal jitter.

Independently variable rise and fall times are set from 5 to 800 seconds. PWM and PDM (pulse width and pulse delay modulation) are incorporated. The TGP3100 also performs linear and logarithmic sweeps of all waveform types, as well as extensive internal/external modulation of all waveforms (AM, FM, PM, SUM, FSK and BPSK), double pulse, and user-defined pulse patterns.

Waveform frequencies are set with up to 14 digits or 1 MHz of resolution. PRBS sequence patterns are created with lengths between 127 and 8,388,607 bits. Time delay compensated external triggering allows asynchronous pulse generation with variable delay and minimal jitter.

An external width mode allows asynchronous pulse reconstruction. A high drive capability output stage drives 20 Vpk-pk into a 50 Ohm load. The variable output voltage is load-impedance compensated, with a minimum output level of 10 mVpk-pk. Sine waves are available up to 50 MHz, and arbitrary waveforms have 16-bit resolution with an 800 Msample/sec rate.

A USB flash drive interface on the front panel stores results or setups, and the unit is externally controlled via USB and LXI-compliant or LAN interfaces. Waveform Manager Plus for Windows software is included.

Saelig is a supplier of industrial test and measurement equipment based in Rochester, NY. [www.saelig.com](http://www.saelig.com)

### MEASUREMENT SYSTEM TESTS LED-BASED PRODUCTS



Delivers flux, colour and flicker data.

Ophir Photonics's FluxGage LED luminaire measurement system delivers flux, colour and flicker data for evaluating the performance of LED-based products.

The all-in-one photometric test system uses  $2\pi$  geometry, with a spectrometer incorporated for colour measurement of the spectrum, CCT (correlated colour temperature), CRI (colour rendering index), Duv, and chromaticity. There is also a fast photodetector for flicker measurements. No fibres are needed.

FluxGage uses solar panels to

detect light. They're arranged on the inside walls of the measurement cavity and covered with black paint. The light passes through a dense array of clear pinholes, which significantly reduces the reflectance of the solar panels. This allows the system to be only slightly larger than the luminaire source being tested (up to 610 x 450 mm).

Integrated software eases set up and operation with optical data from the light source displayed. The system connects to a computer via USB, and a calibrated, NIST-traceable LED source calibrates in the field.

Ophir Photonics is a manufacturer of industrial test and measurement equipment based in North Logan, Utah. [www.ophiropt.com](http://www.ophiropt.com)

### SMART CHAIN MONITORING MEASURES ELONGATION

The CCM (chain condition monitoring) system from iwis continuously measures elongation and warns the maintenance staff if the chain needs to be replaced.

It's compact and easily integrated into most chain applications with a simple retrofit. Commissioning is plug-and-play without calibration and the contactless measurement does not affect the chain drive performance.

Wear status appears on the LED display in graduations of 0.5% increments or be directed to a laptop interface via USB cable and simple software.

Variable speeds and changeable directions are no problem for the system, which is made of corrosion- and wear-resistant materials. It's IP67 compliant and operates at temperatures from 0 to 70 degrees C. Special



Covers most chain sizes.

designs are available for abrasive applications.

Only one strand of the chain is detected by each device so most chain sizes are covered including Simplex, Duplex and Triplex.

Applications for chains with attachments on both sides, or extended pins require special inspection by iwis.

The iwis Group is a German manufacturer and supplier of precision chain systems for power transmission and conveying applications with a Canadian office in Surrey, BC. [www.iwisusa.com](http://www.iwisusa.com)

### COMPRESSED AIR

### PLUMBING KITS INSTALL EASILY



Lengths from 24 to 108 in.

Stainless steel plumbing kits simplify installation of Exair's Steel Super Air Knife by including all the proper fittings and tube for hooking up to a compressed air supply.

The kits are fully assembled and installed on an air knife at the factory to further enhance productivity.

Air knives 24 in. or longer must be supplied with compressed air at multiple inlets. Plumbing kits eliminate wasted time looking for correct fittings or using undersized supply lines.

The kits include cut to length type 316 stainless steel pipe and fittings in lengths from 24 to 108 in., and handle temperatures up to 472 degrees C.

