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## GLASS CULTURE

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its employees  
for growth

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Lubrication analysis is still a good idea  
Will manufacturers say 'good-bye' to Ontario?  
Jeff Dahn wins gold for lithium-ion advances  
Be aware, beware of the proposed border tax plan

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# Eliminate Canada's interprovincial booze barrier

**O**utwardly we fancy ourselves as free traders, sometimes smugly so, especially these days when we look to the south and sniff disapprovingly at the current US administration's anti-global, protectionist rhetoric.

Except trade isn't entirely free, especially when it comes to protecting our dairy, eggs and poultry via "supply management," a barrier that's often challenged whenever Canada negotiates trade deals with potential global partners.

Inwardly we're not so free either, thanks to a complex web of protections tangling up trade between the provinces. They're about to be untangled for the most part by a new arrangement between the provinces and the federal government that would apply to all goods and services. Well, everything except items on the list of exemptions, plus some rules relating to financial services and alcohol that will be resolved at a "later date."

That still leaves us with the ridiculous impediments to the free flow of alcoholic beverages across provincial boundaries, and the ongoing interference in commerce related to the manufacture of these libations.

Which brings us back to the Gérard Comeau case. He was charged by the RCMP in 2012 and fined \$295 for buying 14 cases of beer and three bottles of liquor in a Quebec border town, then "illegally" transporting them to his home province of New Brunswick. You see, it's a crime to buy more than one bottle of liquor or wine, or the equivalent of 12 pints of beer, from retailers outside of the province.

New Brunswick adds an almost 90% mark-up to the base price of beer, which consumers such as Comeau should rightfully view as the greater crime of robbery. Especially since a 2-4 purchased in Quebec, where beverage producers deal directly with retailers, is roughly \$19 cheaper.

The Fathers of Confederation would not be amused by New Brunswick's behaviour. Section 121 of the Constitution Act specifies, "goods, produce and manufacture should be free into all other provinces."

Comeau fought the charge against him based on Section 121 and won, the province's Appeal Court refused to review the decision and now New Brunswick is taking another swing at the case, this time pleading for a hearing from the country's highest court. The province is suggesting the two decisions hamper government control over interprovincial trade and create "nationwide confusion" around the extent of provincial authority.

There's no confusing the real intent, though. Alcool NB Liquor (ANBL) makes about \$165 million a year from its booze distribution monopoly.

Meanwhile, Alberta has also impeded the flow of beer from outside the province. It moved to tax the suds out of some Ontario outsiders to protect local craft brewers. This created some space in the market as they pulled back. But since Alberta is part of the New West Partnership, BC brewers were exempt and increased their shipments to Alberta. Last year the province decided to tax all beer at the same rate but subsidize the local craft brewers based on the volume of their sales.

The Canadian Constitution Foundation (CCF), which continues to support Comeau's case should it reach the Supreme Court, cites a University of Calgary study that estimated the annual benefits of free trade among the provinces at between \$50 billion and \$130 billion, or \$7,500 per Canadian household. Compare to CETA, adding only \$12 billion per year to GDP (about \$1,000 per household).

"At a minimum, a victory in the Supreme Court should open up Canada's closed provincial alcohol monopolies, making it possible for Quebecers to buy wine directly from BC wineries and Nova Scotians to order craft beers from Ontario," writes the CCF.

Cheers to that. It's time to eliminate the booze barriers. It's easier for some folks to acquire pot, and it's not even legal for recreational use yet.

**Joe Terrett, Editor**

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**Canada**

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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.

### 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.

### 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.

### 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.

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

## 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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[www.exair.com/18/423.htm](http://www.exair.com/18/423.htm)



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

## Blowoff Comparison

Type of blowoff	PSIG	BAR	Comp. Air		Horsepower Required	Sound Level dBA	Purchase Price	Annual Electrical Cost*	Approx. Annual Maintenance Cost	First Year Cost
			SCFM	SLPM						
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	\$594	\$1,417	\$300	\$2,311

\* 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

With oil prices stabilizing, organizations in Alberta and the oil and gas industry are adjusting their salary projections since the summer, according to the **Conference Board of Canada**. It says projections for 2017 base salary increases are in line with those reported in the summer at 2.2%.

**Deloitte** says Canadian companies need to be bolder and that requires strong leadership. To help get them there, the advisory firm has launched a leadership development centre in Toronto. Deloitte University North will bridge real-world experiences and active learning, featuring technology-enabled classrooms, live interpretation services and business leaders in the classroom.

The Government of Canada is investing more than \$50 million in 94 research projects through the **Natural Sciences and Engineering Research Council of Canada's** (NSERC). They'll address challenges in environment and agriculture, information and communications technologies, natural resources and energy, and advanced manufacturing.

The **Workplace Safety and Insurance Board** (WSIB) in Ontario has posted its drug formulas, with interactive search capability at [www.wsib.on.ca](http://www.wsib.on.ca). The drug formularies contain more than 15,000 medications. The WSIB spends approximately \$62 million every year on drug benefits for injured workers.

Aerospace components manufacturer **Dishon Ltd.** is getting funding of up to \$3 million to expand production at its Vaughan facility. The repayable contribution from FedDev Ontario will be invested in new machinery. Up to 60 full-time jobs will be added, nearly doubling the company's workforce.

**Magellan Aerospace** is investing \$28 million to build a 140,000 square-foot plant in Bangalore, India. The facility will produce structural assemblies, fabrications, and machined components. The first phase will employ approximately 120 workers and incorporate 5-axis machining centres. Magellan, based in Mississauga, Ont., expects to break ground in June.

## CAE wins \$200M RCAF contract

Options could raise the value to \$300 million



Artist rendering of the CAE C295W training facility in BC. ILLUSTRATION: CAE

**MONTREAL** — Airbus Defence and Space has awarded CAE a contract for C295W aircrew and maintenance training to support the Royal Canadian Air Force's (RCAF) Fixed-Wing Search and Rescue (FWSAR) program.

The Montreal-based manufacturer of aerospace simulators and provider of training systems said the 11-year, \$200 million contract includes options to extend the deal an additional 15 years that raises the value to more than \$300 million.

The Airbus C295W was selected by the Government of Canada. The French aerospace company will provide 16 aircraft modified for search and rescue.

The facility is to be operational by late 2019 when phase two of the contract will commence with CAE leading a three-year in-service support (ISS) transition period for the C295W.

Phase three follows with the 20-year in-service support phase, which is divided into a base five-year ISS contract with three additional five-year options.

## \$18.2M for Ontario auto parts makers

**TORONTO** — The federal government has earmarked \$18.2 million for two Ontario auto parts manufacturers to finance innovations in lightweight auto components and electric vehicle batteries.

Astrex Inc. of Lakeshore Ont. is receiving a repayable loan of up to \$17 million from FedDev Ontario's Advanced Manufacturing Fund to produce lightweight aluminum auto parts, which can reduce fuel consumption and lower carbon emissions. The company expects to create 62 jobs and an additional 24 over the next two years.

Another \$1.2 million will go to Ottawa-based GBatteries Energy Canada Inc. The funding from Sustainable Development Technology Canada's SD Tech Fund will help the company develop longer lasting batteries for electric cars.

## Ford building \$200M wind tunnel

Simulates airflow conditions up to 320 km/h

**DEARBORN, Mich.** — Ford Motor Co. is building a \$200 million wind tunnel complex at a vehicle test facility in suburban Detroit.

The Allen Park, Mich. site will include a rolling road

aerodynamic wind tunnel and a climate chamber with a temperature range between a blistering 60 or chilling -40 degrees C.

The wind tunnel will simulate airflow con-

ditions at vehicle speeds of up to 320 km/h. Ford said the facility will improve the fuel economy and performance of its vehicles.

Construction is to begin this year.



The facility will include a wind tunnel and a climate chamber. PHOTO: FORD

## MDA's SSL wins space orbiting deal

**VANCOUVER** — MacDonald, Dettwiler and Associates Ltd.'s US business unit SSL has entered an agreement with the US Defense Advanced Research Projects Agency (DARPA) to develop, service and maintain spacecraft and other infrastructure in the geostationary arc (orbit around the Earth).

SSL will provide a spacecraft to carry a robotic servicing payload, and manage integration and operation of the craft.

Financial details were not released. DARPA will contribute robotics technology, expertise, and a government-provided launch.

MDA will add a refuelling capability to the program.

SSL is viewing DARPA's Robotic Servicing of Geosynchronous Satellites (RSGS) program as the foundation of a new business.

When launched, RSGS will perform multiple servicing missions for both planned and urgent needs, including: high-resolution inspection; refuelling; correction of mechanical anomalies; assistance with relocation and other orbital manoeuvres; and installation of attachable payloads, enabling upgrades to existing assets.

The company said it's already in discussions with several key customers.

## Outlook 2017 draw winner!

Survey's Best Buy gift card prize goes to ...

Congratulations to Luis Graca, winner of a \$1,000 Best Buy gift card. He was selected from a random draw of respondents who participated in **PLANT's** *Manufacturers' Outlook 2017* survey.

Graca, a product manager (gantry robots) at Cimcorp Automation Ltd. in Grimsby, Ont., was one of 526 managers and executives who provided an overview of how they see business shaping up for the year.

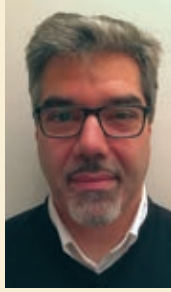
"I was glad to participate in the survey and to see in the report how our outlook compares to that of other Canadian manufacturing companies," said Graca.

And what will be his Best Buy?

"I have a passion for photography so a brand new DSLR camera is definitely something that is high on my list," he said.

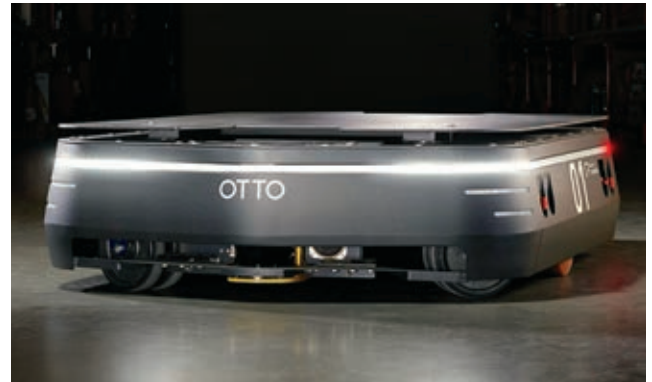
Watch for the 2018 Outlook survey during the summer. You too could be a winner by participating in this important, annual research project.

Download a copy of the **PLANT's** *Manufacturers' Outlook 2017* report at [www.plant.ca](http://www.plant.ca). Look for the widget near the bottom of the page.



## Toyota taps OTTO for US plant

Vehicles will deliver tires to assembly line



The OTTO 1500 has a 1,500-kilogram capacity.

PHOTO: OTTO MOTORS

**KITCHENER, Ont.** — Clearpath Robotics' self-driving vehicles have made their way to a Toyota Motor Corp. manufacturing plant in the southern US.

The company's subsidiary, Otto Motors, reports one of its autonomous vehicles will deliver tires to assembly workers at the automaker's Corolla plant in Blue Springs, Miss.

The Otto 1500, a knee-high palette-moving robot capable of handling up to 1,500 kilograms, will act as the final leg of an automated system, after other machinery unstacks the tires and loads them onto conveyors.

Otto's vehicles use LiDAR sensors to see their environments and incorporate obstacle avoidance.

## Wanted: stronger personal info protection

**GATINEAU, Que.** — A report commissioned by the Office of the Privacy Commissioner of Canada says Canadians want tougher privacy laws and for governments and private sector organizations to be more up-front about their collection and use of personal data.

The survey of 1,500 found a majority of Canadians would support amendments to the Privacy Act, which covers personal information handling practices of federal institutions.

The act has gone largely unchanged since it was introduced in 1983.

Key findings include the following:

- 78% of respondents broadly support requiring government institutions to properly safeguard the personal information they collect;
- 71% support the Privacy Act being expanded to the Prime Minister's

cabinet ministers' offices;

- 69% support granting the privacy commissioner order-making power to enforce recommendations made following an investigation; and

- 66% say government institutions should be required to take steps to assess the privacy risks of any new program or law.

On business transactions, Canadians support measures that give them more control over personal information collected online. Eighty-eight per cent say websites must seek consent for targeted advertising, while 70% say they'd be more likely to do business with companies if they were subject to financial penalties for misusing personal information.

More than half took their business elsewhere over concerns about a company's privacy practices.

## Canadian manufacturing strong in Mexico: report

**VANCOUVER** — The current US administration may not find trade with Mexico all that rewarding, but there are opportunities for three Canadian industries that have the innovative products, demand and capacity to take advantage of them.

A report from HSBC Bank Canada and the Conference Board of Canada found that despite Mexico's clear cost advantage, primary metal, chemical, and machinery manufacturing are poised for success there.

*Reaching Out for Business Opportunities in Mexico* notes that with

economic growth bound to slow in Canada due to its aging population, the Mexican economy is poised for robust growth fuelled by favourable demographics and targeted structural reforms.

Despite a significant trade deficit, Canadian merchandise exports to Mexico posted a 30% increase since 2010, reaching \$6.5 billion in 2015. The report foresees increased demand for Canadian industrial goods, including auto parts, machinery, plastics, and rubber, as well as primary and fabricated metals.

## General Dynamics wins \$404M LAV fleet upgrade deal

Contract amends a \$1 billion 2011 agreement



General Dynamics Land Systems Canada's LAV III light armoured vehicle.

PHOTO: GDLS

**LONDON, Ont.** — The Canadian Armed Forces has tapped General Dynamics Lands Systems Canada to upgrade its fleet of light armoured vehicles.

The deal is worth \$404 million and the work will be completed at the company's London, Ont. facility.

The contract amends a \$1 billion agreement from 2011 between the federal government and General Dynamics, expanding the scope of the work to include chassis upgrades for 141 LAV III infantry carriers. The original deal was only for upgrades to the vehicles' turrets. The additional hull work will improve the vehicle's mobility, protection and information management.

General Dynamics has more than 2,000 workers in the London area, about 250 of which work on the LAV upgrades.

The new contract and original deal are designed to extend the life of the Canadian light vehicle fleet until 2035.

## CAREERS



**Jerry Chenkin**, president and CEO of Honda Canada, is retiring. Dave Gardner takes over the position, moving up from senior vice-president, operations and risk management officer. Chenkin, named president and CEO in 2013, has been with Honda since 1975 after immigrating to Canada from the UK. He has overseen manufacturing investments totalling \$1.3 billion at the company's Canadian operations.

Canadian Pacific Railway Ltd. has named **Keith Creel** president and CEO, becoming the 17th person to lead the company since 1881.

He came to CP in 2013 as president and COO, joining the board of directors in 2015. He was previously the executive vice-president and COO of Canadian National Railway Co.



Keith Creel

HARTING Canada has a new head of Canadian sales. **Carl Maalouf** joins the company after eight years in industry focusing on technical sales and key account management. He will be responsible for expanding the connector manufacturer's presence in the Canadian market.

The Supply Chain Management Association (SCMA) has appointed **Christian Alan Buhagiar** as president and CEO. He comes to SCMA from the Institute of Corporate Directors, where he was vice-president of education.

ATS Automation has a new CEO. **Andrew Hider** joins the Cambridge, Ont.-based manufacturer from Taylor Made Group, where he was the president and CEO of the marine, transportation and construction products manufacturer. He replaces **Anthony Caputo** who stepped down from the board of directors in February after nine years.

## Bombardier loan creates economic distortions: MEI

**MONTREAL** — The Montreal Economic Institute (MEI) says corporate subsidies like the \$372.5-million federal government loan to Bombardier creates major distortions in the economy.

The loan, announced Feb. 8, will support the aerospace company's C Series program and development of the Global 7000 business jet.

The not-for-profit research and educational organization notes the Quebec government already gave the company US\$1 billion in October 2015 to develop and market its C Series jets. Since 1966, the company has received more than \$4 billion in public funds.

"It is taxpayers who involuntarily become investors," said Mathieu Bédard, an economist at MEI. "They are forced to wager their money on the more or less likely success of risky subsidized projects chosen by politicians and bureaucrats for political reasons rather than economic ones."

He said loans and loan guarantees offered by governments include preferential rates and conditions not offered by private financial institutions, which means they consider the loan too risky.

"Taxpayers have been generous enough. It's time to think about completely eliminating corporate subsidies so that the most successful and the most innovating would distinguish themselves, instead of those chosen by government," added Bédard.

## CBSA launches silicon metal pricing investigation

**OTTAWA** — The Canada Border Services Agency (CBSA) is investigating possible unfair pricing of silicon metal originating or exported from several countries following a complaint from a Quebec manufacturer.

