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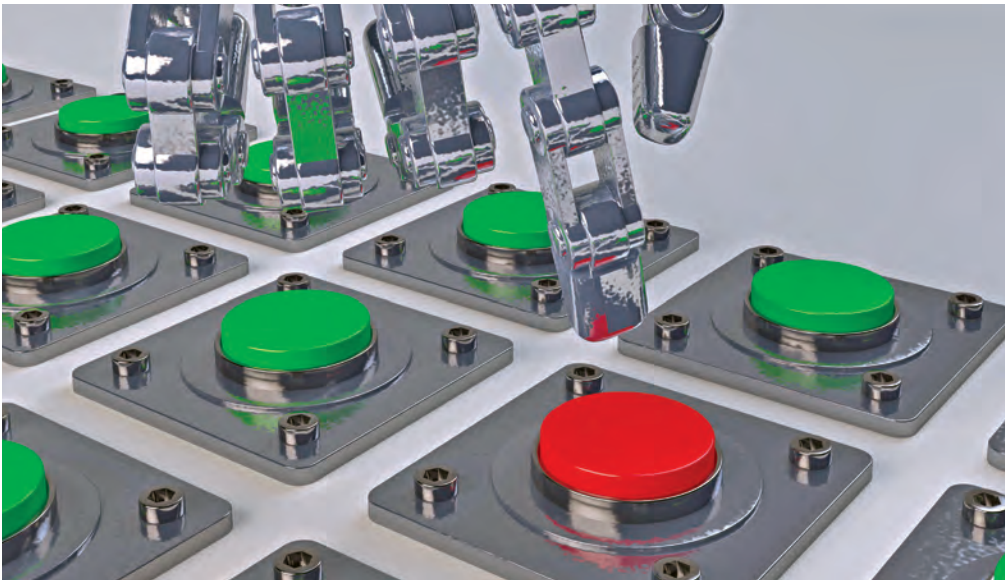
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Currently the FLIR Test Drive program is only available to Canadian citizens or residence and cannot be used outside of Canada.





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Investing in advanced technology boosts productivity and profits.

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Cover: Fotolio

PLANT—established 1941, is published 8 times per year by Annex Business Media. Publications Mail Agreement #40065710. Circulation email: blao@annexbusinessmedia.com Tel: 416-442-5600, ext 3552 Fax: 416-510-6875 or 416-442-2191 Mail: 111 Gordon Baker Road, Suite 400, Toronto, ON M2H 3R1. Occasionally, PLANT will mail information on behalf of industry-related groups whose products and services we believe may be of interest to you. If you prefer not to receive this information, please contact our circulation department in any of the four ways listed above. Annex Privacy Officer: privacy@annexbusinessmedia.com Tel: 800-668-2374. No part of the editorial content of this publication may be reprinted without the publisher's written permission. ©2018 Annex Publishing & Printing Inc. All rights reserved. Performance claims for products listed in this issue are made by contributing manufacturers and agencies. PLANT receives unsolicited materials including letters to the editor, press releases, promotional items and images from time to time. PLANT, its affiliates and assignees may use, reproduce, publish, re-publish, distribute, store and archive such unsolicited submissions in whole or in part in any form or medium whatsoever, without compensation of any sort. This statement does not apply to materials/pitches submitted by freelance writers, photographers or illustrators in accordance with known industry practices. Printed in Canada. ISSN: 1929-6606 (Print), 1929-6614 (Online).



Carbon, for what it's worth

Many Canadians believe climate change is real, that we're causing it and our governments should do something about it. Point taken. So far several federal regimes and their provincial counterparts have done a lot that hasn't amounted to much, and the current guardians of the climate are doing much of the same.

Many manufacturers contending with all kinds of government-induced costs to their businesses probably haven't paid too much attention to the federal Liberal government's scheme to put a price on carbon, starting next January. That's \$20 per tonne of emissions, which will escalate to \$50 in 2022. The provinces can come up with their own, equivalent plans, either by adopting a carbon tax or implementing a cap-and-trade regime.

Will this send us well on the way to achieving our international commitment of a 30% reduction in emissions from 2005 levels by 2030, and will it help to hold global warming at an increase of 2 degrees C? Don't bank on it.

First of all, Canada's contribution to the world's greenhouse gas emissions is about 1.6% so anything we do – for the most part – is symbolic. Moreover, we already have a lot of catching up to do. As of 2015, Canada was behind its target by 200 million tonnes.

Combined, China and the US account for about 41% of the world's total emissions. Both are heavily reliant on coal power. And our good neighbour to the south is busy dismantling its climate regulations. Since most of our trade (80%) is with the US, putting a price on carbon is to our competitive disadvantage. Pricing levers add cost to doing business, but they're also jumbled up in politics and regulation, all of which serves to repel foreign and domestic investment.

How is carbon pricing supposed to work? It's based on the premise that if you have to pay for it, you'll use less of it. Economists love the pricing model because of its theoretical simplicity, and they'll trot out various examples where it's successful – such as BC – where good citizens have obligingly reduced their use of fossil fuels.

That's very laudable and green of them. But Canadians and businesses do enjoy heat in the winter; power to illuminate, run plants, processes and households; and the ability to get around town. These consumption factors offer limited potential for conservation.

Meanwhile, taxes and cap-and-trade both leave a gaping hole for companies that don't mind spending the money to continue discharging their carbon with abandon.

Not that it matters. Both levels of government are doing a poor job of executing a climate strategy, according to auditor generals across the country.

They did a joint audit that concludes: few governments have detailed plans to reach their targets; their assessments to adapt to risks posed by climate change have been haphazard, inconsistent and lacking in detail; and they lack timelines and plans for funding. Only Ottawa and two provinces have emissions targets but they're not on track to meet them.

For those keeping score, the auditors note Canada has set four emissions targets, and had eight plans to meet them, but have not done so, even once.

Looking ahead, Prime Minister Justin Trudeau can expect more pushback on carbon pricing from Saskatchewan; Ontario if Tory Doug Ford wins the upcoming election; and Alberta if rebranded conservative Jason Kenny wins the election next year in Alberta.

And as Canada's contorted efforts to chip away at the 1.6% play themselves out, it will be China, the US and to a lesser extent Europe that will ultimately determine how high the global thermostat will go.

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Subscription Price
 Canada \$74.50 per year, US \$151.50
 (US) per year, Foreign \$171.00 (US) per
 year. Single Copy Canada \$12.00. Add
 applicable taxes to all rates. Combined,
 expanded or premium issues, which count
 as two subscription issues.