Exair is a manufacturer of compressed air products based in Cincinnati. [www.exair.com](http://www.exair.com)

**AUTOMATION**

**AN ALTERNATIVE TO PNEUMATIC DRIVES**



*Closed- or open-loop operations.*

Festo's EPCO compact electrical cylinder delivers a cost-effective alternative to pneumatic drives with the advantages of electric drive technology for factory automation applications.

An electrically actuated spindle converts the rotary motion of the motor into a linear motion of the non-rotating, plain bearing-guided piston rod.

The drives, with a running performance of 10,000 km, come fully assembled in 16, 25 and 40 sizes, with a fixed, adapted motor. End position cushioning reduces noise and impact energy during homing. They come with or without an encoder for closed- or open-loop, application-specific operations.

Festo is a manufacturer of industrial automation technology based in Esslingen am Neckar, Germany. It has Canadian operations in Mississauga, Ont.

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

**SOFTWARE MAKES ROBOT COLLABORATION SAFER**



*A range of safety functions.*

The SafeMove2 robot monitoring software from ABB Robotics enables closer collaboration between robots and factory workers by restricting motion to precisely what is needed for a specific application.

Safety functions include speed limits, standstill monitoring, axis ranges and position and orientation supervision.

Next-generation functionality encourages the development of innovative robot applications by integrating safety features directly into the robot controller.

When an operator needs to interact with the robot system, safety sensors incorporated into the robot cell detect the person's presence. Then the controller will either monitor the robot while it's standing still or supervise its speed. Once the person clears the zone, the robot resumes operation.

ABB is a Swiss manufacturer of power and automation technologies with 50 locations across Canada.

[www.abb.com/robotics](http://www.abb.com/robotics)

**POWER CONVERSION**

**CIRCUITS CONTROL HIGH-POWER IGBT MODULES**



*Short circuit protection.*

MicroPower Direct's IGD962-8A hybrid integrated circuit provides the isolated gate drive for controlling high-speed, high-power IGBT modules in applications such as welding systems, solar converters, uninterruptible power supplies (UPS) and automotive/appliance motor drives.

It converts a TTL compatible input signal into a fully isolated +15 V/-10 V gate drive with a peak drive current of 8 A. An internal, high-speed opto-coupler delivers an isolated (3,750 VAC) 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

and adapts to specific application requirements.

The IGD962-8A uses a two-supply drive topology: an external DC/DC sets up the isolated +15 V/-10 V gate drive, while a POL provides input signal voltage (+5 VDC).

The units come in a compact SIP package to minimize required board space and operate in temperatures between -40 to 70 degrees C.

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

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

**SENSORS**

**SENSOR DELIVERS REMOTE PRESSURE MONITORING**

SignalFire Wireless Telemetry's Pressure Scout wireless pressure sensor delivers pressure monitoring and alarm reporting for applications such as well tubing and casing pressure, tank

levels and compressor station status monitoring.

An integrated sensor, wireless node and internal battery provide users with an alternative to conduit-wired or other wireless pressure monitoring products. Data is delivered via Modbus RTU or TCP interface.



*Data via Modbus RTU, TCP.*

It operates in challenging outdoor environments from -40 to 80 degrees C, while sustaining signal strength through terrain, structures, or weather. Class 1, Division 1 certification is pending. An internal battery powers the unit for up to 10 years.

SignalFire is a manufacturer of wireless telemetry products based in Hudson, Mass.

[www.signal-fire.com](http://www.signal-fire.com)

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## PRODUCTS AND EQUIPMENT

### TOOLS

#### CRIMPING TOOLS ARE ERGONOMIC



Four die sets.

The CS10 Crimping Tool Kit from ITC Electrical Components covers the most common applications in any electrical shop. A 10-in. ergonomic ratchet manual crimping tool comes with four different die sets for ferrules 0.5 to 4 mm<sup>2</sup> (22-12AWG), insulated terminals 0.5-6 mm<sup>2</sup> (22-10AWG), insulated disconnect terminals 0.5-6 mm<sup>2</sup> (22-10AWG), and closed end connectors 0.5-6 mm<sup>2</sup> (22-10AWG). Additional die sets are available.

The kit comes in a sturdy plastic box with transparent cover.

ITC Electrical Components, based in Concord, Ont., is a master distributor of electrical components, products, devices and accessories

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

### POWER

#### MVCB REDESIGNED WITH SMALLER FOOTPRINT



Automatic transfer and bypass.