Countries being investigated for selling at unfair prices in Canada are Brazil, Kazakhstan, Laos, Malaysia, Norway and Thailand. The CBSA is also investigating whether or not the silicon is subsidized by Brazil, Kazakhstan, Malaysia, Norway and Thailand.

Silicon metal is used by primary and secondary aluminum producers as an alloying agent and by the chemical industry to produce a family of silicone chemicals.

Quebec Silicon, a subsidiary of majority owner Globe Specialty Metals Inc. and its joint venture partner Dow Corning Corp, filed the complaint.

The company produces 47,000 tonnes of chemical, solar and electronics grades of silicon annually at its plant in Becancour, Que.

Quebec Silicon is claiming price undercutting is costing it revenue and market share, which is resulting in reduced production and employment.

The Canadian International Trade Tribunal (CITT) will begin a preliminary inquiry to determine whether the imports are harming the Canadian producers and will issue a decision by April 21.

CBSA will investigate whether the imports are being sold in Canada at unfair and/or subsidized prices, and will make preliminary decisions by May 23.

## Bridor invests \$40M in Boucherville plant

**MONTREAL** — Bridor is investing \$40 million to double the size of its Boucherville, Que. baking facility where it makes bread and Viennese pastries.

The expansion will increase the plant's production capacity by 80% and create up to 60 jobs.

The company, owned by Le Duff Group, said expanding the Boucherville plant will broaden its range of products. Several new jobs will go to operators responsible for state of the art production lines.

The \$40 million dedicated to the Boucherville project is part of a global investment of \$563 million over five years initiated by Le Duff, a French restaurant conglomerate, in its French and North American operations.

Bridor has an inhouse R&D department and more than 700 employees at four North American plants, 500 of them in Canada.

## Fanshawe scores Siemens PLM software

For student coursework, research and other activities



Siemens Canada, Longterm Technology Services staff with Fanshawe staff and students.

PHOTO: FANSHAWE

**LONDON, Ont.** — Fanshawe College's engineering students will have access to the same sophisticated PLM software businesses use thanks to Siemens Canada.

The global industrial technology company is providing the London, Ont. college with \$248 million worth of its Siemens PLM software, which includes NX for computer-aided design, manufacturing and engineering.

The software is used by many industries including automotive, aerospace, machinery, medical devices, shipbuilding and electronics.

London-based Longterm Technology Services Inc., a Siemens Channel Partner, worked closely with Fanshawe and Siemens on this grant.





# Calgary Show 2017 Expo & Conference

April 19 & 20, 2017 | Stampede Park, Calgary, AB

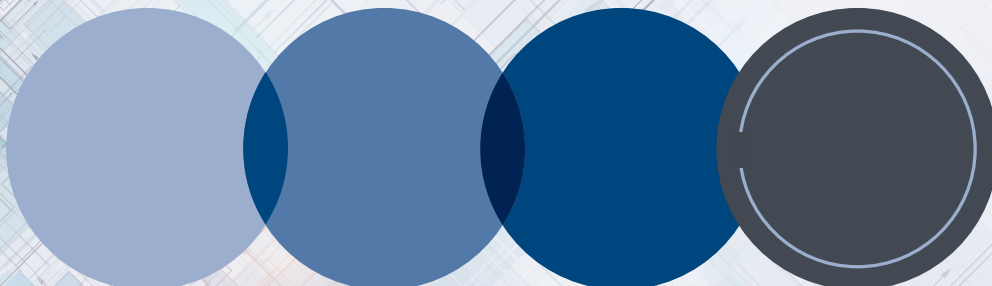
A photograph of an industrial automation environment. A red robotic arm is positioned over a workpiece, with bright sparks emanating from the point of contact, suggesting a welding or grinding process. The background is filled with various mechanical components and machinery, all under a blue-tinted lighting.

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## Clearwater invests \$5M in Arctic surf clams

Processing capacity gets a boost, full time and seasonal jobs added



Processing clams.

PHOTO: CLEARWATER

**HALIFAX** — Clearwater Seafoods Inc. is investing more than \$5 million in its Arctic surf clam fishery, adding processing capacity and jobs in Nova Scotia and Newfoundland.

The seafood harvesting and processing company based in Bedford, NS is broadening its export markets in Europe where sushi consumption is growing rapidly.

The clams are popular in Japan, China and South Korea.

The investment includes \$2 million to add clam processing capacity at Clearwater's Highland Fisheries facility in Glace Bay, NS. A seasonal crab plant in Cape Breton will be turned into a year-round processing operation, providing full time jobs for 36 people and additional seasonal employment during the crab season.

A \$3.6 million investment will also be made to increase grading and processing, improve infrastructure and expand production of additional products.

## Northern gets \$130K in IRAP funding

**WHITEHORSE, Yukon** — Northern Windows and Doors is getting a \$130,345 boost from the National Research Council of Canada to improve its manufacturing process.

The company, based in Whitehorse, Yukon, makes energy-efficient windows, doors and commercial aluminum glazing systems for markets across Canada's north and Alaska.

The funding, through NRC's IRAP program, will support the implementation of automation technologies and lean process improvement, while consolidating production.

The company is a division of the RAB Energy Group.

## Canam to supply steel for Highway 407 overpasses

**SAINT-GEORGES, Que.** — Canam Group Inc. will supply steel for two new Ontario overpasses along Highway 407.

The first phase of the eastern extension of the Toronto-area toll highway opened last year and the second phase will eventually stretch the roadway all the way to Highway 35/115, east of Clarington, Ont.

The Saint-Georges, Que.-based company will also supply and erect the steel for two additional 407 East overpasses in Oshawa, Ont.

Components will be made at Quebec City plant beginning in March. Deliveries will start in August.

Financial details were not released.

## Cascades invests \$6.1M for biomass boilers

**TÉMISCOUATA-SUR-LE-LAC, Que.** — Packaging manufacturer Cascades and the Quebec government have announced two biomass projects to be implemented at the company's Cabano plant.

Cascades will modify two residual forest biomass boilers, upgrading one of the units with automated controls.

The other will be fitted with a new combustion chamber and combustion air preheater.

Cascades will invest \$6.1 million,

and the Quebec government will contribute \$5.2 million for the two projects.

This will improve the plant's boiler operating time and efficiency. Use of another boiler that consumes heavy-fuel oil will be limited.

The Quebec's government contribution to the project is part of its 2030 Energy Policy, an initiative that aims to increase total renewable energy output by 25% and bioenergy production 50% by 2030.

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## NAFTA's benefits

NA trade has tripled since 1994

As Canada, Mexico and the US discuss the future of the North American Free Trade Agreement (NAFTA), a Scotiabank Economics report tallies the factors that show the agreement has been a success over the 23 years since it was signed.

"In net terms, NAFTA has created jobs across all three member countries," said Jean-François Perrault, senior vice-president and chief economist at Scotiabank. "The integration of supply chains across NAFTA's countries has helped realize otherwise unattainable economies of scale and efficiencies that have made North American industry more globally competitive."

Here are some highlights from the NAFTA report:

- North American trade has more than tripled since NAFTA's 1994 inception.
- The agreement has ensured that North America has remained competitive in the race to attract capital and retain jobs. Millions of North Americans in every region now depend on NAFTA trade for their livelihood.
- Don't blame the trade deal for de-industrialization: blame technology, which has cut manufacturing jobs around the world. Manufacturing's share of US GDP has been stable for decades.
- US energy and resource imports – not manufacturing or services – drive the ongoing US trade deficit with the NAFTA partners.
- Cross-border investment within North America has undergone massive expansion. Trade and production integration sustained investment flows that might otherwise have gone to emerging economies.
- Canada and Mexico are the top two export destinations for US small and medium-size enterprises. In recent years, more than 125,000 US SMEs sold goods and services to NAFTA partners.

And here are some statistics from Export Development Canada that show annual gains from NAFTA between 1993 and 2016:

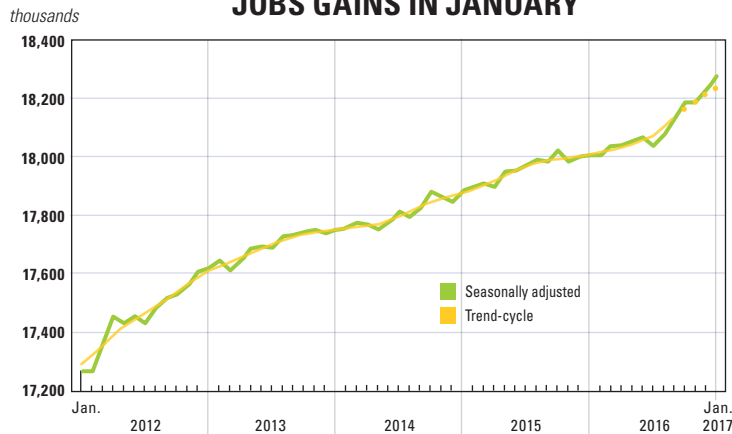
- Canadian exports to the US rose an average of 4.5%, and 9.9% to Mexico.
- US exports to Canada rose 4.5%, and 7.3% to Mexico.
- Mexican exports to Canada rose 9.9%, and 8.6% to the US.

The Scotiabank Economics report concludes updating NAFTA offers a win-win-win opportunity for the US, Canada, and Mexico. Looking ahead a few decades, the focus may very well shift from preserving access to the mature US market to serving Mexico's growing middle class.

# PLANT PULSE

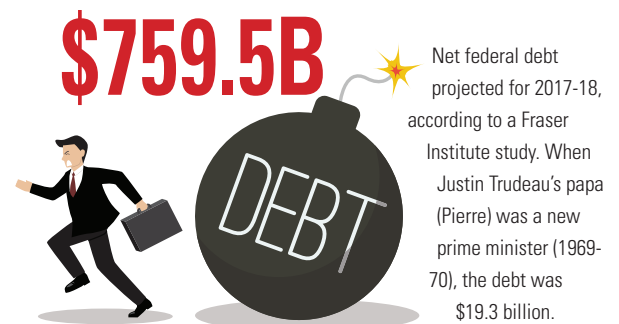
## ECONOMIC DEVELOPMENTS AND TRENDS

### JOB GAINS IN JANUARY



Source(s): CANSIM table 282-0087

Employment rose 3% (48,000 jobs) in January, with most of the gains coming from the service sector. Statistics Canada reports manufacturing flatlined at 0% for the month and was down 2.2% year-over-year. The unemployment rate fell by 0.1 percentage point to 6.8%. Following a significant increase in December, full-time employment held steady in January. It was up by 86,000 jobs (0.6%) year-over-year. Part-time employment is growing. It was at 19.6% in January compared to 18.8% the same month a year earlier.



## \$8.9B to \$50B

What could be Canada's annual tax gap (the difference between what should be collected and what is collected). Because the federal government hasn't conducted a comprehensive assessment to determine the amount of the shortfall, the



Conference Board of Canada has applied estimates from other countries to come up with this range. Components of the gap include: deliberately ignoring a specific part of a law to evade taxes; complying with the letter of a law, but contravening its spirit and intent; mistakes made by tax filers; and nonpayment of assessed tax liability.

# AGNORA'S GLASS CULTURE

## BUILDING SUCCESS BY ENGAGING EMPLOYEES

The focus is on employee well-being to eliminate traditional problems related to absenteeism and skills shortages.

BY MATT POWELL,  
ASSOCIATE EDITOR

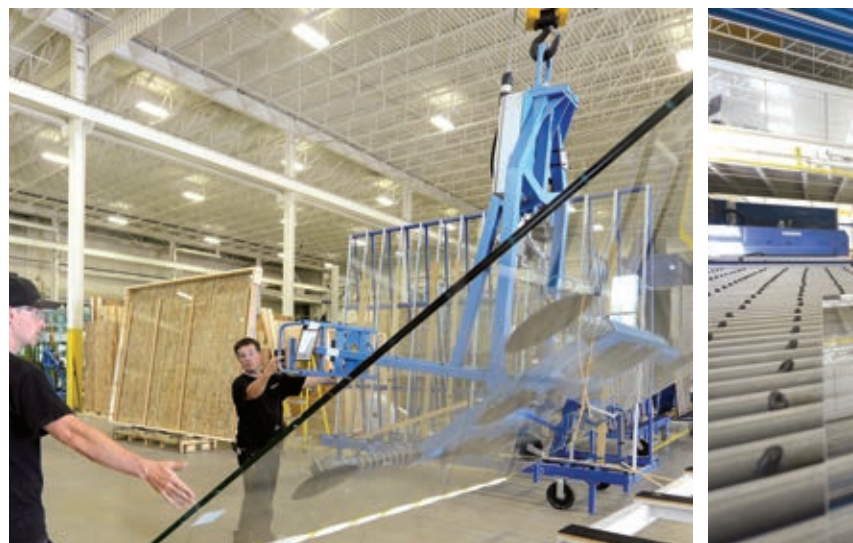
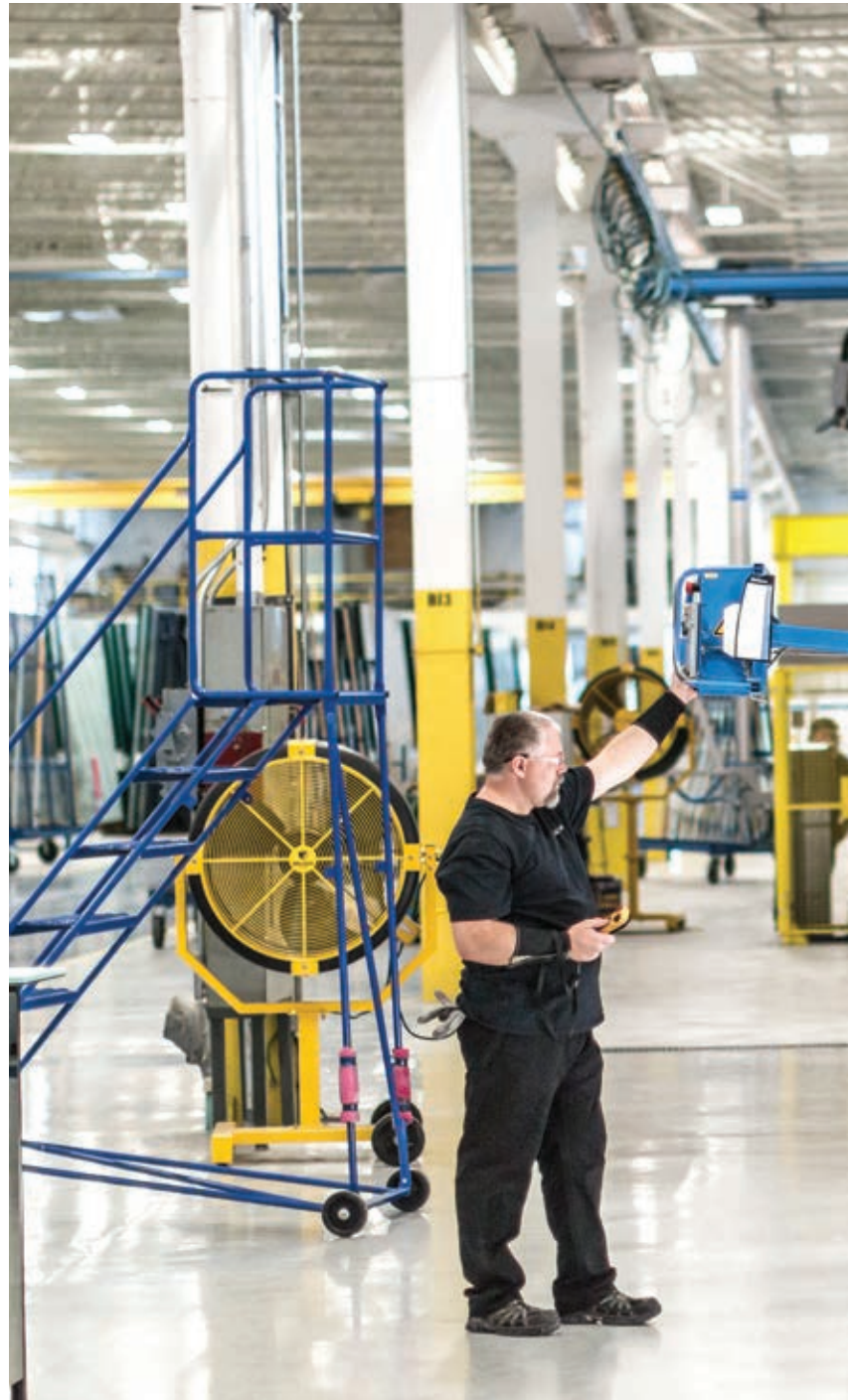
It's been almost six years since Richard Wilson and then-business partner Gord Tozer finalized a deal to save a Collingwood, Ont. architectural glass plant that had fallen into receivership. How things have changed since that day in May 2011.