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Here's how:

A 1/4" copper tube is a common homemade blowoff that consumes 33 SCFM when at a normal supply pressure of 80 PSIG. EXAIR's award winning **Model 1100 Super Air Nozzle** is 1/4 NPT and consumes only 14 SCFM at 80 PSIG.

33 SCFM (copper tube) - 14 SCFM (Super Air Nozzle) = 19 SCFM compressed air saved. For this example, the blowoff is continuous.

Most large plants know their cost per 1,000 standard cubic feet of compressed air.

If you don't know your actual cost per 1,000 SCF, 25¢ is a reasonable average to use.

SCFM saved x 60 minutes x cost/1,000 SCF = Dollars saved per hour.

In this case, 19 SCFM x 60 minutes x .25/1,000 = 28.5 cents per hour.

28.5 cents per hour x 40 hour work week = \$11.40 per week.

\$11.40 per week x 52 weeks = \$592.80 per year.

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For more information, visit https://exair.co/18_410

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BULLETINS

Baylin Technologies in Toronto, a wireless technology company with global manufacturing sites, is bringing some of its production to North America. Its **Galtronics Corp.** subsidiary has signed on with **Jabil Inc.**, which will manufacture passive and active RF products at its Guadalajara, Mexico plant. Manufacturing closer to customers will improve Baylin's scalability.

Sixty workers at **Heroux-Devtek Inc.**'s Longueuil, Que. facility have lost their jobs following the aerospace manufacturer's loss of a US Air Force contract that is winding down next year. The company says it's working with customers in the commercial and defence sectors to obtain new contracts.

Biorem Inc., a manufacturer of air emission control devices, has added \$5.3 million in orders on its books for projects in North America and Australia. The Guelph, Ont. company says it has \$22 million worth of orders on the go.

Aurora Cannabis Inc. in Vancouver, has increased its ownership of Hempco Food and Fiber Inc. to 35%. The Burnaby, BC producer of hemp products has a 56,000 square-foot processing plant in Nisku, Alta. Hempco is being positioned to take advantage of opportunities in the health lifestyle food supplements, and pet, equine markets.

Boeing will not appeal a ruling by the US International Trade Commission that allows Montreal-based **Bombardier** to sell its C Series commercial jets without the 300% duties imposed by the US Department of Commerce. The International Trade Commission rejected Chicago-based Boeing's claim that Canada and Britain subsidized development of Bombardier's jets and allowed their sale at unfairly low prices.

Statistics Canada reports the value of Canadian spirits exported internationally declined 5.1% from \$674.7 million to \$639.9 million last year compared to 2016. Despite this drop, spirits still accounted for 68% of the value of all Canadian beverage alcohol exports in 2017, far surpassing the combined value of beer, cider and wine exports.



Inside Sleeman's Guelph, Ont. brewery.

PHOTO: SLEEMAN

Sleeman invests in Guelph

Upgrading equipment and adding beer tanks

GUELPH, Ont. — Sleeman Breweries Ltd. is investing \$6.6 million in upgrades and improvements to its Guelph, Ont. brewery.

The brewer of 20 different lagers and ales is also getting \$422,000 from the province's Southwestern Ontario Development Fund.

Sleeman is expanding its packaging capabilities, upgrading equipment and adding new tanks to brew and package beer currently produced by a contractor in the US.

Innovative packaging technology will also mean the brewer will produce 710 ml aluminum cans of select brands for the Canadian market.

The project, to be completed by December 2020, will create 15 jobs.

Sleeman is Canada's third largest brewing operation and is one of Ontario's original craft brewers.

It's parent company is Sapporo Brewery, Sapporo Breweries Ltd. in Japan.

Algoma augments its electricity supply

Acquires 55 megawatts with former Lake Superior Power Plant

SAULT STE. MARIE, Ont. — Essar Steel Algoma Inc. has augmented its power generating capacity with the acquisition of a neighbouring combined heat and power plant (formerly the Lake Superior Power Plant).

The 55-megawatt facility will supplement the Sault Ste. Marie, Ont. steelmaker's current supply of power and steam.

"The acquisition of a well maintained asset in such close proximity to our operation is very logical. Not only does it give Algoma the capability to satisfy its peak power requirements, but it significantly enhances our sustainability and reliability by offering some redundancy as several of our existing assets approach end of life," said Algoma CEO Kalyan Ghosh.

The steelmaker is working towards greater electricity self-sufficiency. Ghosh noted the potential for a further 71 megawatts in sustainable power projects through the addition of a solar farm (50 megawatts), a low pressure steam turbine (8 megawatts) in the steelmaking facility, and a top gas recovery turbine (13 megawatts) at the No. 7 blast furnace.

MDE to market Pond CO2 technology

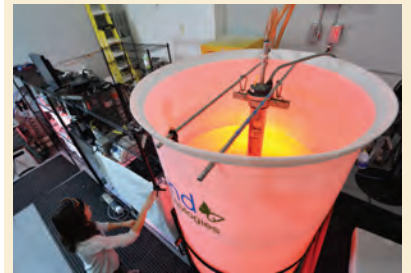
Grows algae to produce nutraceutical products

CALGARY — Pond Technologies Holdings Inc. has shipped its Matrix CO2 emissions conversion system to Markham District Energy Inc. (MDE).

Pond, also based in Markham, said the shipment begins the first phase of a \$16.8 million project to convert CO2 emissions to algae-based nutraceutical products.

In an exclusive marketing agreement, MDE will market and develop customer projects using Pond's technology for the District Energy market worldwide.

Pond's system uses CO2 to grow many species of algae, including strains that produce anti-oxidants, omega-3 fatty acids, and protein for human and animal consumption.



Turning CO2 into algae.

PHOTO: RODNEY DAW

The combined heat and power plant has capacity to increase output to 110 megawatts with the addition of a second gas turbine.

Initially, the facility will operate intermittently, supplementing Algoma's current power requirements.



Seeking energy self-sufficiency.

PHOTO: ALGOMA

London screams for more Nestlé ice cream

\$51.5 million to expand production

LONDON, Ont. — Nestlé Canada is investing \$51.5 million to increase production capabilities at its London, Ont. ice cream factory.

The food manufacturer is responding to growing demand across Canada for its Häagen-Dazs, Parlour and Drumstick products.

Nestlé received \$390,000 in funding from the Ontario government's South Western Ontario Development Fund for an early phase of the investment that involved enhanced cleaning technology for each production line.

The investment adds 12 jobs and 45 part-time positions will move to full-time.