Russelectric has reduced the footprint of its MVCB automatic transfer and bypass/isolation switches by 20% to 50%.

The UL 1008A medium-voltage (5 to 15 kV) switches transfer electrical loads between preferred and alternate power sources through the carefully controlled opening and closing of circuit breakers.

They provide all the functions of an automatic transfer switch plus the ability to bypass power from live source to load in the event the transfer switch becomes disabled. They also isolate and de-energize automatic transfer breakers for maintenance, testing and repair. An operator can easily choose between load-break bypass and no-load-break bypass using a selector switch on the front of the control cubicle.

All functions are controlled by the RPTCS programmable micro-processor-based control system. Switches also meet or exceed stringent IEEE, NEMA and ANSI standards.

Russelectric is a manufacturer of power control technology based in Hingham, Ma.

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

### CONNECTORS

#### MAKE BETTER CONNECTIONS



Reliable ethernet connections.

Binder has expanded its M12 Xcoded product family with new receptacles, cordsets and feed-through connectors that meet CAT6A specifications with data transmission rates up to 10 Gbps.

They're designed for industrial communications and networks, video surveillance and other applications requiring a fast reliable ethernet connection.

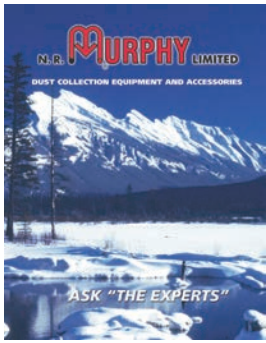
Included are male and female receptacles with dip solder angled contacts for greater versatility when designing panels and mounting the connector to a board; and male to female jumper cords.

There's also a feed-through connector. BinderUSA LP is a German designer and manufacturer of circular connectors and cordsets with US operations in Camarillo, Calif.

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



## POWER WORKHOLDING DEVICES



This 192-page 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, maximum clamping forces, dimensions and more. Available in print and online, either interactive or in PDF. Click CNC Machining at [CarrLaneRoemheld.com](http://CarrLaneRoemheld.com). Carr Lane Roemheld Mfg. Co.

## NEW ITEMS FOR FAST FIXTURING



New this year, Carr Lane Manufacturing's 700-page catalogue provides more efficient tooling products. The catalog includes complete specifications on the CL5 system for 5-axis workholding, the Carr Lock system for fast fixturing, toggle clamps, pins, knobs, ID clamps, and much more. See what's new in the 2017 catalogue edition, including low profile Tiny Vise edge clamps and self-retaining ball plungers. [www.carriane.com](http://www.carriane.com) Carr Lane Mfg. Co.

## PRECISION SPRAY CONTROL FOR COATINGS



Request Bulletin 712B, AutoJet Precision Spray Control Systems for Industrial Coating Applications, from Spraying Systems Co. and learn how to eliminate waste of costly coatings, misting, excessive maintenance downtime and high scrap rates. Ideal for a wide range of coating, moistening and lubricating applications, the bulletin includes case studies and detailed specifications at [www.spray.com](http://www.spray.com). Spraying Systems Co.

## ATN CONVERTIBLE PROFILE TIMING BELT DESIGN



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## EVENTS

### Advanced Manufacturing Canada SME

**Nov. 2-3, Toronto**  
This conference and exhibition covers automation and robotics, additive manufacturing/3D printing, materials and software. Companies will learn how to produce products faster and at lower cost while maintaining quality standards. Visit [www.Advancedmfg.ca](http://www.Advancedmfg.ca).

### MRO 2016: Technical Conference & Workshops

**RATS**  
**Nov. 2-3, Fort Saskatchewan, Alta.**  
Organized by the Rotating And Turbomachinery Society (RATS), this semi-annual event focuses on knowledge, education and career development in rotating equipment optimization. Visit <http://mro.Rotatingspecialist.org>.

### Physical Asset Management Certificate Program

**U of T School of Continuing Studies**  
**Nov. 7-14, Toronto**  
The program, offered in partnership with the Faculty of Applied Science and Engineering, combines fundamental need-to-know material with new, proven, leading-edge approaches to asset management that have shown measurable payoffs. Visit [learn.utoronto.ca](http://learn.utoronto.ca).