Now the plant, formerly known as Barber Glass, is humming along as a major supplier of architectural glass to customers around the world, including major clients such as Apple, Microsoft, Dolce & Gabbana and Burberry. It produces large-scale, custom pieces measuring up to 130 inches wide by 300 inches long. Some are nothing short of spectacular. And much of this success is directly at-

tributed to a deliberate strategy to create and sustain a positive and engaged workforce.

When Wilson purchased the plant in 2011 and renamed the company AGNORA Architectural Glass North America, it had six employees. Tozer has since sold his shares back to Wilson, but the company has undergone a rapid expansion – now employing 75 people, increasing sales by 50% and adding new equipment and processes, including a digital printer capable of putting a picture on a piece of glass as big as 283 by 130 inches. Its products are used as walls, stairs and other building elements. The glass installed in US airport control towers? AGNORA made those in Collingwood, thanks to a con-

*(L-R) AGNORA's James Burns and Chris Huggins inspect a large piece of glass, preparing it for shipping; Curtis Appleton loads glass on AGNORA's line to a cleaning station; Ryan Kober moves glass from the production line to a cleaning station.*





Lee Wilson uses a crane to unload a large piece of glass for inspection.

PHOTOS: BOHDAN CHREPTAK

tract with the Federal Aviation Administration.

“We’re a manufacturer in Collingwood, which was a dying manufacturing area and I’d like to think we helped bring it back,” says Wilson. “We’re differentiating ourselves by not making a commodity product, something that could be produced in a place like China, but instead delivering a useful and wanted product.”

AGNORA’s story is a bright spot for industry in an Ontario town where a strong manufacturing base was eroded through the 1980s and 1990s. Once a shipbuilding hub with automotive, booze and other industry players – there was even a Volvo plant at one point – it’s better known for ski hills, fancy chalets and an annual Elvis Presley festival.

Wilson is adding to the shine. He has been identified as one of the glass and glazing industry’s most influential people by *US Glass*. But he’s also aware that AGNORA’s success wouldn’t be possible without the strength and dedication of its people – the plant workers who shuttle massive pieces of glass around the facility, the administration staff and his executive team. And he has a unique way of operating as a customer service company rather than a commodity business. Wilson sees AGNORA, which exports more than 80% of its production to the US, as a custom builder, so the business model has to be different.

“Customer service is the most important thing for any company, no matter the industry,” says Wilson. “Customers will always be there to support you. Anyone can go out and buy the best technology, but if you don’t have



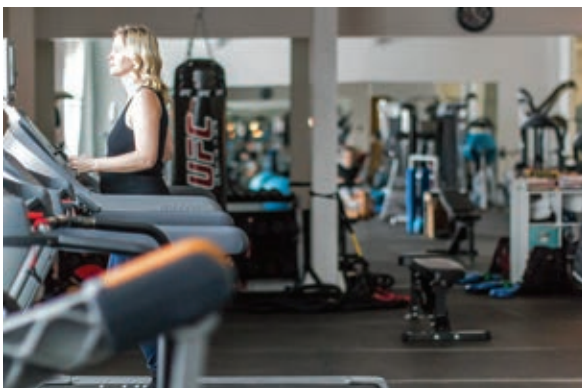


Richard Wilson's employee-first approach has made AGNORA a bit of an anomaly.

PHOTOS: BOHDAN CHREPTAK

“Skills are something you can train for. A positive attitude and being a good person aren’t trainable traits...”

ees feeling any aches and pains. A physician comes by the plant regularly to conduct check-ups. There’s a fully-equipped gym for employees who would like to get a sweat going, and there’s a yoga studio for workers needing a good stretch. A wallyball (combines volleyball and handball) gym encourages some playful trash-talk on the plant floor during a regular Friday afternoon game. A personal trainer is available on-site to provide fitness guidance, and cruiser bikes are there for anyone needing to run a lunchtime errand in town, or just to take a quick rip around the plant and get some fresh air.



Anne Smith works out in AGNORA's gym.



Jesse Humphrys, Evan Hawton, Cathy Haws and Mark Ralston.

the skill set to take care of your customers, you’re not going to be successful.”

Doing this requires an acute focus on creating a culture where employees love to work in a great environment.

“We’ve invested in state of the art equipment, the best we can buy, but it’s the level of engagement our employees have with their work that makes us so

successful,” says Wilson.

That approach extends to the company’s hiring practices, which are directed at fit instead of skillset, then training “everyone to do their job.” New hires shadow experienced workers for three months, and the mentor then reports back to management on the new hire’s fit.

“Skills are something you can train for. A positive attitude and

being a good person aren’t trainable traits,” says Wilson.

The practice also empowers workers, giving them a say in who they work with everyday.

In this culture, there’s a significant reduction in absenteeism because part of a the commitment to its employees is a dedication to health and wellness. The company has hired a full time masseuse for employ-

“The emphasis we’re placing on health and wellness reduces problems like absenteeism and workplace injuries. These are all things that traditional manufacturers see as a problem. We don’t have any of these issues because we’re dealing with them at the source; providing our employees to take care of anything right away,” says Wilson.

This non-traditional, employee first approach has made



*Cody Calahan sets stainless steel spacers on an insulated glass unit.*

PHOTO: AGNORA

AGNORA a bit of a manufacturing anomaly, where in traditional industrial environment, workers come to work, are paid fairly, contribute to a pension or retirement program and then retire. But engagement isn't always the focus. AGNORA is demonstrating that a commitment to employee engagement and well-being, both physical and mental, delivers competitive advantages related to quality, and fewer staffing issues, while cultivating a positive-attitude culture where people are part of a family, taking pride in what they do.

These commitments impressed Lynne Zulian, a tax partner at Grant Thornton Canada LLP in Barrie, Ont. She was tasked with delivering AGNORA's prize for its win at the 2016 Grant Thornton Private Business Growth Awards in November. AGNORA's other

accolades include a place among "Canada's 10 Most Admired Cultures," which is compiled by Waterstone Human Capital, and being named to Canada's Top 100 Small and Medium Employers list by MediaCorp Canada, which recognizes enterprises that have the country's best workplaces and forward-thinking human resources policies.

"Everybody loves their job – you can tell those employees really enjoy being there," says Zulian of AGNORA's employees following her tour.

She recalls asking Wilson how he figured out how to get it right. His response: "I just made it a place I would want to come to work."

Wilson is also known for touring the plant floor, randomly calling out to employees: "Do you love your job?"

The answer is always a resounding "Yes!"

"He's trying to find people who are going to be engaged with what they're doing, and in my experience that's how you find great people," adds Zulian. "You can work with someone who has great skill, but if they don't fit your culture, one bad apple can ruin the entire bushel."

She has noted a shift among a number of manufacturers in the Barrie area. More companies are focused on culture and gathering feedback from their employees while encouraging discussion and implementing rewards programs. It's all about creating employee ownership in the company's success.

"Twenty years ago, manufacturing was all about output. Slowly but surely, there is more of a culture shift, and I believe more companies, particularly manufacturers, are going to end up like AGNORA – that's what is so unique about what [Wilson]

has done," says Zulian.

While these practices have worked well for AGNORA, Wilson admits the company's focus on customer service and custom fabrication force it to consider a metric, such as efficiency, a little differently.

"We can't base everything we're doing on throughput, by the minute like a traditional manufacturer. That means sometimes we're not efficient," says Wilson. "We have to base everything on quality; that we're making sure we meet our commitments. You can spend so much money securing a customer – we work to make sure we don't lose them."

This strategy is working. AGNORA is making glass and kicking ass one spectacular project at a time.

**Comments?**

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

## HUMAN RESOURCES

Young people looking for a way out of dead-end employment represent the next generation of skilled workers.

BY REBECCA HEANEY

There is a shortage of skilled and knowledgeable workers in manufacturing and many companies are targeting youth to fill the gaps. But they're discovering that searching for young applicants by focusing on education and experience is not generating the number of needed candidates. And traditional methods don't prevent successful applicants from leaving to work elsewhere once their training is complete.

As employers seek motivated young people to lay the foundation for the next generation of skilled workers, many young Canadians struggle with "precarious work" – non-standard employment that's poorly paid, insecure, unprotected and doesn't support a household.

According to Statistics Canada, 13.7% of men and women between 15 and 24 were unemployed in 2013, while the Canadian Labour Congress estimates 27.7% are underemployed. Unemployment, underemployment and precarious work go hand-in-hand, trapping young people in a never-ending cycle of uncertainty and dissatisfaction.

To address the gap between youth lacking relevant work experience and the growing number of open skilled positions, the Ontario Manufacturing Learning Consortium (OMLC) applied a different approach to fill positions. It relied on strict screening criteria to identify young individuals with the motivation, abilities and aptitude (rather than experience) that predict success in a skilled role (such as CNC machinist), and a program that offers in-class training, certification, plus on-the-job training.

The OMLC, a non-profit that collaborates with industry



Manufacturing provides unemployed, under-employed youth with opportunities for careers.

PHOTO: FOTOLIA

# Youth UNDER-EMPLOYMENT

## AN OPPORTUNITY TO FILL YOUR SKILLS GAPS

on training, needed to attract enough youth to the program to produce successful candidates, so it partnered with Northstar Research Partners to survey youth and discover specifics about skilled positions that would draw youth to the program and ultimately to manufacturing.

### Careers, not jobs

Of the many factors important to youth, here are the top ones:

#### **Good pay.** Not a surprise.

Unemployed and underemployed youth have few opportunities to find and keep high-paying jobs.

#### **Job security and stability.**

Everything else is irrelevant if young people believe they could be laid off or let go at any time.

#### **Interest and engagement.**

Enjoying what you do and being engaged is motivating. While most young people don't expect to feel passionate about their work, nearly all hope to have at least a general interest in the work they do.

**Opportunity for growth and advancement.** Most young people want some assurance

that if they do a good job, there will be opportunities to advance. They also want to learn, accomplish something and make a difference.

#### **Training and mentorship.**

Many want training to develop a skill and improve at their jobs. Access to training would engender belief that an employer considers them to be worth the investment.

**Responsibility and accountability.** This links to advancement, pay, trust, respect and improved self-esteem.

Young people want careers, not jobs. Manufacturing is uniquely suited to transfer precarious workers to a skilled, motivated and reliable workforce.

Many unemployed and underemployed typically lack skills, natural aptitude, connections or opportunities to pursue careers in many fields, particularly "white collar" professions. But they enjoy working with their hands and learn by watching others, making them well suited to learn through apprenticeship programs and hands-on training.

Working independently and roles that require problem solving and doing different tasks every day appeal to youth. Many roles offer opportunities for advancement as experience and skills grow, while demand for skilled workers suggests employees are less likely to be laid off.

The research suggests a career involving a skilled position in manufacturing inspires young people and is life changing. Given the opportunity, they will rebuild the motivated, committed and lasting workforce manufacturing (and country) so desperately needs.

*Rebecca Heaney is senior research associate at Northstar Research Partners Inc., a global insights firm with offices in Toronto. E-mail rheaney@northstarhub.com. The research, funded by the Government of Ontario, was managed and sponsored by the Canadian Manufacturers & Exporters for the OMLC.*

#### **Comments?**

**E-mail jterrett@plant.ca.**



## HR STRATEGIES

Focus on strong human resources backed up with employment practices and liability insurance.

BY STEPHEN SHORE

Increasing regulation and heightened employee awareness of workplace rights has exposed manufacturers to an explosion of liabilities related to recruitment, employment contracts, human rights, employment standards, class action, privacy, wrongful dismissal, pay equity, workplace compensation, occupational health and safety and labour relations.

The most effective way to minimize risk is through tailored, effective employment agreements combined with policies and practices implemented by top-notch human resources professionals. But they can't eliminate risks, nor is there any guarantee a current, former or prospective employee will not launch a claim that requires a response from the employer. To help further reduce the financial risk, consider employment practices liability (EPL) insurance.

**What types of claims are covered?** As a general rule, coverage includes legal costs and damages arising from an employment-related claim for ha-



# Workers have RIGHTS

## HOW TO REDUCE RISKS POSED BY POTENTIAL LIABILITIES

arrassment, wrongful termination, breach of contract and vicarious liability. Negligent pension or benefits administration may also be covered under a more comprehensive plan; however, union issues or regulatory proceedings relating to occupational health and safety are not typically

covered.

**What costs are covered?** Generally, an EPL policy covers damage awards as well as the legal costs incurred or owing to another party. It's possible to purchase insurance for legal costs only (not damages), which may provide leverage to

*An EPL policy typically covers damage awards and legal costs of the other party.*

PHOTO: THINKSTOCK

withstand pressure to settle for "business reasons."

**Who's covered?** Coverage may extend to the actions of an insured individual or to a proceeding in which an organization is implicated either directly or through the action of an employee (vicarious liability).

**Who makes key decisions?** The insurer – as the ultimate payer of a claim – retains the right to steer the response. This includes deciding which counsel to appoint, what investigations to conduct and whether to litigate or settle. Some policies allow the insured to select counsel from a pre-approved roster or to recommend counsel for approval.

**When does EPL make sense?** An organization with a high frequency of employment-related claims, whether it's because of industry norms, size or peculiarities related to the business model, may consider EPL a good investment to help defray the costs associated with claims management. A smaller organization may look to EPL as a hedge against the risk of a complex or expensive claim that can cause unsustainable damage (class action or large

## HIRING

### Trouble adapting to change?

Technology cited as a top challenge

Canadian human resources executives are concerned about the capacity of their organizations to adapt to the rapid pace of change driven by global market forces and accelerating technology advances.

The Conference Board of Canada polled 150 human resources executives for its fourth trends and metrics survey, and they see business models and strategies being revamped.

The Ottawa-based research firm's study shows 26% of respondents regard the impact of technological change as a top organizational challenge, up from only 4% in 2005.

Leadership capacity is also a concern. Retirements are peaking just as organizations transition to a digital economy, and 60% find mission-critical skills is an ongoing challenge.

Efforts focused on employee engagement seem to be paying off. Retention of employees with critical skills is strong with an annual voluntary attrition rate of less than 2%.

About half of the organizations are bringing in youth. Internships and co-op placements grew 10% since the last survey.

Digital and web-based tools are replacing standard approaches to services such as recruiting. LinkedIn has become the "new standard" for finding candidates, while Twitter and Snapchat are emerging

as viable recruiting avenues.

Digitally-driven technologies are expected to lead to productivity improvements, while



*Digital and web-based tools are replacing traditional recruitment methods.*

ILLUSTRATION: THINKSTOCK

reducing the number of manual tasks and positions. Scientific and technical services workers will benefit most, but low- to mid-skill positions outside of the service industries will likely be most impacted.

And more than one quarter of survey participants cited the changing nature of work as a

top challenge last year, compared to only 4% in 2005. Priorities for most companies over

the next three to five years will be developing managers and leaders, strategic workforce planning, and deepening the succession planning pool beyond the executive level.

wrongful dismissal). A company with relatively few internal resources or where there's a high ratio of front-line to managerial staff may not be sufficiently resourced to address workplace issues as they arise. EPL coverage provides a backstop should matters go awry.

With or without EPL coverage, implementing strong human resources practices and strategies, including the following, reduces many employment-related risks:

**Written employment contract.** The relationship between an employer and employee is contractual even in the absence of written terms (or if the written terms are unenforceable). In that case, courts impute contractual terms through legal precedent known as common law. For example, without "just

cause for termination" a court will require an employer to provide an employee with "reasonable notice" of termination. Reasonable notice will almost always far exceed whatever minimum notice is required under employment standards legislation.

Utilizing an employment contract significantly reduces employment-related risks and achieve important business objectives.

### Clarifying obligations

Although a termination clause may be the principal reason for an employment contract, it's not the only reason. A written employment contract clarifies obligations and entitlements during the course of the employment relationship including remuneration, duties of employ-



Minimize risk with detailed employment agreements.

PHOTO: THINKSTOCK

ment, hours of work, vacation and confidentiality obligations. It may also address post-employment covenants such as a restriction on the solicitation of customers.

If written contracts aren't in place, an enforceable contract can be introduced into an existing employment relationship under the right conditions and

with the assistance of experienced employment counsel.

**Workplace violence and harassment policy.** Every company is required to establish, implement and train employees on workplace violence and harassment, as well as comply with occupational health and safety and human rights law. Organizations with an up-to-date, well-written and properly implemented policy will be better prepared to prevent or respond to a claim of workplace abuse, and avoid expensive and potentially embarrassing litigation.