Expansion at the plant began in early 2016 with reconfiguration and consolidation of production



Workers outside the London plant.

PHOTO: NESTLÉ

lines to increase its capacity and flexibility for Häagen-Dazs. The second phase saw the addition of a second Drumstick line to further meet increasing demand. The third phase helped to modernize the existing processes for greater flexibility.

The latest plant expansion of 9,000 square-feet creates more capacity for future growth of Häagen-Dazs and other products.

Husky Energy charged for 2016 spill

LLOYDMINSTER, Sask. — A blended heavy-oil spill into the North Saskatchewan River in July 2016 has led to charges against Husky Energy and Husky Oil Operations Ltd.

Ten charges laid by Environment and Climate Change Canada and Saskatchewan's Environ-

mental Management and Protection Act, 2010 are the result of a 19-month joint federal-provincial investigation.

The Calgary-based energy company's pipeline near Maidstone, Sask. leaked 250,000 litres, 40% of which entered the waterway.

Eclipse still a best-managed company

Automation manufacturer achieves the gold standard with fourth win



Making customized machinery.

PHOTO: ECLIPSE AUTOMATION

TORONTO — When it comes to business performance, Eclipse Automation Inc. represents the gold standard in Canada, thanks to its fourth consecutive win in Canada's Best Managed Companies program.

The Cambridge, Ont. manufacturer was recognized for its overall performance and sustained growth among Canadian owned and managed companies.

Eclipse Automation won its first award in 2014 and obtained its Requalified Winner Status in both 2015 and 2016 before earning gold status. The company makes custom automated manufacturing equipment for several industries.

To accommodate growth, it added a sixth facility in Cambridge and expanded its US operations into Mesa, Ariz.

Canada's Best Managed Companies sponsors are Deloitte, CIBC, Canadian Business, Smith School of Business, TMX Group and MacKay CEO Forum.

Abattis LOI looks at cannabidiol for infused bottled water

VANCOUVER — Abattis Biocentials Corp. has entered into a non-binding letter of intent with Canadian Artesian Ice Ltd. to provide THC- and pesticide-free cannabidiol (CBD) isolate for infused water, plus other services.

Canadian Artesian is a bottler of Premium artesian 7.8 pH mineral water, based in Nel-

son, BC and is the bottler of Clearly Canadian Artesian mineral water.

The two companies have agreed to negotiate the terms of a definitive research services agreement.

"The bottled water market is expected to be approximately \$280 billion by 2020 and we believe point of origin will be the key

differentiator among big players," said Rob Abenante, president and CEO of Abattis. "In light of recent research indicating that more than 60% of North American bottled water comes from municipal water sources, Canadian Artesian's access to premium mineral well water positions it to produce a world-class line of CBD-infused mineral waters."

European acquisition for Premier Tech

Secures a foothold for its industrial equipment

RIVIÈRE-DU-LOUP, Que. — Premier Tech, a Quebec manufacturer operating across three industry groups, is expanding its global footprint with the acquisition of a machine builder in the Netherlands.

Swabo Machinebouw & Toelevering makes steel and stainless steel machinery components for OEMs in several industries.

Premier Tech, based in Riviere-du-loup, Que., said the acquisition secures its Industrial Equipment Group's (IEG's) mechanical manufacturing supply chain and increases the marketing agility of its packaging technologies in Europe.

Financial details were not released but the deal adds 70 people to the manufacturer's global team of 4,200.

In February the company announced a \$2.25 million investment in a plant operated by its IEG in Caraquet, NB that employs 56 people (with 12 positions left to be filled). Repayable loans were contributed to the project involving high-end production technologies by the federal government (\$250,000) and New Brunswick (\$800,000).

Premier Tech serves three core industries: horticulture and agriculture, industrial equipment and environmental technologies. It operates in 25 countries with global sales of more than \$725 million dollars.



Premier Tech industrial equipment in action.

PHOTO: PREMIER TECH

CAREERS

Ron Marcolin is Canadian Manufacturers & Exporters divisional vice-president for New Brunswick and PEI. Prior to joining CME New Brunswick,



Ron Marcolin

he was the senior manager of business development for Deloitte & Touche LLP in Saint John, NB. Most recently, he was vice-president of client services for Voice of the Client, a business development and consulting company helping SMEs grow. He served as a member of the CME Advisory Board for New Brunswick and PEI from 2009-2010.

BluMetric Environmental Inc. has a new CEO. **Scott MacFabe**, who has a varied background in environmental consulting, comes to the cleantech company based in Ottawa from an executive team that reorganized and expanded a premier US water/industrial/environmental firm.

The Conference Board of Canada has a new president and CEO. **Susan Black** is the seventh person to head the Ottawa-based research firm. She has held several executive positions including chief human resources officer with Intact Financial Corp., and senior vice-president, people with Holt, Renfrew & Co. Ltd.

Grande West Transportation Group Inc., a manufacturer of mid-sized multi-purpose transit vehicles in Aldergrove, BC, has added **Keith Parker** to its board. He's the president and CEO of Goodwill of North Georgia. Before that he was CEO and general manager of the Metropolitan Atlanta Rapid Transit Authority.

Nova Bus, based in Saint-Eustache, Que., welcomes **Ray Little** to the company as vice-president of sales for North America. He will oversee growth efforts across North America. Previously, he was vice-president of business development for MV Transportation in Dallas. Nova Bus is owned by Volvo.

E-mail appointments, promotions, retirements and other career changes to jterrett@plant.ca.

Creepex joins the space age

URM tech heading for SpaceX in California

QUEBEC CITY — A mechanical creeper designed to inspect the belly of SpaceX's Falcon 9 rockets will be supplied by Creepex, a manufacturer of garage equipment.

The Quebec City company was contacted by a SpaceX engineer after Creepex's Body-Guard creeper was featured at the SEMA show in Las Vegas.

Code-named URM (Under Rocket Mobility), the company says the device's manoeuvrability and ease of adjustment make it fit for many other applications such as: aerospace, trains and subways, machinery, tunnel boring machines as well as any other industry that requires very precise and secure working positions.

SpaceX is an Elon Musk creation that designs, manufactures and launches advanced rockets and spacecraft in Hawthorne, Calif.



The Under Rocket Mobility device.

PHOTO: CREEPEX

Ottawa shuts Canada's steel, aluminum backdoor

OTTAWA — Canada is taking steps to prevent the trans-shipment and diversion of cheap foreign steel and aluminum into the US market following its temporary exemption from tariffs imposed on the two metals by the Trump administration.