### FABTECH 2016

**AWS/SME**  
**Nov. 16-18, Las Vegas**  
North America's largest metal forming, fabricating, welding and finishing event features products, developments and tools for improving productivity. Presented by FMA, SME, PMA, CCAI and AWS. Visit [www.fabtechexpo.com](http://www.fabtechexpo.com).

### IFPE 2017

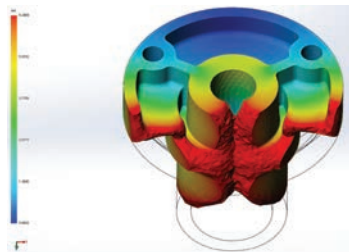
**AEM**  
**March 7-11, 2017, Las Vegas**  
This international exposition and technical conference is dedicated to the integration of fluid power with other technologies for power transmission and motion control applications. Presented by the Association of Equipment Manufacturers and the National Fluid Power Association. Visit [www.ifpe.com](http://www.ifpe.com).

## PLANTWARE

### SOFTWARE EASES MOULD FLOW ANALYSIS

Haydon Kerk Motion Solutions Solid Works Plastic Professional mould flow analysis software produces custom-moulded lead screw and linear motion components.

Mould flow analysis helps engineers run critical calculations to expedite the design of custom part and mould features, such as gate location, parting line location, design geometry, material flow, fibre



Works with 60 materials.

alignment, vent locations, weld-line analysis, and cooling-line locations.

These factors impact design considerations such as ease in part

strength, reduction in part voids, cooling and cycle times, material waste and part warpage.

It works with 60 materials, including the Kerkite composites, PEEK and PPS base materials combined with the capabilities of this new software to allow engineers to reduce required time for the design and build process for custom moulds.

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

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



# Why Canada should avoid free trade with China

BY GWYN MORGAN

Prime Minister Justin Trudeau's trip to China prompted speculation that it was the first step towards a free-trade agreement, but expanding our trade relationship with China is unlikely to give us any significant economic, environmental or human rights leverage.

The basic principle of free trade is clear. Imagine two isolated neighbouring islands engaged in a tariff-free trade relationship. One is green and fertile, capable of producing more food than it can consume. The other, while dry and barren, possesses natural resources needed to manufacture consumer goods. Farmers in the fertile island sell food to the other in return for the raw materials needed to manufacture consumer products. Over time, factories on one island become more efficient at making some products while manufacturers on the other island become more efficient at producing others. The result is consumers get access to the lowest cost supplier, and the benefits are incontrovertible.

But what if one island is a free-market democracy and the other a socialist aristocracy? What if one has a culture of fair dealing enforced by the rule of law through an independent judiciary, while the other has a judiciary that's an apparatchik of government, often acting as an instrument of repression rather than justice?

What if one island respects international intellectual property laws, while the other facilitates industrial espionage and the production of cheap knockoffs? What if one economy is driven by private enterprise, while businesses in the other gain advantage from government loans and subsidies facilitated by corrupt officials?

What if one island has a free and open media, while the other blocks international media and has only state-controlled, regime-friendly media? Or one protects human rights, while the other throws critics in jail for treason?

Finally, what if one island holds industries to strong environmental standards, while citizens in the other choke on smog and drink toxic water? In such circumstances, wouldn't the leader of the first island be extremely unwise to consider entering into free trade with the other?

Of course, the "other" island is China, and there are even more reasons for Canada to stay away from free trade with the great dragon.

What do we have to sell them? Certainly not manufactured goods. There are very few that China can't produce more cheaply. The crux of the Canada-China trade relationship has always been that we send them raw materials and they ship consumer goods

back to us. Since natural resources are globally traded commodities that already move tariff free, free trade would provide no benefit to Canadian resource exporters. On other hand, removing tariffs on manufactured goods would put our manufacturers at even greater disadvantage.

Six years on the board of the largest foreign bank operating in China provided me with insights into why free trade with that country is even more unwise. My stint coincided with China's supercharged gross domestic product growth, which was dominated by what bankers call "capital account" – massive government infrastructure programs and equally massive loans from government banks to underpin the building of every kind of industrial facility and manufacturing plant.

The result is a mega-capacity surplus of industrial facilities such as cement plants and every kind of consumer goods manufacturing plants. That enormous surplus capacity will hang over the global processing and manufacturing sectors for decades.