**Employee handbook.** Some employers will have a handbook that addresses various aspects of the employment relationship such as: core values, workplace rules and practices, hours of work, leaves, social media, use of confidential information, and workplace conflict resolution. A handbook should create clear and express expectations with a view of minimizing any misunderstanding or disagreement that might lead to a claim.

By covering these bases, manufacturers will be better prepared to handle employee-related issues that pose financial risks.

*Stephen Shore is a lawyer with Sherrard Kuzz LLP in Toronto, an employment and labour law firm representing management. Call (416) 603-0700 or (416) 420-0738 (24 hour). E-mail sshore@sherrardkuzz.com. Visit www.sherrardkuzz.com.*

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

## TRAINING

### How much is 30%?

Why essential skills are important

BY HUGH ALLEY

My mother-in-law went into a store to get a price adjustment that was missed when she went through the checkout the day before. Two cashiers couldn't figure out 30% of \$6.28, so they went to a third cashier. After some discussion, my mother-in-law's cashier handed her \$5.35.

So how much did this cost the company? I figure the total cash cost was at least \$8.57, adding the staff time and overhead. This meant the company had to sell another \$175 of product, assuming a 5% profit margin (which is high for grocery stores).

This was just a single transaction. Consider how often this happens. And we haven't factored in the annoyance factor for my mother-in-law or the customers waiting behind her.

How important are essential skills?

When a cashier doesn't have basic math skills to figure out a percentage, it increases the daily sales the grocer needs to break even.

When a production worker can't read a drawing correctly, the components are cut wrong, costing hundreds of dollars a month in scrap.

When a sheet metal worker can't use a calculator correctly to work out angles, it costs \$2,000 to \$3,000 a month in rework.

So what are these essential skills? Employment and Social Development Canada offers the following list:



Numeracy is an essential skill.

PHOTO: FOTOLIA

- Reading
- Document use
- Numeracy
- Writing
- Oral communication
- Working with others
- Thinking
- Computer use
- Continuous learning

People who don't have these skills look like the rest of us. They've figured out coping strategies, but those strategies often include trial and error and inefficiency.

You probably should know who needs to upgrade their essential skills. Start with the assessment at [www.esdc.gc.ca/en/essential\\_skills/tools/workplace\\_survey.page](http://www.esdc.gc.ca/en/essential_skills/tools/workplace_survey.page). Otherwise, your staff may be costing you much more than you thought.

And my mother-in-law? The "30%" adjustment went towards some nice lamb chops.

*Hugh Alley is an industrial engineer based in the Vancouver area who helps organizations achieve significant performance gains in delivery, quality and cost in a short time-frame. Call (604) 866-1502 or e-mail [hughalley@gmail.com](mailto:hughalley@gmail.com).*

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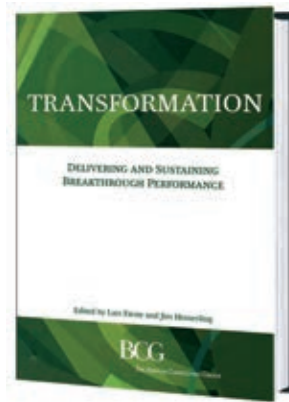
# GO DIGITAL!

## ACT NOW TO LAUNCH PRODUCTS AND SERVICES

**M**anufacturers need to embrace fast-moving change and seize digital transformation opportunities, according to a new e-book

from the Boston Consulting Group (BCG).

It advises manufacturers to create multiple low-cost tech initiatives,



Draws on more than 400 transformations. PHOTO: BCG

kill lagging projects quickly and commit to “always on” transformation to stay ahead.

*Transformation: Delivering and Sustaining Breakthrough Performance* draws on the firm’s work in more than 400 transformations that generated a median annual impact of approximately \$340 million through the application of capital efficiency levers, cost cuts, revenue increases, and improvements in organizational performance.

Artificial intelligence, advanced data analytics and 3D printing are a few of the emerging digital innovations companies can apply to create value for customers, says Lars Faeste, a senior partner at BCG and one of the editors of the e-book.

Manufacturers are advised to act now to launch digital products and services, and to digitize internal processes, even if they don’t feel ready. BCG suggests taking these steps:

- Establish a baseline on your current use of digital technologies.
- Successful companies move quickly to create lots of project “portfolios” focused on just a few key areas where technology makes a difference, such as customer experience; reimagined products, services, and business models; and re-engineered business processes.
- Become agile to accelerate the transformation. Successful digital transformers launch multiple pilot projects at once. The goal is a “good enough” product with just enough features to make it functional. Apps are often basic at launch. New features are added over time depending on what customers want.
- Transform the organization. Add capabilities, sometimes with the help of an ecosystem of partners, or create external incubators through joint ventures or acquisitions.

Link to [www.bcgperspectives.com/transformation-breakthrough-performance](http://www.bcgperspectives.com/transformation-breakthrough-performance).

**Comments?**  
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Cyber-attacks cause business disruptions, damaged machinery, result in lost revenues and may even cost lives.

PHOTO: THINKSTOCK

# Smart and SECURE

## I IOT REWARDS COME WITH RISKS

Not all necessary safeguards have been implemented to protect networks, data and systems from cyber threats.

itize the manufacturing process by using machine-to-machine (or person-to-machine) communication to relay, synthesize, evaluate, exchange and analyze

data. This process improves warehouse inventory management, quality control, preventive maintenance and repair work.

IIoT has already been adopted

by some of the world's biggest companies. According to a 2016 TATA Consultancy Survey, manufacturers implementing IIoT solutions saw revenues increase by an average of 28.5% between 2013 and 2014. IIoT investment is to increase to \$70 billion by 2020 from \$29 billion in 2015; and-McKinsey & Co. estimates IIoT's economic impact could reach \$3.7 trillion by 2025.

But early adoption comes with its own, unique set of challenges. All the necessary security safeguards required to protect networks, data and systems from cyber-attacks may not be in place, and the problem is exacerbated by the fast-paced evolution of the risks.

Considering IIoT devices are connected to one another and the internet, the scale of an attack could be large and difficult to contain. Attacks on systems result in prolonged business disruptions, physical damage, and lost revenue. Threats include the disruption of the digitization process, such as intellectual property and production metrics, and the destruction of equipment.

BY IMRAN AHMAD AND SARAH NASRULLAH

The term 'smart devices' may conjure images of consumer appliances such as refrigerators and thermostats that you can control remotely, but they're also transforming manufacturing by improving productivity and cutting costs.

Experts believe the adoption and use of smart devices will be a catalyst and an enabler of Industry 4.0, the fourth industrial revolution, and it will be defined by the pivotal role of the Industrial Internet of Things' (IIoT)

Smart, connected devices dig-

### ATTACKS

## Cyber breaches on the rise Companies are spending millions on recovery efforts

The number, sophistication and severity of cyber-attacks on companies in Canada are on the rise, according to a new study from Toronto-based computer consulting firm, Scalar Decisions Inc.

The study, which polled more than 650 Canadian IT and security workers, found the number of reported cyber-attacks has risen to an average of 44 attacks per year, up nearly 30% since 2014. Most respondents also reported the severity (81%) and sophistication (72%) of attacks are increasing.

Forty-one per cent of respondents said their organization had systems in place to deal with advanced persistent threats, up from 38% in 2016. The most frequent compromises continue to be web-borne malware attacks (76%),

followed by rootkits (67%).

Threats on the rise for 2017 include spear phishing, exploits of existing software vulnerability and botnet attacks. Mobile devices and third party applications were identified as the greatest potential risks threatening IT environments.

Respondents said their companies spent an average of \$7.2 million to remediate cybersecurity breaches.



Attacks such as ransomware are on the rise. PHOTO: THINKSTOCK

Cyber-attacks are not theoretical. In 2014, a German steel plant was the target of hackers who sent spear-phishing e-mails to infect its computers. The attack prevented a blast furnace from initiating its safety settings, which then caused extensive physical damage to the plant.

Given the damage unsecured IIoT devices cause, a comprehensive security program is a must.

By deploying strong cyberse-

curity measures, manufacturers protect themselves, their employees and their customers.

### Steps to take

Most organizations have adopted well-known frameworks, such as those developed by the National Institute of Standards Technology (NIST). It recommends the following approach:

**Identify.** Assess your network and identify the gaps vulnerable



Protect your systems.

PHOTO: THINKSTOCK



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to a cyber-attack.

**Protect.** Apply appropriate safeguards to protect critical infrastructure.

**Detect.** Put procedures in place to identify potential cyber threats.

**Respond.** Set up an action plan to deal with a threat when it's detected.

**Recover.** Maintain plans for resilience and restoring any capabilities or services that were impaired by a cyber event.

Retain external consultants to test the security of IIoT devices within the manufacturing supply chain. Also consider legal counsel that specializes in cybersecurity to review contracts with IIoT manufacturers. Include key provisions that ensure updated software versions are pushed out automatically or devices are deployed based on a "security by design" model. Consult with insurance brokers to ensure an existing policy covers physical and cyber damages.

Despite the risks, IIoT optimizes operations and significantly improves the manufacturing process, but take the necessary steps to protect your systems.

*Imran Ahmad is a partner specializing in cybersecurity law at Miller Thomson LLP in Toronto. E-mail iahmad@millerthomson.com. Sarah Nasrullah practices cybersecurity law in Toronto. E-mail sarahnasrullah@gmail.com.*

**Comments?**

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# Meet CME's NEW CEO

## DENNIS DARBY TAKES THE HELM

Initial work will be focused on engagement and communication, while growing the association's membership base.

BY MATT POWELL,  
ASSOCIATE EDITOR

Canadian Manufacturers & Exporters (CME) has a new president and CEO. Dennis Darby, previously CEO of the Ontario Pharmacists Association, officially joined the Ottawa-based industry association Jan. 30.

He takes over from Jayson Myers, who has stepped into the public affairs world, launching an advocacy firm that helps organizations identify opportunities arising from the changes

that are reshaping industry and international business.

Darby was responsible for strengthening the OPA and growing membership through the development of programs and services, and advocating public policy improvements for association members. He'll have a similar focus at CME, which currently has 2,500 members.

He is not a stranger to the world of manufacturing. Darby spent 24 years with consumer products company Procter & Gamble, where he began as a product engineer, eventually becoming director of North American external relations.

His work with Procter & Gamble included stints in Europe and the US leading a number of plant startups. He started in product development and



Dennis Darby joins CME from the Ontario Pharmacists' Association.

PHOTO: CME.

engineering before moving on to plant operations, responsible for identifying cost savings at P&G plants, including operations in Hamilton and Montreal.

Born in Hamilton, he's the son of a steelworker and a graduate of McMaster University, earning a degree in chemical engineering and management. He's also a registered Professional Engineer

in Ontario and he achieved the Institute of Corporate Directors designation from the Rotman School of Management at the University of Toronto in 2011.

"As a Hamilton kid, everyone worked in manufacturing. What I remember most is their pride in making things people used that contributed to the economy," he says. "Those memories have a

### INDUSTRIE 2030

## Techno-laggards

### Manufacturers are not advancing

Almost two-thirds of Canadian manufacturers surveyed are lagging their international peers in the adoption of advanced manufacturing technologies, according to a study by Canadian Manufacturers & Exporters (CME).

*Accelerating Adoption of Advanced Manufacturing Technologies*, the second of CME's five reports stemming from its Industrie 2030 initiative, notes more than 60% of survey respondents do not make use of technologies such as 3D printers, IIoT, robotics and automation systems.

Manufacturing investment in machinery and equipment in Canada fell by nearly 5% between 2009 and 2014, hitting a 30-year low in that year, the report says. US investment rose by 58% during the same period.

"In fact, few industrialized countries have a worse record than Canada," said Mathew Wilson, CME's

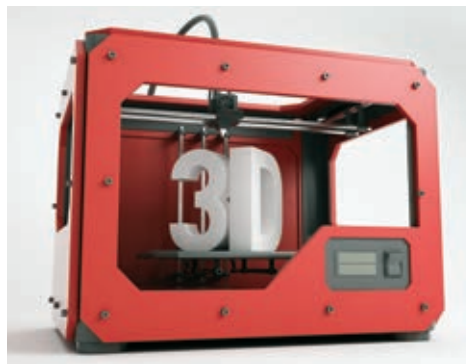
senior vice-president.

Although acknowledging investment has decreased for several years as the sector struggled with static output and exports, he said companies must nonetheless invest in advanced manufacturing capabilities.

To accelerate the adoption, the report recommends governments:

- enhance depreciation rates and provide tax credits to encourage investment;
- establish manufacturing hubs and technology demonstration centres to showcase and test new technologies;
- expand all regional manufacturing technology investment support programs across the country; and
- reinvest federal and provincial carbon-pricing revenues back into offsetting the cost of purchasing new technologies and machinery and equipment.

"Other countries have created national strategies around technology adoption," Wilson warned. "It's critical that Canadian governments work closely with industry to facilitate adoption of these technologies and to grow our manufacturing sector."



Advanced manufacturing includes 3D printing.

PHOTO: THINKSTOCK

lot to do with why I gravitated to manufacturing.”

One of his goals at CME is to engage the membership while attracting new companies to the organization. As a member of CME during his time at P&G, he applauded the progress related to government policy and the manufacturing sector achieved by Myers and the then-CME leadership committee.

With Donald Trump in the White House, he believes this is

a crucial time to further engage Canadian manufacturers and help them deploy their efforts on a more global scale to leverage free-trade agreements, such as CETA.

“Some associations have struggled to provide value to their members; and many SMEs aren’t as likely to join associations as they once were. That’s going to be my focus. It’s no secret that the association has lost some members over the last



Manufacturers need to invest in high-tech tools to compete globally.

PHOTO: FOTOLIA

few years, so we need to make sure our current and potential members know why it’s important to be part of an association

like ours.”

Nationally, manufacturing is close to full capacity and there isn’t a lot of room without investment, he says. CME will also continue to bring all levels of government together to make that happen.

“We have to provide companies with the right conditions to encourage investment in people, training and high-tech capacity, and making those decisions easier,” Darby says.

As for the Trump factor, he’s confident the federal government will work to maintain Canada’s balanced trade relationship with the US.

“We share a lot of common regulatory frameworks, so when the US administration is critical of countries where there are perceived unfair advantages, it’s critical Canada reminds the US that we build things together,” Darby says.

Canada’s deeply rooted relationships with the US Great Lakes states, home to most of America’s auto manufacturing, is critical. CME has ongoing dialogue with governors there.

Should the Trump administration get into a tweaking of the North American Free Trade Agreement, CME has some ideas on how to modernize the deal and provide members with the tools they’ll need to compete and export globally.

“Canadian manufacturers are nimble and efficient, so we want to promote those capabilities and export into other markets,” he says, adding CME will remain active in the TPP and CETA trade agreement frameworks. “Whenever there is a challenge, there’s opportunity.”

Comments?

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Coalition calls for government action as soaring energy and carbon costs drive small and mid-sized companies out of the province.

BY MATT POWELL,  
ASSOCIATE EDITOR

In December, Leland Industries brought to life the concerns of many small and mid-sized manufacturers in Ontario that are feeling squeezed by sky-high energy costs and new carbon policies that are rendering them uncompetitive.

The fastener manufacturer, founded in 1984 and based in the Scarborough area of Toronto, is moving its operations to the US and blaming Ontario's escalating energy costs.

"We have big plans for expansion ahead," says Byron Nelson, the company's founder and CEO in a release. "But no longer here in Ontario."

Leland Industries employs more than 200 people at its plants in Scarborough and Waterloo, Ont.

It's among many small and mid-sized companies looking to grow, but also considering investment outside of the province. Ontario's time-of-use pricing system has increased peak time energy costs by 81% since 2010. US states have been quick to act by deploying juicy incentives to entice Canadian companies to invest and add manufacturing capacity south of the border.

"Industrial electricity bills have soared over the past year, and with Ontario's new cap-and-trade system, electricity and natural gas costs are likely to jump by at least another 20%," says Jocelyn Bamford, founder of the Coalition of Concerned Manufacturers. It advocates for small and mid-sized manufacturers concerned about the impact of rising energy costs on their businesses and the economy. So far, the coalition has attracted more than 300 members to its

# Is this "GOOD-BYE" ONTARIO?

## MANUFACTURERS MAY LOOK ELSEWHERE TO INVEST



US states are enticing Ontario companies with incentives to move south.

PHOTO: FOTOLIA

Facebook page.

Bamford cites an anonymous manufacturer who told the coalition of a November hydro bill of \$162,212.66. The manufacturer used just \$13,060.10 worth of electricity, but its global adjustment fee was a whopping \$107,698. The fee is the amount tacked onto energy bills to cover above-market rates paid to green energy companies.