This action follows assurances given by Prime Minister Justin Trudeau to US President Donald Trump that Canada would not be a backdoor for foreign imports.

Measures include the following:

- New anti-circumvention investigations will allow the Canada Border Services Agency (CBSA) to stop companies that try to dodge duties (for example, by slightly modifying products or assembling them in Canada or a third country).
- The CBSA will have greater flexibility in determining whether prices charged in the exporter's domestic market are reliable or distorted.
- Unions will gain standing to participate in trade-remedy proceedings, including at the Canadian International Trade Tribunal.

Canada will coordinate more closely with the US to strengthen enforcement at the border, and intends to meet more often with the US and Mexico to identify and discuss solutions to issues that harm the three partners. Stakeholder committees will meet regularly to monitor steel and aluminum trade to ensure imports don't hurt Canadian and North American jobs.

In 2017, the Canadian steel industry employed more than 23,000 Canadians and contributed \$4.2 billion to Canada's gross domestic product (GDP). The Canadian aluminum industry employed 10,500 workers while contributing \$4.7 billion to Canada's GDP.

Industrial firms share \$3M for expansions

WINDSOR, Ont. — A handful of industrial firms at the southwest tip of Ontario in Essex County are sharing in more than \$3 million in new funding from the province.

The five projects in the Windsor, Ont.-area are expected to create a combined 168 jobs and help the companies scale up.

The funding recipients include:

- **Jahn Engineering**, a tool and die manufacturer for the auto industry, is spending a total of \$6.6 million to expand its plant in Oldcastle, Ont., bringing in equipment such as a new thermal forming oven and hydraulic press. The work is expected to double the site's workforce, adding 80 new jobs, and reach completion by the beginning of 2021. Queen's Park has committed \$602,456 to the project.
 - **Reko International**, a maker of automated assembly systems and tooling for a number of industries, is spending \$15.4 million on a scaling-up project that includes unspecified advanced equipment and technology. The project will get \$1.5 million from the province and create 30 jobs in Windsor. The expansion is to be complete by 2021.
 - **Technicut Tool** will receive \$661,722 from the province to put toward a \$4.4 million expansion. The aerospace and defence sector manufacturer expects the work to create 10 new jobs at its Windsor plant by January 2021.
 - Metal fabricator **Uni-Fab** is also scaling up its operation by spending about \$5.4 million, plus \$585,970 from the Ontario government. The company will buy new equipment over next the two years and expects to create 33 jobs.
 - Fellow fabricator **Windsor Industrial Services** is also embarking on a smaller-scale expansion at its Windsor plant. The company expects to spend nearly \$1.9 million, including \$185,700 from Ontario to increase its production capacity and branch out its offering to new industries. The company says the project will create 15 new positions and be complete by early 2022.
- Ontario is accepting applications for funding. Visit www.ontario.ca/page/southwestern_ontario-development_fund. — Canadian Manufacturing.com Staff



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* Rental shop towels, cotton rags and mixed rags were compared to Tork Heavy-Duty Cleaning Cloths. Panel test conducted by Swerea Research Institute, Sweden, 2014. ** Rental shop towels, cotton and mixed rags were compared to Tork Heavy-Duty and Tork Industrial Heavy-Duty Cleaning Cloths. Panel test conducted by Swerea Research Institute, Sweden, 2014.

CE marking sought for cannabis inhaling device

OTTAWA — Tetra Bio-Pharma Inc. and its partner PS Innovations are seeking CE Marking for its Rx Princeps inhalation device as a first step into the European market.

The device is used in conjunction with a dried, loose cannabis to provide relief for advanced cancer pain and non-cancer pain patients.

Rx Princeps is a blend of three strains of medical cannabis. Production has been standardized to ensure lot-to-lot consistency of THC and CBD.

It's the same medical cannabis blend used to produce PPP001, the lead product in Tetra's pipeline of five cannabinoid-based prescription drugs seeking Health Canada and FDA approval in Canada and the US.

CE Marking guarantees a product's conformity to the European regulations and is required to allow Tetra

to commercialize and trade on the European and European Economic Area markets. Under the European regulation, the PS Innovation inhalation device will be considered to be Class 1 Medical.

The medical cannabis market for Europe is valued at \$56.7 billion, according to a Prohibition Partners report. In the US, the consumption devices market grew 116.5% in 2016 (year over year, according to a New Frontier data report).

Tetra Bio-Pharma is an Orleans, Ont.-based biopharmaceutical company involved in cannabinoid-based drug discovery and clinical development.

PS Innovations was created in 2017 to produce new devices for the use of cannabis products, and the creation of machinery dedicated to the manufacture of cannabis-based dosage forms.

Phishing attacks snag Canadian domain users

OTTAWA — Almost one-third (32%) of .ca domain users have been duped by phishing attacks and divulged sensitive information, according to a Canadian Internet Registration Authority (CIRA) study.

In late 2017, CIRA collected 2,000 responses from registrants who identified as either businesses or institutions who were asked about their cybersecurity concerns, challenges, and awareness. Here are some key findings:

- 77% of small business domain owners say they are either concerned or very concerned about being the victim of a cyber attack.
- In the last year, 19% of companies report being hit by ransomware.
- 22% of large organizations have been victimized by a denial of service attack in the past 12 months.
- 36% of individual domain holders report spending nothing on cybersecurity protection in 2017.

CIRA manages the .ca top-level domain on behalf of all Canadians.



PLANT ONLINE

SOUNDING OFF

What readers have to say about breaking news

Have you checked out **PLANT's** daily news online? Here are some headlines that have inspired members of the Canadian manufacturing community to chime in. They're edited, but use the links to see the raw – and for some – longer versions of their remarks plus the stories that inspired their reactions.

Stay up-to-date on the developments – domestic and global – that affect Canada's industrial sectors by watching the news feed at www.plant.ca or reading **PLANT's** twice-weekly newsletter (hit Subscribe on the website).

Uber suspends self-driving car tests in Toronto and elsewhere after pedestrian death

<http://www.plant.ca/yIVkF>

Well if self-driving cars are super safe, then by that logic, AR15s are too. They need someone to pull the trigger, and they're used in only a handful of killings each year. Good job everyone.

Alberta suspends caribou protection plan, asks for assistance from Ottawa

<http://www.plant.ca/BvDIi>

The order has nothing to do with protection and everything to do with a government floating false/

fake science as a means to shut down oil developers. The people who want the oil to stay in the ground are economic terrorists working for foreign governments, and those whose only interest is to control the energy market for profits, not the environment.