## A different truth

Then there's the contrast in environmental enforcement. While Beijing touts toughened environmental laws, the truth is starkly different. Despite all the rhetoric about renewable energy from Chinese officials at the recent Paris COP21 global warming conference, China operates over 2,300 coal-fired power plants with almost 1,400 more planned or under construction. That's bad enough, but few of those plants actually meet government emission standards.

Cheap power, subsidized manufacturing plants and huge overcapacity. Who can compete with that?

Finally, there's China's self-serving track record in trade. Just as Trudeau was heading to China came news that, after decades of buying Canadian canola, Chinese officials had suddenly determined that our canola contained unacceptable "impurities." This \$2-billion market is very important to Canadian farmers. Our canola is perfectly fine in other countries, so how could it be unacceptable to China? Could the enormous stockpile of Chinese canola have anything to do with it?

Trudeau should use his exceptional relationship building skills to warm relations with China, but studiously avoid any signals that free trade will ever be part of that relationship.

---

*Gwyn Morgan is the retired founding CEO of EnCana Corp., which produces, transports and markets natural gas, oil and natural gas liquids. Distributed by Calgary-based Troy Media © 2016.*

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

SINCE NATURAL RESOURCES ARE GLOBALLY TRADED COMMODITIES THAT ALREADY MOVE TARIFF FREE, FREE TRADE WOULD PROVIDE NO BENEFIT TO CANADIAN RESOURCE EXPORTERS...



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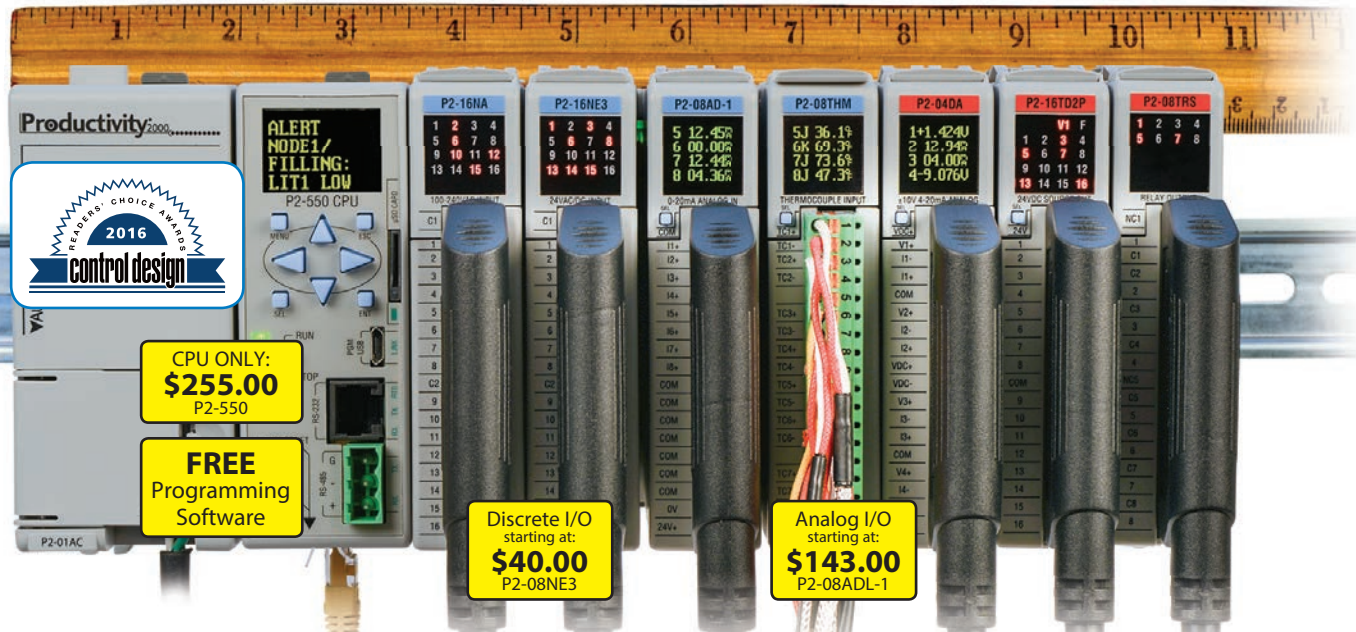


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