"The province is removing HST on electricity bills, but that won't offset the energy and transportation cost increases in store for smaller manufacturers, many of whom are tied to contracts that prevent them from passing costs along in the form of higher prices to their customers," adds Bamford, who is also the vice-president of Automatic Coating Ltd. The supplier of powder coating, pipe coating and grit shot blasting for both industrial and consumer products, also in Scarborough, has 75 employees.

In October, Bamford told the *Toronto Sun* Automatic Coat-

ing's energy bills grew from \$34,000 in April 2016 to \$42,000 in May. The extra costs weren't from increased energy use, but the government's add-ons.

"Manufacturers have become more competitive and able to reduce emissions at the same time because they've invested in new technologies," says Bamford.

### Investment inactivity

Indeed, Ontario manufacturers have reduced greenhouse gas emissions 15% since 1990, according to a study by Canadian Manufacturers & Exporters.

"Higher energy costs leave us less money for investment. And, if manufacturers can't invest in Ontario, it's not good for the economy or for jobs in this province. Ultimately, it's not good for the environment either."

Bamford emphasizes the urgency of the situation.

"Companies like Leland are making investment decisions now. Ontario stands to lose good, high-paying jobs if some-

thing is not done to mitigate the negative impacts that cap and trade will have on smaller manufacturers across the province."

Ontario's cap and trade tax came into effect Jan. 1, and will tax companies based on their emissions, forcing them to buy carbon credits if they want to continue production in the province. A Stikeman Elliott report estimates the policy will add \$136,000 to small manufacturers' costs this year. By 2030, the cost to large participants will top \$2 million, a significant increase that's the result of the government expecting carbon credit prices to increase by 428%, (from \$18 to \$95 per ton). Problem is, many SMEs won't be able to take advantage of the program's benefits because they don't generate enough carbon dioxide to be included in the cap and trade marketplace.

And many medium-sized manufacturers aren't eligible for Ontario's new hydro rebate because they consume more than 250,000 kilowatt-hours of power annually, and exceed demand of 50 kilowatts. Ontario's Industrial Conservation Initiative is also a no-go for SMEs because the incentive is only available to large electricity users with a peak monthly demand of more than one megawatt.

That leaves small and mid-sized manufacturers between a rock and a hard place. Without action, the province's manufacturing sector will continue to lose production capacity to more attractive US jurisdictions. The coalition is hopeful its lobbying will start to alleviate the pain. It's calling on the Ontario government to make all cost increases resulting from its cap and trade program visible to consumers and industry. It's also recommending that the Liberal government's forthcoming budget introduces a tax credit that would offset the impact of higher energy costs and encourage manufacturers to invest in new technologies.

**Comments?**

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## MARIJUANA

A new 800,000 square-foot greenhouse facility will have an annual capacity equivalent to almost 313 million joints.

BY PLANT STAFF

Canada is poised to legalize marijuana use – perhaps some time this year – if the Liberal government under Justin Trudeau gets around to it. Cannabis stocks are doing well, dispensaries that aren't necessarily legal have been popping up in urban centres across the country and those Canadians who intend to indulge are practising rolling techniques.

A 2015 Forum Research poll found 59% of those polled support legalization. And a Deloitte study found about 22% of Canadians smoke weed but the percentage would rise by an additional 17% if marijuana is legalized.

That represents a promising potential market for producers that Deloitte says could bring in annual sales of \$8.7 billion while boosting the economy by as much as \$22.6 billion.

Of course, cannabis is legal now when it's sanctioned for medical use and there are several licensed producers, among them Aurora Cannabis Inc.

The company trades on the TSX Venture Exchange and is a wholly owned subsidiary of Aurora Cannabis Enterprises, which operates a 55,200 square-foot, expandable, state-of-the-art production facility in Mountain View County, Alta.

Aurora Cannabis has started construction of an automated 800,000 square-foot plant in Alberta that will be capable of producing 100,000 kilograms of cannabis annually. Based on an average size of 0.32 grams, that's about 313 million joints.

The greenhouse production facility, dubbed Aurora Sky, has a footprint equivalent to 16 football fields and sits on 30 acres in Leduc County, Alta.

The company has selected a closed-system, hybrid green-



*Legalizing cannabis could deliver an annual boost to the economy of up to \$22.6 billion.*

PHOTO: FOTOLIA

# Aurora Sky rolls a BIG ONE

## PLANT EXPANDS CAPACITY

house concept for the expansion. Its Dutch design is modular, which allows for a rapid construction process with a completion target of October.

### High-tech production

The facility features the world's first industrial-scale plant tissue culture process specific to cannabis.

Forced air, bottom-fed positive pressure is supplemented by sunlight through a specialized glass roof that optimizes micro-mole levels. And anti-reflective and diffusion glass that reduces fan leaf shadows goes in a four-sided rubber gasket system, minimizing heat and CO2 loss, while preventing escaping odour.

The steel is white powder-coated for maximum reflection and GMP-compliant cleanliness and a separated condensation system eliminates humidity issues.

Exterior walls optimize insulation and light penetration, with UV and mechanical filtration technology harvesting and re-us-

ing rainwater.

Climate control is electronic and automated. The heating and cooling systems balance temperature, airflow and humidity to avoid vapour pressure deficits and the double, self-adjusting, wire-driven screens maximize energy savings and provide plant protection with a 99.9% effective blackout. The latest lighting technology includes hybrid HPS and LED installations and a fully automated, mobile platform growing system ensures plants are in the best position for climate, irrigation, light and growth at all stages.

A flexible, component-based, multiple-stage water filtration, irrigation and nutrient delivery system features full recirculation and cultivar-specific feeding, plus systems are in place to track product from seed to sale.

And safety is enhanced with cranes and conveyors deployed throughout the facility.

Aurora Cannabis is looking at additional production and an expansion of its processing capabilities at its plant near the

Village of Cremona, in Mountain View County. To accommodate the change, the municipal council has approved a re-designation of Aurora's property as a Direct Control District.

The producer is also involved in the joint development and commercialization of cannabinoid extracts with Radiant Technologies, which operates a 20,000 square-foot plant in Edmonton that extracts natural compounds from a variety of biological materials.

Their agreement seeks to confirm the effectiveness of Radiant's MAP technology applied to cannabis extraction.

The companies say initial results from the first phase of the study are encouraging so they have agreed to move to a second phase, which includes an eight-week scaling-up of activities.

If successful, they see this technology as potentially groundbreaking. Looking ahead, it would increase production capacity while maintaining terpene profiles (the oils that provide distinctive flavours), which Aurora considers to be a differentiator for its products.

As Canada prepares to light up or vapourize, Aurora Cannabis is pegged by at least one investment banker as a big player and good long-term bet in the marijuana space.

**Comments?**

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The Republican-backed proposal would alter the US tax system to penalize imports, without special status for Canada.

Canadian business leaders should be concerned about the new US administration in Washington, particularly the protectionist tone US President Donald Trump has adopted.

For example, a Republican-backed border adjustment tax (BAT) could severely impact Canadian exporters. It would slap a 20% tax on imports, and there would be no special status for Canada.

The plan includes lower personal tax rates that would pose a challenge for Canadian businesses seeking skilled talent, and CIBC Economics says in a February economic note that it would shift the basis of US corporate taxation from profits to cash flow, cutting the rate from 35% to 20%.

Economists Avery Shenfeld and Benjamin Tal, authors of the report, say firms would pay the 20% tax on domestic revenues after deducting purchases of domestic goods and services. Foreign operations serving markets abroad wouldn't be taxed. Businesses would also expense capital expenditures rather than depreciating them over time. They won't be able to claim an expense for purchases of imported goods and services, but would instead allocate those costs to their base for the 20% corporate tax. Export revenues would be excluded from the net revenues being taxed while the 20% tax would also be applied to imports made directly by a final consumer. And no deductions for interest costs.

US advocates of the tax reform argue that rather than distorting trade, exchange rates would adjust (as in plunge) to offset the price impacts on US imports and exports. They also argue the tax on imports is fair because the same tax is embedded in the price charged by a domestic supplier that has paid tax on its net revenues. But

# Congress swings THE BAT

## CIBC ECONOMICS GAUGES THE US BORDER TAX THREAT



How will Donald Trump's "America First" stance impact trade with Canada?

PHOTO: THINKSTOCK

CIBC notes domestic suppliers would get a deduction for wages. Not so for the export supplier that has already paid a corporate tax at home.

Shenfeld and Tal compare the BAT to the Smooth-Hawley Tariff of 1930 that imposed an average of 20% charge on imports. Canada, among other countries, acted quickly to impose a tariff on US exporters, which stalled global trade and helped to deepen the Great Depression.

### Trump is Trump

Who knows if the BAT plan will get through Congress. Trump isn't keen on the proposal, but he is unpredictable and protectionist. With the benefits to US companies, including those with a large reliance on domestic suppliers and a solid foreign customer base (such as producers of electrical equipment, machinery and transportation equipment), the economists say the proposal could see some light of day.

What does it mean for Ca-

nadian companies? At the micro level, the economists say export-oriented sectors such as transportation equipment, chemical, machinery and computers could feel some pain.

Roughly 20% of Canada's GDP comes from exports to the US. But Shenfeld and Tal haven't

settled on how bad the impact would be. If the proposal does make it through Congress, a Canadian response might involve addressing corporate tax rates to entice companies not to shift operations to the US.

US law currently incentivizes multinational companies to book as much profit as possible outside the country given the higher marginal tax rates stateside. Under the proposed reform, a US company with a Canadian subsidiary would instead try to lowball the price it charged a US parent company for made-in-Canada goods or services to reduce taxes on Canadian profits. Such intra-company transfers would present an enforcement challenge for Canadian tax authorities.

Shenfeld and Tal suggest the Trump administration may seek other methods to ease corporate tax burdens. But they warn Canadian businesses to keep a sharp eye on the BAT proposal, and prepare for any sudden developments.

*This article is an edited version of a CIBC Economics report, *The Border Adjustment: Gauging the threat*. Download a copy at <http://economics.cibccm.com>.*

### Comments?

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## NAFTA: We approve

### Poll shows it has grown on some since June

Canadians are more enthusiastic about the North American Free Trade Agreement (NAFTA) now than they were more than eight months ago.

A recent Angus Reid poll found 44% of Canadians believe NAFTA has benefited the country, compared to just 25% who responded to a similar poll in June.

That's a turnaround from the early 1990s when the agreement was made and 58% were against.

Fifty-eight per cent believe the deal will be renegotiated, and 8% think it will be scrapped. Twelve per cent expect it to survive unchanged.

How will Canada survive the "tweaking" Trump envisions?

Twenty-four per cent want the deal renegotiated, while 31% would like to see it expanded and strengthened. Only 10% think Canada will come out in a better position, while 35% say a renegotiation will hurt us.

A September Angus Reid poll revealed Americans were evenly split on keeping NAFTA, while 71% of Canadians were in favour.

## RECOGNITION

The researcher was awarded the \$1 million Herzberg Medal recognizing his efforts to improve lithium-ion batteries.

BY PLANT STAFF

**A** Dalhousie University researcher has been awarded a \$1 million science prize by the Natural Sciences and Engineering Research Council of Canada (NSERC) for his work developing lithium-ion battery technology, which includes a partnership with electric vehicle innovator Tesla.

Jeff Dahn, a professor in the Halifax university's Department of Physics and Atmospheric Science received the Gerhard Herzberg Gold Medal for Science and Engineering, NSERC's top honour recognizes sustained excellence and influential Canadian research that has advanced the natural sciences and engineering fields.

Considered to be Canada's "Battery Man," Dahn has been involved in the research and development and commercialization of lithium and lithium-ion batteries since 1978. His mix of fundamental and practical research focuses on finding novel materials to satisfy the increasing demands for the batteries, while building on discoveries that improve energy production, storage and sustainability.

Last summer, Dahn began a five-year exclusive research partnership with Tesla Motors, the first collaboration of its kind between an innovative electric vehicle manufacturer and a university.

NSERC says Dahn's work has pioneered the use of Li-ion batteries in mobile devices, making the power source a "part of our everyday lives." His research included fundamental studies on all materials used in lithium-ion batteries, and helped invent some of the positive-electrode materials used in Li-ion cells for



Professor Jeff Dahn at his Dalhousie University lab. PHOTO: DALHOUSIE UNIVERSITY

# Dal's Battery MAN

## JEFF DAHN IS AWARDED THE HERZBERG MEDAL

power tools, grid energy storage and electric vehicle batteries.

Born in Bridgeport, Conn. and settling with his family in Nova Scotia in 1970, Dahn has spent more than 35 years researching battery technology. So far, two companies have been spun off from the Dahn Lab at Dalhousie, including Novonix. Its ultra high-precision charger devices allow customers to predict the lifespan of Li-ion cells over decades.

### EV partnership

Dahn studied physics at Dalhousie before completing a PhD at the University of British Columbia. He has also worked at the National Research Council of Canada, Moli Energy and Simon Fraser University. He returned to Dalhousie in 1996 as the

NSERC/3M Canada Industrial Research Chair in Materials for Advanced Batteries.

Working with post-doctoral candidate Zhonghua Lu and graduate student Dean MacNeil, Dahn developed certain grades of lithium nickel-manganese-cobalt (NMC) oxide compounds that, when used as the positive electrode, increase the safety and stability of the batteries at larger sizes.

These grades of NMCs are widely used in power tool and electric car batteries and represent several of the 65 or so inventions his team has patented. 3M has licensed the use of these NMC grades for commercial use to many companies around the world.

In 2016, the partnership with Tesla formed the NSERC/Tesla

Canada Industrial Research Chain. The five-year exclusive arrangement will focus on developing longer-lasting, lower-cost lithium-ion battery cells.

Tesla has emphasized lowering the cost of battery systems for its vehicles, and is now operating a \$5 billion gigafactory in Nevada with annual battery production of 50 gigawatt-hours by 2018.

The factory is aiming to reduce the per-kilowatt-hour cost by more than 30% by the end of this year. The price decrease will be necessary for Tesla to make an electric vehicle that's 50% cheaper than its \$100,000-plus Model S sedan.

Dahn's work with Tesla also aims to increase both energy density and the lifetime of Li-ion battery cells, which would help drive down costs in automotive and grid energy storage applications.

The \$1 million research award is a milestone for the university. With Dahn's win, three of the past four Herzberg Medal recipients have been Dalhousie faculty, including microbiologist Ford Doolittle's 2014 win and Axle Becke, a theoretical chemist, who won the prize in 2015.

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

Use regular sessions to identify hazards in the workplace and how to mitigate them.

You may know them as morning check-ins, tailgate meetings, safety briefings, or toolbox talks. Although the names are different, these brief safety-focussed discussions among managers or supervisors and workers keep everyone up-to-date about safety concerns, relevant procedures and topics.

Supervisors commonly lead toolbox talks but any available subject matter expert can lead the discussion, whether it's a management representative, other workers sharing knowledge, skills and experience or the safety officer noting relevant examples from daily inspections. Involving all workers ensures they're aware of all hazards.

Holding a daily talk is a good idea. High-risk industries such as mining have a safety meeting covering a different topic every morning before the shift starts. Industries and workplaces with a high employee turnover or changing work environments should schedule more frequent meetings to account for changes.

The talk needs to be long enough to clearly identify hazards and risks, and how they'll be controlled. Include an opportunity for discussion, questions from workers and responses from management. This is not a substitute for training. Employers must ensure that workers receive training for the jobs they're performing to work safely.

Meetings are best held in a comfortable location at the beginning of a shift, after lunch or a break, or incorporated into another operational meeting.

Here are some tips for hosting effective toolbox talks:

- Prepare in advance and allocate a sufficient amount of time.
- Focus on safety, identifying hazards and risks. Include controls. Don't be distracted by unrelated issues.
- Use subject matter experts.

# Toolbox TALKS

## PROMOTE A STRONG SAFETY CULTURE



The term "toolbox talks" comes from the likely location of many workplace safety briefings.

PHOTO: FOTOLIA

- Ensure all workers are involved.
- Lead by example.

### Track attendance

Everyone should be required to attend the talk. Tracking attendance ensures each person you're sending off to perform tasks has the information needed to work safely.

Need some help preparing for the talk? Follow these guidelines:

1. Focus on one idea (hazard or job-related task) with as much detail as necessary to convey the information.
2. Select a key topic to discuss. Consider your own experiences, observations and beliefs. Think of your area of control, repeated problems, recent accomplishments and areas for improve-

ments. Consider the workers, what they want and need, opinions, accomplishments and areas for improvements. Keep notes of day-to-day occurrences so you can address them at the sessions. Read safety-related material, bookmark occupational health and safety websites and save news articles.