Hire more women: A solution to the skills shortage challenge

<http://www.plant.ca/gqE2q>

It's no secret that women are a greatly underutilized segment of the workforce, most particularly in manufacturing and the trades. This needs to be addressed if we're going to maximize opportu-

nities in the economy.

Trump admits making up facts about trade deficit in meeting with Trudeau

<http://www.plant.ca/fsLXM>

Talk about your Fake News!!!

Trump seems to be the master of it.

Ontario Tory leader Ford is focused on finances, can't wait to take on Wynne

<http://www.plant.ca/tNHwb>

Doug Ford needs to eliminate the numerous and scandalous money grabs the Liberals have in place, in particular the exorbitant accident fines imposed on businesses by the MOL. They are literally shutting down small companies.

Fewer Canadians identify as middle class, that's where the budget will focus

<http://www.plant.ca/b0tMw>

Maybe if the Trudeau government just got out of the way the working and middle class

would be much better off. It's not government that gives. It's taxpayers who work very hard to stay afloat...something most politicians know nothing about.

Canada will meet climate targets despite emissions gap: McKenna

<http://www.plant.ca/DDgzE>

Climate Barbie McKenna: Keep planting trees.

US proposes anti-dumping duties on Chinese aluminum foil

<http://www.plant.ca/ZOPGa>

This sounds like one dishonest unscrupulous regime versus another. The battle for last place on the corruption ladder.

Magna posts higher income and record sales in Q4

<http://www.plant.ca/b0tMw>

Why doesn't Magna assemble BMW in Canada to benefit both the domestic market and the local supply chain?

ECONOMY

Execs bullish on NAFTA: HSBC

...But they're concerned about protectionist policies

TORONTO — Protectionist trade policies are concern for business leaders around the world, but executives still have a positive outlook, including those in Canada, the US and Mexico. They expect NAFTA to have a positive impact on their businesses, according to a new HSBC report.

The international bank surveyed 6,000 firms trading globally and found 77% are optimistic about their international prospects, although 61% are concerned governments are becoming protective of their domestic economies.

North America executives are similarly concerned but half expect the North American Free Trade agreement to be good for their businesses over the next two years. Only 9% of US firms expect NAFTA to inhibit growth versus Mexico (16%) and Canada (13%). In fact, they're more positive about NAFTA. Canadian firms see less growth from CETA (43%) and CPTPP (39%) than from NAFTA (52%).

NAFTA partners rank each other as the top two most important target markets for expansion.

Assuming NAFTA remains intact, the study projects a positive long-term outlook for Canadian exports. Goods are forecast to average 6% growth annually through 2030. Natural resources, machinery and transport equipment are to retain the largest share, with mineral fuels accounting for about one-fifth of export growth.

Machinery and equipment sales will show gradual improvement as global investment advances.

Canada will be looking to emerging Asian markets where Vietnam and India are particularly promising. HSBC forecasts growth will average 10% annually through 2030.

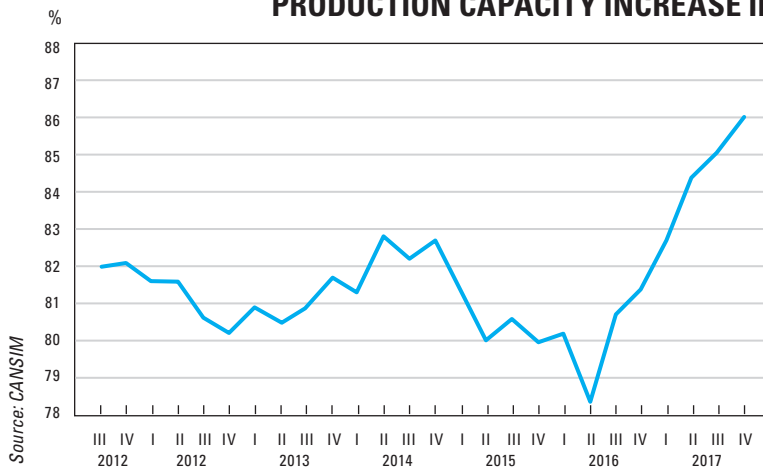
The US will remain the largest single market for Canadian exports over the coming decade but its dominance will erode with growth limited to about 5% annually. China will be Canada's second largest market with 9% growth annually.

The UK will hold third place.

PLANT PULSE

ECONOMIC DEVELOPMENTS AND TRENDS

PRODUCTION CAPACITY INCREASE IN Q4



Canadian industries operated at 86% of their production capacity in Q4 of 2017, up from 85.1% in Q3, the sixth consecutive quarterly increase. Manufacturing edged up 0.7% to 86.1% after a pause in Q3, the highest level since the fourth quarter of 2000. Durable goods manufacturers were the leading contributors. The overall increase was partly offset by decreases, particularly in chemical manufacturing, which declined in two of the four quarters.



4%

The upper end of consolidated operating income for global forest product companies rated by Moody's Investor Services over the next 12 to 18 months.

\$5.7B

The estimated value of marijuana consumed in 2017, according to experimental numbers from Statistics Canada. That's about 773.3 tons at a price of \$7.43 per gram.



\$1,091

Average weekly earnings for manufacturing in January, reflecting a 1.7% decrease. Statistics Canada notes Alberta and New Brunswick had the largest decreases in the sector.



\$13.9B

Value of the global digital twin (replica of physical assets) market by 2022, thanks to surging adoption of the Industrial Internet of Things (IIoT) and growing penetration of smart technologies and devices, says ResearchAndMarkets.com.



\$14B

What 11 billion tonnes of steel traded between Canada and the US each year is worth. Canada won a reprieve from US President Donald Trump's steel and aluminum tariffs. About half our steel is exported, mostly to the US. The industry employs 22,000 people directly, and 100,000 indirectly. About 3.2 million tonnes of aluminum are produced annually, worth \$12 billion. The industry employs 8,300 directly and 20,000 indirectly. The metal is produced in BC and (mostly) Quebec, with 80% exported to the US. (Canadian Steel Producers Association, Aluminum Association of Canada)

SMARTER AUTOMATION

HOW IT'S REVOLUTIONIZING MANUFACTURING



Select Food Products, owner, president and CEO Andrew Mitchell (right) on the plant floor.

PHOTO: SILVANA METALLO

Investing in advanced technology boosts productivity and profits.

BY KIM LAUDRUM

Installing an internet-connected, automated production line last year made it possible for Select Food Products Ltd. to attract a significant customer and ensure the company's future success.