3. Summarize your talk in point form. Include key points, facts and examples.

4. Run through the material before you present. This will get easier over time.

5. Make toolbox talks a regular and scheduled part of the workday; and if needed, before starting a particular task.

6. Make the meeting short and to the point. Have an agenda to keep the talks on track. Docu-

ment the session and maintain a record in your business files.

Toolbox talks, like all safety meetings, are critical to your company's health and safety program and to establishing due diligence. Conducting regular sessions will reinforce a strong safety culture.

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*This article was contributed by the Hamilton-based Canadian Centre for Occupational Health and Safety (CCOHS), Canada's national resource for the advancement of workplace health and safety. It provides information, training, education and management systems. Visit [www.ccohs.ca](http://www.ccohs.ca).*

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

## THINK LEAN

Become more agile and react quickly to changes in the marketplace.

BY RICHARD KUNST

Markets are skittish and not always in a bullish way, so it's the most agile manufacturers that will thrive in these uncertain times.

As US president Donald Trump unleashes his "Make America Great Again" agenda, there is potential for significant disruptions in your marketplaces. NAFTA and its highly integrated supply chains are at risk, there are threats of tariffs, and the world is unsettled by what all of this means. As conditions change, be ready to act quickly by managing with these simple, quick, structured bursts:

**Slow down, go faster.** With the added stress of a struggling economy, people feel they must perform faster, aggressively and with more motion. As a leader, stop and observe what's actually happening with your people. Help them sort the necessary from unnecessary motion to improve productivity.

**5 minute 5S.** Don't look for quantum gains, just sustainable incremental improvements. Challenge your team members to clean out one drawer, clean a specific corner within the department or just unclutter their inboxes.

**Understand your disturbances to flow.** Problem-solve as a team daily. Reflect on what happened yesterday and the concerns the team may have in meeting goals and targets today. Then fix them permanently.

Use the power of structured questions using the de-brief methodology.

- What worked well? Let's keep doing it.
- What didn't work well? Stop doing it.
- What should we have done differently? Opportunity for continuous improvement.
- What are your planned accomplishments? Crystallize goals



Assess risks, act quickly to manage change.

PHOTO: FOTOLIA

# Uncertain TIMES

## HOW TO THRIVE AS CONDITIONS CHANGE

and objectives.

**Ignore the organizational noise.** Listening to it distracts from the task at hand. Act when it becomes a valid concern.

**Work a process.** Take a few hours to run a process. It will increase your operational knowledge and provide an opportunity to apply continuous improvement ideas. And you'll have another individual cross-trained to do this function.

**Homework and hard work pay off later.** "The fight is won or lost far away from witnesses. It is won behind the lines, in the gym and out on the road, long before I dance under those lights." *Muhammad Ali*

**You don't know what you don't know.** So how come you believe that you don't need to learn new stuff?

### Achieving success

How do you survive 2017 and beyond? The following rules will help you achieve success, especially when uncertainty rules.

**1. Time is the currency that counts.** Faster is better than cheaper – and customers

will pay a premium for it. Success depends on speed and the coordination/communication that makes it possible.

**2. Market share doesn't matter.** Solve problems. Your customers are relentlessly opportunistic. Anticipate their problems and focus on developing individual solutions that make them more competitive.

**3. You are only as good as your supply chain.** Partners are key. You can't compete based on your talents alone.

**4. Get over yourself. Look beyond your walls.** You can't see the future by staring at your corporate navel. To see what's next, look at how your customers' demands are changing. How are new trends or new technologies changing what they do?

**5. Explore what others do.** Read magazines and books about things outside your field. Study companies that make products unrelated to yours. The best ideas aren't new; they're just hiding out in someone else's market. Aim for free, perfect and now. The idea is the hard part!

**6. Learn from the best.** Folks like Bill Gates didn't get to be so successful by coming up with bad ideas. Tackling the what and the why of people "in the know" will give you a heads-up on trends destined to change the way you compete. What are they betting on? Where do they think value lies?

**7. No rest for the weary.** Leaders can't take time off. There is no end to change, and competition will accelerate. The only real protection you have is the ability to produce something new today, embrace its obsolescence tomorrow and use it as motivation to inspire something better still for the future.

*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@kunstoftosolutions.com](mailto:rkunst@kunstoftosolutions.com).*

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

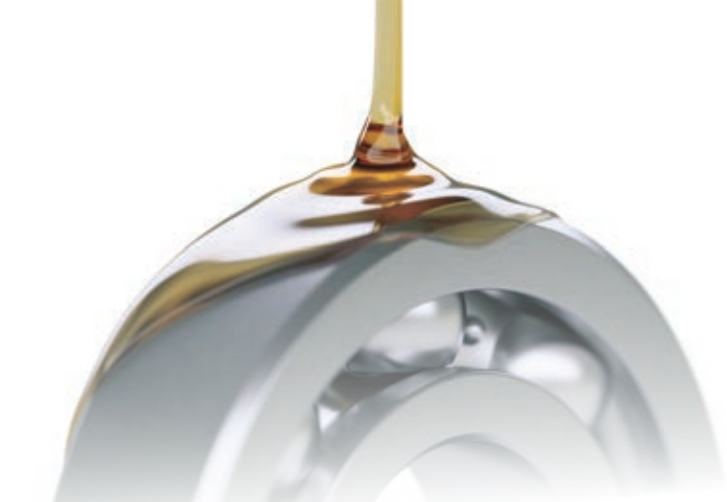
You'll learn a lot about machine health and it helps to avoid trouble while saving energy and money.

More than 80% of the world's rotating equipment runs on rolling bearings lubricated with oil or grease. Grease is used in almost 90% of rolling bearing applications, often improperly, which leads to premature defects and failures.

It's difficult to determine lubricant state, when to grease, how to grease and when to stop greasing without knowledge and proper tools. That's where lubrication analysis comes in, which the Hamilton Section of the Society of Tribologists and Lubrication Engineers addressed during a seminar.

"A lubricant is the lifeblood of any machinery," said presenter Bill Carver, a chemical technologist at steel producer ArcelorMittal Dofasco in Hamilton. "All lubricating fluids and greases have certain key properties that affect their ability to lubricate."

That's why lubricant analysis is always a good idea. Samples are taken from the machinery and sent to a laboratory where their physical and chemical properties,



# Lubricant ANALYSIS

## ALWAYS A GOOD IDEA DESPITE THE OVERHEAD COSTS

contamination levels, and the presence of water are checked.

### Failure modes

When included as part of a predictive maintenance (PdM), program analysis detects typical failure modes, such as lubricant end of life; use of the wrong lubricant; seal failures, leading to dirt or water ingress; abnormal wear of components; and incorrect grease application.

Overhead costs can be sig-

nificant, running from \$10 to \$500 per sample, but this can be mitigated by:

- optimizing the number of samples taken, the type and the number of tests for each;
- extending the interval of system change-outs;
- consolidating inventories;
- preventing a single unplanned downtime event;
- reducing the cost of poor quality products from unstable processes; and

Lubricants travel to the most important load-bearing areas. PHOTO: THINKSTOCK

- reducing customer claims about late deliveries and/or unacceptable product quality.

Add to the list of benefits improved maintenance planning; increased equipment availability and reliability; reduced lubricant consumption; fewer catastrophic failures; energy savings; and extended equipment and lubricant life.

You'll get the best value when analysis is done in conjunction with other predictive maintenance technologies and correlated with condition-monitoring indicators such as total acid number (TAN) and viscosity. Viscosity is especially important because changes cause thermal cracking, shearing, solvent oxidation, and the formation of insoluble oxide and carbon deposits. When viscosity is too high, the flow to bearings is impaired, varnishing occurs and there are energy losses. Low viscosity causes oil film loss, boundary lubrication, excessive wear and energy losses.

Contamination is indicated by the presence of dirt or water. Debris (iron, steel, non-ferrous metals such as yellow metals or babbitts) indicates wear. Accumulating this kind of change data over time establishes trends.

Typical applications are hydraulic, gear and oil systems; compressors and turbines; and large grease-lubricated systems.

Is lubrication analysis worth doing? It's highly recommended, especially if you intend to avoid costly machine downtime.

*The article is adapted by PLANT contributor Steve Gahbauer from a presentation by lubrication expert Bill Carver, a chemical technologist with steel producer ArcelorMittal Dofasco, for the Hamilton Section of the Society of Tribologists and Lubrication Engineers.*

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

### Tribology definitions

**Abrasive:** wear between two surfaces due to particles or surface roughness.

**Adhesive** (plus galling, scuffing/scoring): wear caused by metal-to-metal contact.

**Brinelling:** denting caused by impact of one bearing component against another while stationary.

**Cavitation:** formation and subsequent collapse of vaporous cavities within a liquid. Caused by pressure oscillations.

**Cavitation damage:** metal is removed.

**Centistoke:** kinematic viscosity.

**Corrosive:** wear caused by chemical reaction.

**Demulsifier:** loosens and breaks stable emulsions.

**Denting:** numerous small dings in a metal surface, caused by foreign material and debris.

**Detergent:** prevents oxidation products from sticking to metal parts.

**Dispersant:** keeps oxidation products separated and suspended in the oil.

**Emulsifier:** promotes rapid mixing of oil and water, promoting formation of stable emulsions.

**Erosion:** wearing away of a surface by impinging fluids or solids.

**Fatigue:** cracking, flaking or spalling of a surface from stresses beyond the endurance limit of the material.

**Ferrography:** magnetic particle analysis.

**Fretting:** wear resulting from small amplitude motion between two surfaces; may produce oxide.

**Morphology:** structure and form.

**Naphthenic oils:** oils derived from naphthenic crude.

**Paraffinic oils:** oils derived from paraffinic crude.

**Pitting:** surface cavities that may be related to fatigue overload or corrosion.

**Plastic flow:** surface deformation from yielding under heavy load.

**Polishing:** a form or ultra-fine abrasive wear.

**Ridging:** a form of plastic flow in gear teeth, characterized by definite rides in the direction of sliding.

**Scratching:** fine abrasive furrows in the direction of sliding.

**Stoichiometry:** the fixed numerical relationship between the relative quantities of substances in reaction.

**Spalling:** severe damage characterized by large pits, cavities and related tracks; related to overload and fatigue.

*Source: Jim Arner, lubrication expert with Pirr Tribology Solutions in Toronto, and Steve Gahbauer*

## SEALS

# Sizing O-RINGS

## HOW TO MEASURE THEM ACCURATELY

O-rings are round, cross section torus mechanical gaskets that seal in a static or dynamic application. They're inexpensively made, easily assembled in an application and resist very high pressures. So how do you measure them?

Here are some tips:

- They're typically described in terms of inside diameter (ID) and cross sectional (CS) thickness because these characteristics are most commonly considered important. Outside diameter (OD) accepts stack up tolerance. In situations

where the OD is considered more important, the OD and CS can be specified to ensure the tightest tolerances.

- Measuring ID is usually done on the inside circumference of the O-Ring with division by pi (3.1428). For example, 25.5 inches IC divided pi (3.1428) equals 8.1138 inches ID.
- Calipers provide some guidance, but are not considered accurate for measuring ID. Newer digital devices provide hundreds of measurements along the ID for best accuracy.
- Measurement of the CS is best



Newer digital devices take hundreds of measurements along the ID of the O-Ring for best accuracy.

PHOTO: CRAIG WEBB

performed with calipers or a micrometer. Digital measurement equipment calculates CS by comparing ID and CS, but it has difficulty measuring the actual CS height.

- OD measurement is best performed with digital equipment. Caliper measurement of OD is not considered accurate. The AS568 size chart provides standard-size O-Rings in various ID and cross-sectional measurements. It identifies standard sizing by ID and CS with reference dimensions only for

OD. Other standard size charts include British Standard (BS), European Standard and Japanese Standard.

Familiarity with standard sizing makes it easier to compare suppliers and improve delivery.

*Contributed by Craig Webb, director of business development at Specification Seals Co., with locations in Anaheim, Calif. and Chicago. Visit [www.o-rings.com](http://www.o-rings.com).*

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



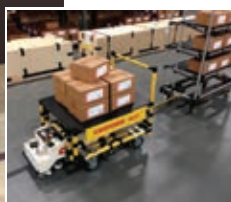
BST NSI

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## MATERIAL HANDLING



Vertical levellers provide a smooth path between the plant and trailer.

PHOTO: RITE-HITE

# Save your ENERGY

## GETTING THE JOB DONE COMING OR GOING

Plant loading docks and high-speed doors combine to offer opportunities for big energy savings.

BY PERRY KNUTSON

Many facility managers miss out on opportunities to maximize energy efficiency – and the cost savings associated with it – throughout their material handling operations.

There is equipment available that delivers energy efficiency gains when moving raw product

from cell to cell within a plant or shipping it out on trailers at the loading dock.

Let's take a more in-depth look at equipment that maximizes energy use from inside the plant to the dock doors in shipping/receiving.

Whether it's putting raw materials into a cell to be welded or putting thawing food into a freezer, moving materials within a plant results in a massive loss of energy. For many years, plants focused on using doors with high R-values, which minimize heat transfer

through an object. These doors are typically heavy and slow moving. In high-cycle processes that demand dozens of openings and closings throughout the day, they're often left open, allowing air from high- and low-temperature operations to infiltrate other areas in the plant.

Upgrading to high-speed doors provides an R-value high enough to minimize conduction of heat while delivering quick operational speeds. The most advanced high-speed, roll-up doors operate up to 2.5 metres per second. And minimizing air

## SUPPLY LINES



AmmEL unit: 14 meters long, weighs 21,000 kg. PHOTO: ENPAR

### AMMONIA REDUCED

ENPAR Technologies Inc.'s AmmEL plant operating at an undisclosed customer's location in Virginia has reduced toxic ammonia in wastewater to one part per million from 175.

The Guelph, Ont.-based developer of proprietary water treatments says the system converts toxic ammonia into nitrogen gas without producing nitrate (a carcinogen) or nitrous oxide (a greenhouse gas).

The patented system treats a daily equivalent of 200 cubic metres of wastewater containing up to 27 milligrams of ammonium-nitrogen per litre.

ENPAR, working with an engineering partner, intends to sell the remote controlled, automated plants for between \$400,000 and \$500,000.

### PARTNERS CONNECT

HARTING Americas and Heilind Electronics have entered into a distribution agreement.

The companies, which supply industrial electronic connectors, will carry each other's products.

Heilind operates across North America, including Markham, Ont.

HARTING's Canadian headquarters is in Montreal.

### SAFETY LIBRARY

Safety First Training Ltd., a health and safety training provider based in Mississauga, Ont., has launched more than 700 courses online.

They can be purchased individually or in groups.

Visit the library at <https://safetyfirsttraining.ca/online-safety-training>.

## MATERIAL HANDLING

infiltration conserves energy in a big way.

Hard-core doors are susceptible to forklift damage and the air penetration continues until they're repaired. High-speed doors take a hit and automatically re-align on their tracks.

Industry-specific high-speed doors made from a smooth polypropylene fabric that handles acids and bases help facilities comply with the strictest of regulations. For example, the most advanced, CFIA-compliant roll-up doors will incorporate a one-piece radial header and non-corrosive side frames that are removable for regular cleaning. They also align with current good manufacturing practices.

### Energy savings

Loading docks present one of the best opportunities for improved energy efficiency.

Drive-throughs provide energy benefits for many types of facilities. Since they allow docked trailers to open their doors inside the facility, they prevent the infiltration of outside contaminants, preserve cold chain integrity and reduce opportunities for conditioned air to escape through open loading dock doors.

After the trailer is secured to the loading dock, a vertical storage leveller bridges the difference in height and gaps between the dock floor and the trailer bed. They allow the loading dock door to close directly on the pit floor. This reduces energy loss by minimizing outside air infiltration and helps reduce contaminants from entering the building.

Security is enhanced by minimizing points of entry at the loading dock; and cleaning or washing down the pit floor is easier when the leveller is in the upright and stored position.

Vertical levellers provide the smoothest path between the facility floor and the trailer, which reduces "dock shock," or whole-body vibration. That's good for

forklift operators and minimizes damage to products and equipment. The most advanced levellers reduce dock shock by incorporating specialized rear and front hinges that minimize the bumps and gaps. And a finely tuned lip chamfer at the front of the leveller reduces the speed bump effect normally felt by forklift drivers as they enter and exit the trailer.

The second piece of a good drive-through operation is a loading dock seal and shelter system. It creates an environmental barrier between the back end of the semi-trailer and the inside of the loading dock, dock seals and shelters to keep wind, rain, dust, bugs and other contaminants outside the building.