"It helps us get into the big leagues now and down the road," said Andrew Mitchell, CEO of the Toronto food processor. Select Food stepped in to help Leamington, Ont. tomato farmers when US-based Heinz left town. Partnered with French's, Select Food now makes and packages French's ketchup, plus other condiments and dressings, at its

newly automated Toronto plant.

Now running two shifts per day for five days per week, the company is installing another highly automated line that Mitchell says "runs more efficiently and ultimately could result in the decommission of some old lines."

Kettles hooked up to the internet with touchscreen programming automate functions such as batch control, flow meters and temperature holds.

"If the temperature doesn't hit what it should be, that product will be rejected. It's all done automatically," Mitchell says.

Streams of data are collected and analyzed regarding throughput, for example, that help the managers make informed operational and business decisions.

Select Food has joined the Fourth Industrial Revolution (dubbed Industry 4.0), which involves automation and data exchange via cyber-physical systems, IoT, cloud and cognitive computing. The impact of advanced automation technology connected to the Industrial Internet of Things (IIoT) promises to modernize manufacturing, boost productivity and improve North America's global competitiveness.

But automating the plant has displaced some workers. "We have higher-skilled, but fewer people on the lines now," Mitchell points out. "We realized we had a lot of low-skilled people that ultimately are doing the work that machines can do. That's what we're moving toward."

He cites "hydro rates that are going

through the roof,” ever shrinking margins, new labour laws such as increased minimum wages and allowances for more time off for workers as pressures that led him to consider automation.

“Machines don’t take days off.”

Automation has made it possible for Select Food to increase throughput and improve quality control. Mitchell says food packaging is an ever-evolving area of his business that requires constant attention. “The quality standards are insane!”

He advises other manufacturers to consider this: “The velocity of a business is a lot faster now than it ever was. You need to constantly transform or you might get disrupted and then what are you going to do? Any decent company is on top of that.”

Like most revolutions, Industry 4.0 is proving to be disruptive for workers in plants who do routine tasks. But manufacturing careers, not always alluring, will now demand higher-skilled – and better-paid – people. It’s going to be a challenge.

Between 1990 and 2007 one robot per 1,000 workers reduced employment for nearly six people. More than 670,000 jobs were lost during this period, report Creig Lamb and Matt Lo, of the Brookfield Institute for Innovation + Entrepreneurship in Toronto.

Since then, Canadian manufacturers shed 15% of the overall workforce, almost 300,000 people, according to numbers from Jean-Pierre Giroux, national director, skills and talent development for the Excellence in Manufacturing Consortium (EMC) based in Owen Sound, Ont. That is close to one million manufacturing jobs lost in almost three decades. “These are primarily low-skilled jobs,” Giroux says.

At the same time, the number of manufacturing establishments also declined from 85,000 in 2007 to 50,000 in 2017. “That’s a big drop,” Giroux says. “It doesn’t mean the companies are less profitable. Some of those companies disappeared due to lack of succession or mergers, for example.”

Make no mistake. Industry 4.0 offers new business models that manufacturers are testing now. The collection and analysis of data on everything from customer orders, production, inventory and logistics allows businesses to gain insight, make informed decisions and drive better outcomes.

Implementation of industrial robotics, in particular, has demonstrated a 100% in-



Robotic welders, cheaper than humans. PHOTO: FOTOLIA

crease in productivity since their arrival. In Canada it took 20 jobs to create \$1 million in manufacturing output in 1980. By 2013, this number was halved, figures from Statistics Canada illustrate.

Plant operations run more efficiently thanks to automated predictive maintenance of machinery, programmed sensor alerts on precision parts, or robots that operate 24/7, lights out.

Major adopters

The automotive industry – by far – has adopted automation more readily than others in manufacturing. It accounts for almost half of all industrial robots sold in Canada. Operational cost savings are one reason. For example, it’s cheaper to use a robot than a human to weld. A welder earns about \$25 per hour compared to the \$8 per hour it costs to run the robot, once the purchase and installation are factored in over five years.

Globally, it’s estimated the adoption of robots can cut labour costs by 33% in South Korea. China, Germany, the USA and Japan could see a savings of 18% to 25%.

Canada has some catching up to do, ranking relatively low when it comes to density (robots per 100,000 workers) in the manu-

facturing sector, compared to South Korea, Germany or Sweden. Germany has one robot for every 505 people, while Canada had one robot for every 2,325 people, according to a report by Desjardins.

Just as the steam engine created an entirely new industry, yet altered everything before it, Industry 4.0 is anticipated to do much the same to our economy. While it’s possible that increased automation improves productivity, it’s important to know what the impact might be on society.

“The digital era could herald a time when technology destroys old jobs faster than new ones can be created,” writes Paul Krugman, economics columnist for the *New York Times*.

Dire predictions see manufacturing, among the highest risk industries for job losses due to disruptive automation technology, joining: accommodations and food services; transportation and warehousing; mining; oil and gas; agriculture; forestry; fishing and hunting. “Overall, 46% of work activities in Canada have the potential to be automated, across all industries. This is equivalent to 7.7 million jobs,” according to the Brookfield Institute report.

But new jobs will be created, Giroux says. He advises leaders to conduct skills assessments among employees. “There is a direct link between a well-trained work force and productivity. It is well documented.”

He sees investing in today’s skills requirements as a big project. “It’s quite a challenge to recruit new skilled people to manufacturing,” Giroux says. “We’re encouraging manufacturers to train their existing employees. Retention is important – and cheaper than recruiting.”

In 2016 the average level of company

Three tips for leveraging IIoT

Manufacturers need to think strategically, operationally, and financially to best take advantage of the Industrial Internet of Things (IIoT) for profitability, according to Tanja Rueckert, president of the Internet of Things and supply chain business unit at enterprise software firm SAP.

Rueckert recommends asking these questions:

- Would using real-time process data improve daily decision-making and operations planning for senior management and plant operators? Do they have the skills and tools needed to make the best use of it?
- Where are the bottlenecks in your plant or front office process that most erode profits? Could real-time data help identify areas for improvement?
- Do any of these areas for improvement include equipment that can be adapted with embedded intelligence to communicate with plant and enterprise networks?

Source: *Digitalist Magazine*, SAP

investment in training was \$800 per employee, per year, Giroux says. "But in manufacturing it was only \$375 per year – or less than half the national average. In 2017 it was more encouraging at \$535, but still well below the national average."

SMEs running operations have to stay focused day to day," notes Ian Howcroft, CEO of Skills Ontario. "It's difficult for them to stay on top of changing technological needs. But we no longer have the luxury of time."