Some of the newest dock shelters, specifically designed for drive-through applications, complement vertical storing dock levellers. This allows the trailer doors to open inside the building, while still maintaining a tight, consistent seal around the trailer. Special design features ensure tight sealing against sides, across the full width of the top and at the corners without interfering with the opening and closing of trailer doors.

To complete a four-sided seal, an under-leveller seal closes off the space beneath the vertical leveller that is lowered into the back of the trailer.

Although safety is the most important consideration for any material handling operation, energy efficiency is also key. Plant managers now have options inside the facility and at the loading docks.

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*Perry Knutson is director of engineering for Rite-Hite Doors, a manufacturer of loading dock equipment, industrial doors, safety barriers and HVLS industrial fans based in Milwaukee, Wis. Visit [ritehite.com](http://ritehite.com).*

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

## PRODUCT FOCUS MAINTENANCE

### MONITOR RELIABILITY OF ROTATING MACHINERY

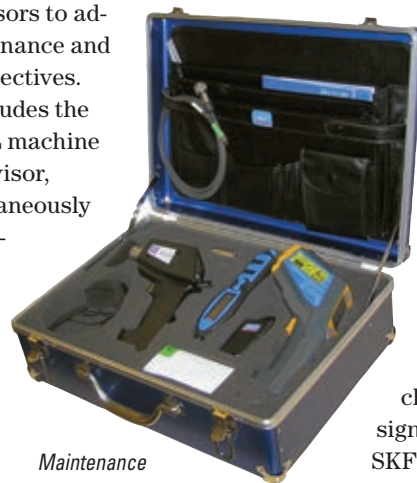
SKF's CMAK 400-ML basic condition monitoring kit provides all the tools your plant needs to assess the health of rotating machinery. They test bearings, pumps, electric motors and compressors to advance maintenance and reliability objectives.

The kit includes the CMAS 100-SL machine condition advisor, which simultaneously measures machine vibration signals and temperature to indicate machine health and bearing condition; a compatible external sensor with a 100 mV/g accelerometer, coiled integral cable and magnet for accessing

hard-to-reach surfaces and provide repeatable data measurements; the CMSS 3000-SL infrared thermometer, which serves as a dual laser-sighted, non-contact instrument for

temperature monitoring at a distance; and the SKF Inspector 400 Ultrasonic Probe (CMIN 400-K), which senses high frequency sounds, leaks and electric discharges that may signal problems.

SKF is a global supplier of bearings, seals, mechatronics, lubrication systems and services based in Sweden with offices in Toronto. [www.skfusa.com](http://www.skfusa.com)



Maintenance tools.

### MAINTAIN CLEANLINESS WITH CORROSION-FREE CHAINS



No lubrication required.

*b.dry* stainless steel, corrosion-free chains from iwis Drive Systems Inc. run completely dry, they're wear-resistant, and they withstand high dynamic loads.

Use them for applications involving water or steam or where strict cleaning

regulations apply, such as the food and pharmaceuticals industries, in cleanrooms and in painting lines.

Thanks to the friction bearings in their links, they don't require lubrication. Made from a high-performance polymer, the heavy-duty sleeves are low-friction. The chain's stainless-steel bushes are thin-walled, seamless and ball-drifted and the CF base chain is made from austenitic stainless steel, making it highly resistant to aggressive media.

Length tolerances are compliant with ISO 606. Use the chains in temperatures ranging from -100 to 200 degrees C. They also come as roller chains with attachments or extended pins.

The iwis Group is a German supplier of precision chain systems for power transmission and conveying applications with Canadian offices in Surrey, BC.

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

## FOAM AND SPRAY KEEP MOULDS CLEAN

Clean injection moulds and tooling quickly and safely with IMS low-toxic foam and spray cleaners.



Low in toxicity.

IMS C-Foam Foaming Citrus Mold Cleaner is an aggressive, drip-resistant foam that stays in place for minutes – allowing its solvents to dissolve the grease or contaminant.

The biodegradable, citrus-based foam is low in toxicity and is not flammable as sprayed. Use it for jobs that require low flammability and low toxicity.

IMS LT-65 low-VOC spray mould cleaner evaporates fast. Use it where low toxicity and low VOC content are required, where cleaning ability and evaporation rate can't be compromised, and where a flammability hazard can be managed.

IMS Co., based in Chagrin Falls, Ohio, provides products for the plastics industry.

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

## REDESIGNED CAMERAS ADVANCE THERMAL IMAGING

FLIR Systems Inc. has redesigned its Exx Wi-Fi advanced thermal imaging cameras for identifying hot spots or building deficiencies in electrical, mechanical and building applications.

The E75, E85 and E95 have intelligent interchangeable lenses, laser-assisted autofocus modes and area measurement functionality. FLIR's MSX imaging technology has also been improved and the devices have larger, more vibrant four-inch touchscreens.

Laser distance measurement assures precise autofocus to improve temperature measurement accuracy, while the E85 and E95 models provide data for on-screen area measurement in square feet or meters. Both models offer increased thermal detector resolutions with up to 464x348 (161,472 pixels), and measure temperatures up to

1,500 degrees C.

Used in conjunction with FLIR Tools, the three cameras apply UltraMax, an embedded, process that improves effective resolution by four times – up to 645,888 pixels – and thermal sensitivity by up to 50%.

Improved MSX technology uses a 5-megapixel visual camera for improved image clarity and readability. These improvements, combined with a display that is 33% brighter and 30% larger than previous Exx models, yield more vibrant and detailed thermal imagery.

They're also rugged thanks to a water-resistant design and scratch-resistant Dragontrail cover glass over an optically bonded, projected capacitive touchscreen.

Connectivity, archiving and report generation are easy with enhanced Wi-Fi, Bluetooth and Meterlink and a simplified user interface that delivers faster, more intuitive operation.

FLIR, based in Wilsonville, Ore., makes advanced thermal imaging and threat detection systems. Canadian offices are in Burlington, Ont.

[www.flir.com/exx-series](http://www.flir.com/exx-series)



Three improved models.

## SIMPLIFY SEWABLOC PUMP MAINTENANCE

KSB's SewaSlide pump maintenance aid makes operations such as impeller inspections, blockage clearances and seal replacements on Sewabloc wastewater pumps quicker and easier.

This optional accessory makes opening the pump a simple one-person job. Undo the bolts, fastening the volute casing to the rest of the pump, and slide the core pump assembly (including the impeller, shaft, bearings, seals and motor) away from the volute casing, which remains in place, attached to its inlet and outlet pipes.

Once the pump has been opened, the impeller is exposed so removing the materials that caused the blockage or other maintenance operations are

straightforward.

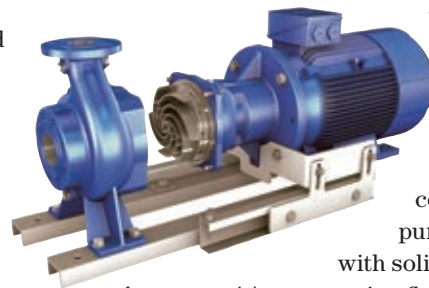
When tasks are completed, the pump is quickly re-assembled by rolling the impeller/shaft/motor assembly back into place and re-inserting the bolts. No cranes or lifting apparatus are required.

For facilities using several Sewabloc pumps, a single SewaSlide unit can be moved between these pumps on an as-needed basis.

Sewabloc pumps are single-stage, close-coupled centrifugal pumps for use with solids-containing fluids such as sewage, industrial wastewater or stormwater.

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

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



A one-person job.

## DESCALE FABRICATED METAL SURFACES

TreadBrite Edge Gel cleaner from Madison Chemical etches away soil, laser scale, rust and heat-treat scale (including heat tint/weld burn) on aluminum, mild steel, stainless steel and copper.

The viscous gel contains a blend of surfactants and acids that are effective on fabricated metal surfaces, especially where L series stainless is used and post-weld clean-up is required. Use it where an exposed metal edge has been aggravated by CO2 laser cutting, or in areas where sulfurized cutting oils and metalworking fluids have damaged stainless steel surfaces.

It's also suitable for cleaning up severely fouled press brakes or other fabrication equipment, removing all class I and many II and III rouges.

Apply it full strength at room temperature by pump, spray or manual wiping or brushing. Rinse thoroughly with water after each use.

Madison Chemical is a chemical formulator based in Madison, Ind. [www.madchem.com](http://www.madchem.com)



Use it full strength.

## PRODUCTS AND EQUIPMENT

### TEST AND MEASUREMENT

#### LOAD SENSOR TRANSMITS WEIGHT DATA IN REAL TIME

Saelig Co. Inc.'s LoadSense load measurement sensor wirelessly transmits data to a compatible display or data recorder at 10 times per second, with an overload capacity of up to 200%.

Dual antennas in the IP65 enclosure deliver data transmission in harsh environments.



An internal rechargeable Li-ion battery provides up to 1,000 hours of operation before needing a charge. The unit contains 32 Mbits of internal memory to record up to 280 hours of load data.

Data is downloaded to a PC via USB port. The sensor is configured to automatically switch at a certain time of the day or to standby. This feature is particularly useful if the sensor is attached in a location where switching on and off before and after use is inconvenient. This function also conserves battery life.

Saelig is a supplier of test and measurement equipment based in Fairport, NY.

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

#### MONITOR MEASURES DUST LEVELS



Logs up to 100,000 measurements.

New Star Environmental's Kano-max Dust Monitor accurately measures dust levels in plants via an intuitive interface.

Particle size ranges from 0.1 to 10  $\mu\text{m}$ . Measuring range is 0.001 to 10  $\text{mg}/\text{m}^3$ . Data logging is up to 100,000 measurements and a USB interface handles data transfer.

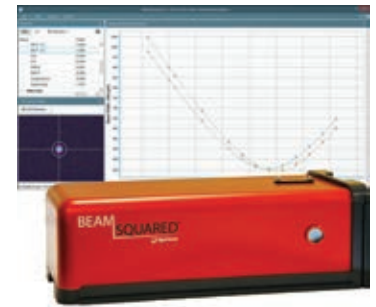
The lightweight monitor, with both analogue and digital outputs, is equipped with a Li-ion battery and has a 24-hour run time. Use the tripod mount for stationary installations or go portable with the shoulder strap.

New Star is a manufacturer of industrial test and measurement equipment based in Roswell, Ga. [www.newstarenvironmental.com](http://www.newstarenvironmental.com)

#### GAUGE LASER PROPAGATION

The BeamSquared M2 laser beam propagation system from Ophir delivers quick, automated measurement of the propagation characteristics of CW and pulsed lasers.

The system runs in an automated mode from UV to NIR



ISO 11146-compliant.

and telecom wavelengths, or in manual mode for terahertz and CO<sub>2</sub> laser beams.

The continuous use system is used in research, prototyping, fabrication and machining applications. It includes BeamSquared M2 software; a high accuracy CCD, InGaAs, or pyroelectric array camera; and an optical train.

The software measures beam propagation characteristics on both the X and Y axes, including waist diameters, full angle divergences, waist locations, Rayleigh lengths, M2 or K and BPP factors, astigmatism and asymmetry. 2D or 3D beam profiles are also displayed for visual beam profile verification.

The system combines a longer optical train with the Ultracal calibration algorithm for accurate measurements and full ISO 11146 compliance.

Ophir is a manufacturer of test and measurement equipment based in North Logan, Utah.

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

### CONNECTORS

#### CONNECTORS FOR HARSH ENVIRONMENTS



Rated to IP67.

Binder USA's RD24 panel-mounted connectors are fitted with gold plated contacts and rated to IP67 to withstand harsh environments in the power, industrial and communications sectors.

They come in 4- and 7-pin con-



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figurations, rated at a maximum of 16 A per contact and transfers up to 400 V.

An optional protection cap lanyard attaches directly to the housing body of the connector. Male and female field-attachable connectors and cordsets are available.

Binder USA is a connector manufacturer based in Camarillo, Calif.

[www.binder-usa.com](http://www.binder-usa.com)

**CABLES**

**CONNECTORS HANDLE LARGE CABLE DIAMETERS**



9- to 18-mm clamping range.

HARTING has expanded compatible cable types for its Han 3 A connectors, which are now assembled with diameters up to M25, rather than the previous limit of M20.

The connectors now configure with any contact insert in the series, including those with higher rated current and bigger cross sections, such as the Han Q. Hoods also meet IP65/67 protection requirements.

Han 3 A hood components have a narrow external geometry overall, terminating in the cable holding area. The hood is available with a bigger M25 connection and a plastic version to allow traditional mounting, such as on control cabinets.

Other versions include EMC (electrically conductive) and M for stricter corrosion requirements.

M25 screwed cable glands for both the plastic and metal 3A size hoods cover a clamping range of 9 to 18 mm.

HARTING is an industrial connector manufacturer based in Espelkamp, Germany, with a sales office in Montreal.

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

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

**FASTENERS**

**THREADED INSERTS ARE ENVIRONMENTAL**



70% lighter than brass.

Aluminum versions of PennEngineering's SI threaded inserts are lead-free and lightweight alternatives to brass counterparts that eliminate environmental and recycling issues.

The aluminum inserts are up to 70% lighter than brass versions, and are corrosion resistant.

They're used with durable and reusable metal threads in plastics to accept mating hardware.

Applications include plastic enclosures or components for the consumer electronics, medical, automotive, aerospace, transportation and recreational industries.

They're equipped with ultrasonic/heat staking inserts for ultrasonic installation or with a thermal press, moulded-in types installed during the moulding process, and press-in types installed by pressing the insert into a pre-moulded or drilled hole.

The inserts, with threads as small as M1, install permanently and disassemble and re-attach plastic components without damaging the threads.

PennEngineering is a fastener manufacturer based in Danboro, Pa.

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

**DOSIMETER CONNECTS IN EXPLOSIVE ENVIRONMENTS**

Casella CEL Inc.'s dBadge2 wireless noise dosimeter operates in explosive environments such as the oil and gas, and chemical sectors.

Equipped with Bluetooth 4.0, the dosimeter wirelessly controls multiple units from distances up to more than 30 m,

Real-time noise exposure data.



including starting, pausing or stopping noise sampling, even without a clear line of sight between devices.

dBadge2 is certified for Class I, Zone 0 hazardous locations,

where there may be high concentrations of flammable gases, vapours or dusts present.

It transmits real-time noise exposure data via IS approved mobile devices; measures hazardous location noise environments; and preserves hearing health without interrupting the employee or overall workflow.

The lightweight unit's enclosure seals against the elements, handling a temperature range of



**Relax, tomorrow has already been tested.**  
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[HARTING.ca](http://HARTING.ca)

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## PRODUCTS AND EQUIPMENT

-20 to 45 degrees C.

Casella CEL Inc. is a developer of monitoring equipment based in Buffalo, NY.

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

### TRANSMITTER DELIVERS DUAL MEASUREMENT CAPABILITY

GF Piping Systems' Signet 9950 dual channel transmitter measures two readings in one transmitter. This eliminates

single channel transmitters in applications that require several measurements.

With dual channel capability, two of the same sensor measurement types connect, such as flow and flow, or two different types such as pH or ORP. A backlit dot matrix display



Multiple relay modes.

illuminates both measurement readings simultaneously.

The device controls relays and current loops with the sum, difference, or ratio of two-like measurements. Multiple relay modes handle up to three signals to control a single relay in any combination of analogue and binary inputs. Time

based relay modes set activation on a repeating basis.

The transmitter meets CE, UL, and CUL standards for applications including water/wastewater treatment systems, reverse osmosis, deionization, media filtration, chemical manufacturing/addition, cooling towers, and metal and plastic finishing.

GF Piping is a manufacturer of process control products based in Irvine, Calif.

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

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## CABLES

### CABLES DELIVER SECURE INDUSTRY 4.0 DATA



Immune to electrical interference.

*igus's* chainflex fibre optic and CAT7 continuous-flex cables for "smart" factories deliver real-time communications between machines at all levels of a manufacturing operation.

They increase data transfer rates tenfold.

Cables come in three jacket material options for rolling flex applications. A torsional CAT7 option is available for robotic applications.

The cables are immune to electrical interference, which produces higher data transmission rates, and they stand up to 36 months of continuous-flex performance.

There are also cables that handle harsh or torsional environments.

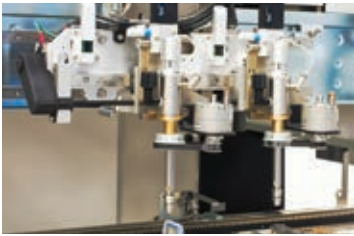
*igus* is a cable and bearing manufacturer based in Cologne, Germany.