Workers will have to be good in math and sciences, Howcroft stresses. "They'll need the hard skills but life skills will also be important. They will need to be able to work on a team. They must know how to communicate. And they're going to have to maintain and upgrade their skills continually due to IIoT and digitization."

Howcroft says the community colleges are doing a good job of



Operating a robotic welder.

PHOTO: FOTOLIA

offering training for the trades, but few parents encourage their children to take that path.

"Labour and the implications of disruptive technology is a topic as old as the steam engine," says Bill Murnighan, director of research at Unifor, a general trade union in Canada, founded in 2013 as a merger of the Canadian Auto Workers and Communications, Energy and Paperworkers unions.

Dealing with disruption

Unifor is currently putting together a more comprehensive policy regarding disruptive technologies. Murnighan is concerned for those displaced by: self checkouts in retail; touchscreen ordering in food service; autonomous vehicles in the energy sector; and AI robots in healthcare. But he sees the disruption of automation technology in manufacturing as something that has already happened.

"It began in the automotive sector in 1980s with CNC machinery and robots," he says. "We're on a continuum now with advanced manufacturing."

There is a lot of debate around Canada's lack of success in manufacturing, Murnighan says. Many things – not just automation technology – have had an impact: Canada's monetary policy; the strong Canadian dollar, which hammered every Canadian manufacturer; trade policies; manufacturing that went to Mexico or China where plants look identical to our own. And, yes, automation has an ongoing impact.

"We understand that corporations and companies are going to be looking at productivity gains," the union spokesperson said. "We would be foolish to stand in the way of it."

According to PLANT's Manufacturers' Outlook 2018 report, the top three most used advanced technologies among plants are: computer-aided design, engineering and manufacturing; custom manufactur-

ing; and automation. Less than half (42%) have implemented automation, but that number is expected to grow.

However, only 36% report making use of automatic data access, analysis and review to measure and monitor productivity. This is arguably one of the most significant benefits of the technology. And a majority of manufacturers (59%) reported they didn't plan to transform their companies to take advantage of Industry 4.0 or the IIoT over the next year.

Costs could be a factor why manufacturers seem reluctant to take advantage of the technology. On average, digital adopters among SME manufacturers invested \$250,000, according to a 2017 survey conducted on behalf of the Business Development Bank of Canada.

But automating his surface coatings plant in Sept-Îsle, Quebec helped CEO Marc-André Gervais save 10% of Metal 7's annual budget and improve the quality of his product. The company, which employs 85 people, provides equipment to the iron ore and aluminum industries.

Consider, too, that the price of industrial robots fell from 1990-2005 by approximately one half across six major developed economies. This could boost adoption in Canada.

As the costs of such a transformation decrease, as they are expected to do, there might be more manufacturers eager to learn and benefit from the insights and intelligence Industry 4.0 promises. Whether it's to improve productivity, enhance quality, make informed decisions about what products to manufacture and how, or to position the company for future success, it's all about the data. Use it wisely.

Kim Laudrum is a Toronto-based business writer and regular contributor to PLANT. E-mail klaudrum@rogers.com.

Comments?
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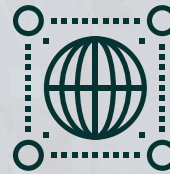
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CCOHS SAFETY TIPS

Identify hazards to determine the safest way to run a plant's production processes.

A job safety analysis is a valuable technique used to identify hazards for a particular task or job in order to reduce the risk of injury to workers.

Why is it important?

Initial benefits will become clear during the preparation stage. The process identifies previously undetected hazards and increases the job knowledge of the participants. Safety and health awareness is raised, communication between workers and supervisors is improved, and acceptance of safe work procedures is promoted.

It's up to employers to protect the health and ensure the safety of employees by keeping them informed of hazards and providing the necessary protective procedures and equipment. Assessing health and safety risks and developing safety procedures eliminates or mitigates them before anyone is harmed.

The following points will help you conduct a successful safety analysis:

1. Select the job to be analyzed. Ideally all jobs should undergo an analysis, which should be revised whenever there is change to the process. Base your selection on accident frequency and severity, the potential for severe injury or illness, and newly established, modified and infrequently performed jobs. Examine the most critical first.

2. Break the job down into a sequence of steps. Look at each segment of an operation that's necessary to advance the work. Consider what is done rather than how it's done; for example, putting a propane tank on a filling scale. Generally, most jobs can be described in less than 10 steps. Keep the steps in their correct sequence because any one that's out of order may miss potential hazards.



Perform a job safety analysis for each process.

PHOTO: FOTOLIA

Job safety ANALYSIS

TAKE A PROACTIVE APPROACH

This is usually done through job observation, which should be completed during normal operating times. Collaboration is important. The worker, supervisor and health and safety representative should review the analysis to ensure all steps have been identified, in the correct order.

3. Identify potential hazards. The job hazard identification process is also a collaborative effort involving workers and supervisors. Once the basic steps have been recorded, potential hazards must be identified for each of them. Based on observations of the job, knowledge of accident and injury causes, and personal experience, list the things that could go wrong at each step. It's important to get input from workers and to con-

sider all categories of hazards – physical, biological, chemical, ergonomic and psychosocial.

4. Determine the preventive measures. Determine ways to eliminate or control the identified hazards. This includes changing or modifying processes, improving the environment, substituting less hazardous substances or changing the tools. If the hazard can't be eliminated, investigate controls that avoid contact or exposure by using enclosures, machine guards, worker booths or other forms of containment. Also review work processes and procedures. This involves modifying or changing process steps that may be hazardous, or adding steps.

If there are no other solutions, consider methods to reduce exposure to the hazards, such

as the use of personal protective equipment, although such measures are the least effective. You can also reduce the severity of an accident by providing emergency facilities such as eyewash stations.

An effective job safety analysis covers all aspects of a specific task. Workers, the supervisor and a safety committee representative should participate in its development. Once the analysis is completed, be sure to communicate the results to all workers who are, or will be performing that job. Learning about and addressing the hazards attached to each task is one of the best ways to keep your workforce safe and healthy.

The Canadian Centre for Occupational Health and Safety (CCOHS) in Hamilton contributed this article. CCOHS provides information, training, education, management systems and solutions that support health and safety programs and the prevention of injury and illness in the workplace. Visit www.ccohs.ca.

Comments?
E-mail jterrett@plant.ca.

MAINTENANCE

Guidelines address maintenance issues that impact plant assets.