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

## FLUID DISPENSING

### CUT COATING TIME BY HALF

Nordson Asymtek's Select Coat SL-940 conformal system's dual-simultaneous programmable pitch coats two parts at the



Eliminates guess-work.

same time. This is especially beneficial in automated high-mix production environments.

The motorized system automatically repositions the applicators to match the programmed pitch to eliminate set-up time and double throughput, especially for high takt time conformal coating processes or when multi-up panellized or patterned parts are used.

Pitch is programmed and adjusts automatically.

Nordson Asymtek is a manufacturer of fluid dispensing technologies based in Carlsbad, Calif. [www.nordsonasymtek.com](http://www.nordsonasymtek.com)

**MACHINING**

**MACHINING CENTRE BOOSTS PRODUCTIVITY**



32 in. of Y-axis travel.

Mazak's VTC-805E vertical travelling column machining centre boosts productivity to operations that machine long or heavy parts.

It combines an increased Y-axis stroke, long bed/table size, high spindle speed and torque and Mazak's SmoothG CNC control.

The machining centre delivers an extended Y-axis travel of 32 in. as an alternative to a bridge-style machine. The fixed table measures 82.7 x 32.3 in.; and 69.3

in. X axis and 28.3 in. Z axis.

To reduce cycle times, an optional centre transforms the unit into two separate work areas to process parts on one side while operators load/unload parts on the other. A turret-style magazine accommodates 40 tools for longer periods of uninterrupted production and part-processing versatility.

A 30-hp, CAT 50-taper, 6,000-rpm spindle handles a variety of materials such as titanium, aluminum, steel and cast iron.

SmoothG CNC generates programs for off-centreline machining as well as angled drilling, milling and tapping operations. Advanced hardware includes a tilting CNC panel and intuitive, multi-touch control screen. The SD card stores up to 32 GB of program data.

Mazak is a manufacturer of machine tool technologies based in Florence, Ky. The company has a Canadian Technology Centre in

Cambridge, Ont.

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

**TOOLHOLDERS IMPROVE MACHINING CONSISTENCY**



For dual-contact spindle systems.

Seco Tools' taper-face toolholders increase rigidity and consistency in machining applications that require higher production and process reliability.

The toolholders for dual-contact spindle systems use plastic deformation of the machine spindle for simultaneous fit of both the taper and the flange face from the holder. This creates a rigid connection that prevents the toolholder from being pulled into the machine spindle,

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## PRODUCTS AND EQUIPMENT

while improving run-out precision and machining accuracy.

This also makes it possible for machinists to use higher machining parameters to increase productivity.

Use them for applications that involve long tool overhangs, deep-hole boring and exotic workpiece materials that magnify cutting force.

Spindle connections include BT30 TF, BT40 TF, BT50 TF, CAT40 TF and CAT50 TF, in metric and imperial measurements.

Seco is a manufacturer of metalworking technologies based in Troy, Mich.

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

### ROBOTICS

#### ROBOT WITHSTANDS HARSH ENVIRONMENTS

ABB Robotics' IRB 1200 Foundry Plus 2 robot increases flexibility and reduces cycle times for precision die casting processes, material handling and machine tending applications.



700- to 900-mm variants.

The robot is IP66/67-rated for harsh environments from base to wrist, meaning its electrical compartments are sealed against liquid and solid contaminants.

They're also corrosion resistant and withstand high-pressure steam washing.

The robot comes in two variants: a 700 mm version carries payloads up to 7 kg, while the longer reach 900 mm variant carries up to 5 kg.

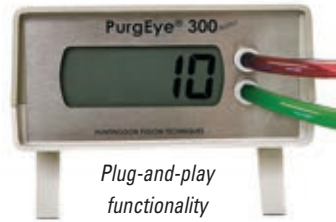
ABB is a robotics manufacturer with North American operations in Chicago.

The ABB Group is headquartered in Zurich, Switzerland. ABB Canada is headquartered in Montreal.

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

### WELDING

#### MEASURES OXYGEN LEVELS TO 10 PPM



Plug-and-play functionality

Huntingdon Fusion Technologies' PurgEye 300 Nano weld purge monitor measures oxygen levels from 1,000 down to 10 ppm.

The 300 Nano has been developed for weld purging where data logging, alarms and welder control aren't required.

It's small and lightweight, without knobs, switches or controls to deliver plug-and-play functionality.

Sensor warm-up time is less than 60 seconds. There aren't any monitors with 'wet cell' technology that have to be regularly calibrated and have sensors replaced.

Purge gas quality is checked from the main source and at the exhaust end of a purging system, while uncovering air leaks in hose connections anywhere in the system.

'Leak tight' connectors allow the monitor to be used with an optional accessory hand pump and gas sampling probe.

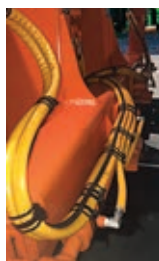
Huntingdon is a manufacturer of weld purging technologies based in Carms, UK.

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

### HOSES

#### SLEEVES REDUCE HAZARDOUS CLEANUP

Parker Hannifin's SplashShield hose sleeves contain splashes to deflect hot oil or other fluids away from sensitive controls and reduce hazardous material cleanup.



Reduces hose failure.

The sleeves protect the hose from spraying fluids, while reducing hose failures that could occur due to hose-to-hose or

structure contact.

They stay in place without zip ties or clamps, but are flexible enough to bend with the hose.

SplashShield is a non-stick cover that eliminates cleaning between helixes.

They come in sizes to cover hoses with diameters of 0.67 to 2.13 in.

Custom colours are available to code hoses by pressure, system line or type.

Parker Hannifin is a manufacturer of hoses and tubing based in Ravenna, Ohio.

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

### POWER CONVERSION

#### POWER CONVERTERS REQUIRE MINIMAL BOARD SPACE



12, 15 or 24 VDC input bus voltages.

MicroPower Direct's IG275E miniature DC/DC converter delivers the asynchronous output voltage levels required to properly bias the gate drive of IGBT semiconductors, such as inverters used in solar power systems.

Three models operate from 12, 15 or 24 VDC input bus voltages, with dual outputs of +15 and -8 VDC. Output current is  $\pm 120$  mA.

Standard features include 3,000 VAC I/O isolation, very low isolation capacitance and high efficiency.

All models come in a 7-pin SIP case that requires minimal board space. Pin-out is industry standard and all case materials meet UL94-V0 requirements. They operate in temperatures between -40 to 105 degrees C.

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

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

### PUMPS

#### PUMPS REDUCE AIR CONSUMPTION



Sizes from 38 to 76 mm.

Wilden's Advanced FIT AODD pumps replace existing installations with bolted product containment, easier maintenance and efficient operation.

They fit bolt-to-bolt and pipe-to-pipe in fluid-handling systems.

Their FIT-wetted path minimizes the number of fasteners used and allows for single socket reassembly to ease maintenance and an energy-efficient Pro-Flo SHIFT Air Distribution System uses less air.

Sizes range from 38 to 76 mm, with elastomer options for severe environments.

Wilden is a pump manufacturer based in Grand Terrace, Calif.

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

### AUTOMATION

#### OUTPUT MODULE REDUCES COSTS PER CHANNEL

WAGO's 750-515 4-channel digital relay output module reduces cost per channel while maximizing space in the control cabinet.



Uses multiple voltages.

It's used with multiple voltages (250 VAC/30 VDC) and delivers 2 A per electrically isolated channel when all four are employed, or 5 A when used as single channel for high current applications.

The component works with any WAGO PLC or coupler.

WAGO is a manufacturer of automation technologies based in Germantown, Wis.

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



## Plantware



Authenticates and encrypts.

### CONTROL FIRMWARE EXTENDS CYBERSECURITY

Bedrock Automation's Cybershield 2.0 control firmware extends cybersecurity protection to networks, the Industrial Internet of Things (IIoT) and third-party applications.

It enables authentication and encryption of I/O networks and field devices, but also protects compliant networks and user applications such as controller configuration, engineering and SCADA.

The firmware achieves this with the world's first industrial control system certification authority – drawing on the power and flexibility of public key infrastructure and transport layer security.

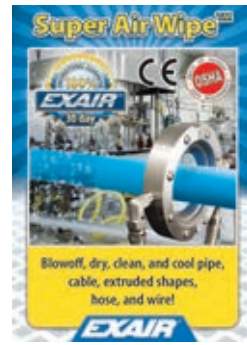
Bedrock Automation has also released a controller that obtains customized, company specific root keys and certificates. Its Open Secure Automation initially secures a control platform and component supply chain. The resulting endpoint root of trust leverages hardware-based secret root keys and certificates for advanced cryptographic authentication of Bedrock hardware and software components, which are further fortified with layers of anti-tamper protection.

Bedrock Automation, based in San Jose, Calif., is the creator of the Bedrock cyber secure automation platform.

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

## Industrial Literature Reviews

### SUPER AIR WIPE TO BLOW, DRY, CLEAN AND COOL



EXAIR's Super Air Wipe™ is ideal for blowoff, drying, cleaning and cooling of pipe, cable, extruded shapes and hose. It delivers a 360° airstream that adheres to the surface of the product passing through it.

The split design makes it easy to clamp around the surface, eliminating the need for threading. Applications include drying of inks, paint and silk screen printing; cooling hot extruded shapes; blowoff of water or contaminants.

[www.exair.com/18/125.htm](http://www.exair.com/18/125.htm)

EXAIR Corporation

### FLIR TG165 IMAGING IR THERMOMETER



The FLIR TG165 Imaging IR Thermometer bridges the gap between single spot infrared thermometers and FLIR's legendary thermal cameras. Equipped with FLIR's exclusive Lepton micro

thermal sensor, the TG165 lets you see the heat so you know where to reliably measure it. Easily find unseen hot and cold spots for instant troubleshooting. Store images and data to show customers and include in reports.

[www.flir.com/tg165](http://www.flir.com/tg165)

FLIR

### AUTOMATED SYSTEMS FOR CONVEYING



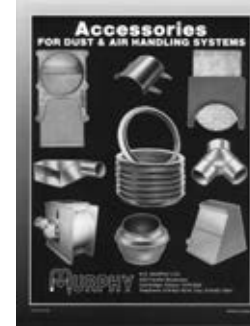
This brochure offers a detailed overview of the VAC-U-MAX range of pneumatic conveying components and automated systems. These include conveying, weighing and batching of powders and bulk

materials in food, pharmaceutical, chemical and petrochemical processes.

[www.vac-u-max.com/landingPneumatic.cfm](http://www.vac-u-max.com/landingPneumatic.cfm)

VAC-U-MAX

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locks and exhaust fans. For this free catalogue contact:

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## EVENTS

### Partners in Prevention 2017 WSPS

May 2-3, Mississauga, Ont.

The workplace health and safety conference and trade show is presented by Workplace Safety & Prevention Services (WSPS). It features sessions, workshops and exhibitors. Keynotes include Steven Paige, formerly of Barenaked Ladies and an advocate of mental health awareness, Neil Pasricha, award-winning blogger and Curt Steinhorst, digital distraction expert. Visit [www.PartnersinPreventionConference.com](http://www.PartnersinPreventionConference.com).

### ADM Expo

May 16-18, Toronto

The Advanced Design and Manufacturing show brings together ATX Canada, Design & Manufacturing Canada, PACKEX Toronto, PLAST-EX, and Powder & Bulk Solids Toronto. Visit <http://admtoronto.com>.

### CPES2017 Conference and Exhibition CPEIA

May 24-26, Toronto

Presented by the Canadian Printable Electronics Industry Association. Presentations will focus on intelligent packaging, intelligent buildings, aerospace and defence, automotive

and industrial applications, health and wellness, intelligent documents, consumer electronics and wearables. Visit [www.CPES2017.ca](http://www.CPES2017.ca).

### WMTS 2017

SME

June 6-8, Edmonton

Keynotes, panel discussions and interactive technology exchanges at this Western Canada focused manufacturing event. Visit [www.wmts.ca](http://www.wmts.ca).

### CMTS 2017

SME

Sept. 25-28, Mississauga, Ont.

A national manufacturing event featuring the latest advances in

machine tools, tooling, metal forming and fabricating, 3D printing/additive manufacturing, automation, design engineering and plant management. Visit <http://cmts.ca/general-info>.

### FABTECH 2017

FMA, SM, PMA, CCAI, AWS

Nov. 6-9, Chicago

North America's largest metal forming, fabricating, welding and finishing event featuring 1,700 suppliers. Presented by Fabricators & Manufacturers Association, SME, Precision Metalforming Association, American Welding Society and Chemical Coaters Association International. Visit [www.fabtechexpo.com](http://www.fabtechexpo.com).



# Trudeau's economic policies suicidal in Trump world

BY GWYN MORGAN

Donald Trump's election victory set off a political earthquake and earthquakes are often followed by devastating tsunamis generating huge waves that travel far beyond the quake epi-centre. Yet, even as those "Trump-quake" waves threaten to sink our economic ship, Prime Minister Justin Trudeau seems determined to maintain his pre-Trump course and there are some dangerous shoals lurking along that perilous route.

Trump is anti-free trade. His advisors have said that Canada isn't their target. Even if that's true, the recent decision by General Motors to move 600 jobs from its CAMI assembly plant in Ingersoll, Ont. to Mexico demonstrates that Trump's protectionist bullets can ricochet across our border. Given his bombastic threats, there's no way automakers will move jobs from the US to Mexico, so their only option is to move those jobs from Canada.

Making matters worse is the new administration's plan to exempt export revenues from income tax, while disallowing imported goods as a tax expense. These damaging actions are occurring even before NAFTA comes up for reconsideration.

Trudeau is pivoting towards China as an offset to Trump's protectionism. But a free trade agreement with corrupt and opportunistic China would be strategically and ethically unwise. Canadians keep their word, while the Chinese are notorious for saying one thing and doing another.

Trump plans to slash corporate tax rates to 15%, erasing Canada's previous advantage that saw US companies changing domicile through reverse takeovers. Adding Trudeau's carbon tax tips the scales in America's favour. Moreover, Trump's "America First" and "Buy American, Hire American" policies will be a strong deterrent to creating or expanding operations in Canada that target US markets. All this bad news comes when Canadian business investment has already been dropping for eight consecutive quarters.

Trump plans to reduce the top federal personal income tax rate to 33%, while Trudeau's increases on higher income earners raised the top rate to 33%. Sounds like a tie, until state and provincial taxes are considered. Seven US states have no income tax and, with the exception of California, taxes in those that do are much lower resulting in combined rates of between 33% and 42%, compared with Canada's 49% to 54%. This presents a serious impediment to attracting and retaining skilled, highly mobile workers.

Trump wants to encourage more oil produc-

tion to create jobs and reduce imports. Trudeau recently told Albertans he wants to "phase out" oil production. Perhaps he's unaware of oil's crucial importance to Canada's balance of trade, generating as much net export revenue as the next nine of our top 10 exports combined.

Trump wants to streamline the regulatory process for new oil pipelines. Trudeau is contemplating a new regulatory process featuring even more extensive "social licence" consultations that have already seen economically important projects stymied for many years.

Trump wants more natural gas hydraulic fracturing, a key contributor to jobs in some of the country's poorest states. Meanwhile, the Trudeau government continues to hand some \$18 billion per year in equalization payments to the four so-called "have not" provinces that have banned fracking. Perversely, the funding of those payments has come almost entirely from tax revenues of oil and gas producing provinces. But now the economies of those provinces, and the federal tax revenues from them, have collapsed. Under the three-year rolling average calculation of the equalization formula, payments to the four frack-shunning provinces will start a precipitous drop at the same time as the Trump-quake takes its toll on Canada's economy.

Trump supports coal-fired power generation. Trudeau wants to replace coal-fired power with much more costly "green" alternatives. That will add more challenges to the struggling economies of Alberta, Saskatchewan, Nova Scotia and New Brunswick, which don't have hydro-power alternatives.

The federal government recently released a study projecting three decades of continuous budget deficits that would double national debt to an incredible \$1.5 trillion. That's an unconscionable legacy to leave young Canadians and their offspring. And the federal study didn't consider the Trump-quake impacts that are certain to make that terrifying debt scenario even worse.

Virtually all of Justin Trudeau's policies, from energy regulation, tax rates, income and carbon taxes to deficit spending are economically suicidal in the face of Trump's avowed actions. Clinging to those policies could prove to be the biggest mistake made by any Prime Minister in Canadian history.

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*Gwyn Morgan is the retired, founding CEO of EnCana Corp., which produces, transports and markets natural gas, oil and natural gas liquids. Distributed by Troy Media © 2017.*

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

TRUMP PLANS TO SLASH CORPORATE TAX RATES TO 15%, ERASING CANADA'S PREVIOUS ADVANTAGE...

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