Reliability is a powerful concept in the world of maintenance. Applied properly, it makes the difference between success and failure of installations, process and systems. It doesn't need to be difficult, complex or overwhelming. Applications are more likely to succeed if they're easily understood by everyone – from trades to CEO. And Emilio Sarno, now director of global maintenance at mining company Kinross Gold Corp. in Toronto, offered a path to get there during a workshop hosted by the Plant Engineering and Maintenance Association (PEMAC).

The session provided theoretical and practical guidelines for identifying and addressing reliability issues that have an impact on the productivity and profitability of plant assets.

Sarno said applying reliability centred maintenance (RCM) to a process determines what should be done to ensure that equipment or a system element performs according to expectations. The questions to ask are:

- What are the equipment's or the system's functions?
- How can the equipment fail?
- What is the origin of the failure?
- What happens when equipment fails?
- How does it matter?
- What can be done to prevent the failure?
- What happens if the failure can't be prevented?

The best reliable metric is meantime to failure. It includes a criticality analysis, a technique that allows the sorting or ranking of equipment, processes, installations or assets in general, based on established criteria. This prioritizes maintenance activities and improvement projects according to how much they contribute to business objectives.



Using reliability strategies to improve machine performance.

PHOTO: FOTOLIA

Reliable THINKING

BREAKING PARADIGMS FOR PRODUCTIVITY AND PROFIT

There are two critical factors for evaluating criticality: the frequency and the consequences of failure. To determine the latter consider safety, environment, product quality, production losses, customer service and repair costs.

Sarno recommended two specific methods to investigate failure modes.

One is failure modes effects and criticality analysis (or FMECA), which: identifies problems that have a major impact on operation; reviews policies and maintenance strategies; reduces the number of incidents, failures and waste; reduces deferred production associated with a failure; improves the efficiency, profitability and productivity of processes; and improves reliability, safety and environmental impact.

Each failure mode is a problem to be analyzed and solved with a technically and economically feasible solution.

Root cause analysis (RCA) identifies failure modes and the

causes, or sequence of causes that result from unwanted events.

Attending to failure

Then there are the hidden and chronic failures. The latter are often accepted as part of everyday life. But Sarno noted 20% of chronic failures account for 80% of a plant's failures, so they warrant attention.

RCA questions to ask include:

- Is there a basic, specific reason for the failure?
- Can it be identified in a reasonable and cost-effective manner?
- Is it one over which maintenance has control?
- How can it be prevented from recurring?

Collect detailed information through diligent condition monitoring and a finite element analysis, as well as by asking questions about the primary functions of systems:

- What justifies the existence of the system?
- What is needed for the system

to perform?

- What is the required capacity of the system?

Sarno recommended these tasks and actions: vibration analysis, ultrasound inspection, thermography, X-rays, oil analysis, preventive maintenance, changes of procedures, replacement or systems redesign, redundancy incorporation, organizational change, training and retraining.

Make a decision diagram, develop a decision worksheet and do a reliability, availability and maintainability analysis to improve maintenance programs. Use the performance of individual components to calculate and predict the likelihood of a system performing as expected.

Several techniques do this: reliability block diagrams, FMECA, fault tree analysis, accelerated life testing, Markov analysis, lifecycle cost analysis, stress-strength analysis, and the Arrhenius model.

These guidelines, tools and methodologies for addressing reliability issues go a long way to dispelling old paradigms and improve the performance of plant equipment and systems.

This article was adapted by PLANT contributing editor Steve Gahbauer from a workshop held during PEMAC's 2016 MainTrain. E-mail gahbauer@rogers.com.

Comments?

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IIOT

Drowning in DATA?

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PHOTO: FOTOLIA

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The Industrial Internet of Things (or IIoT) and its connected web of instruments, controls, sensors and media is creating a tsunami of data that threatens to overwhelm maintenance efforts. How do you make the best use of it?

By setting up reliability and maintenance programs, says Keith Berriman, a senior reliability consultant at Emerson Automation Systems in Richmond Hill, Ont. Building a framework of information captures what you know and don't know.

Reliability identifies and mitigates failures. Maintenance restores function to a system or equipment that has failed, or is about to fail. Applying both helps detect and fix problems before they impact performance.

A reliability program includes an equipment master list, a criticality rating, reliability-centred maintenance, failure modes and effects analysis, strategy development, a tool selection scheme, and a root cause analysis. Maintenance requires data on work identification and planning strategy, covering scheduling, execution, follow-up and analysis. Also look at lifecycle. Ninety-five per cent of its costs are set before start-up.

Using risk data, failure data and equipment history improves design and reduces manufacturing defects.

From a presentation at the MainTrain conference convened by Plant Engineering and Maintenance Association of Canada. Visit www.pemac.org.

CONFERENCE

Partners in Prevention covers business transformation, technology and disruption.

Health and safety take centre stage at the 2018 Partners in Prevention conference and trade show with an eye on marijuana and how its legalization will impact the workplace.

The theme of this year's event May 1-2 at the International Centre in Mississauga, Ont. (presented by Workplace Safety & Prevention Services) is Shifting Landscapes in Health & Safety. With July 1 as the federal government's target date for decriminalizing the recreational use of pot, manufacturers must prepare for quite a shift in the way safety issues are managed. With that in mind, Partners in Prevention 2018 is offering three extended sessions to educate and inform employers:

- A panel discussion May 1 titled, *Legal Access to Marijuana: The Workplace Impact, Why It Matters and How to Manage It*, will look at the changes, their legal impact, and the implications, with guidance on how to manage these challenges in safety sensitive industries.
- On the same day, an interactive workshop titled, *Managing Addictions: Stress & Mental Wellbeing*, will focus on recognizing when someone is experiencing personal hardships.
- On May 3, Workplace Safety & Prevention Services will host a post-event half-day workshop, *Marijuana and the Workplace: Managing the Impact of Legalization and Policy Development*. Participants will receive a policy template at the end of the workshop.

There's a diverse line-up of keynote speakers starting with Seth Mattison on May 1. He's a trend spotter and workforce strategist who will offer insights into the new world of business transformation and disruption.



Partners in Prevention show floor in 2017.

PHOTO: WSPS

Health & safety in the WORKPLACE

MANAGING SHIFTING LANDSCAPES AT PIP 2018

Lunch will feature Dr. Greg Wells, CTV sports science analyst and physiologist who will discuss how to improve health, fitness and performance using simple techniques.

Trade show features

The May 2 morning keynote will feature Amanda Lindhout, kidnap survivor, author and journalist,

who was abducted and held in Somalia for 460 days.

The lunch keynote features singer-songwriter Dave Carroll, who found a creative way to take United Airlines to task for breaking his guitar in checked luggage. He'll describe how he, some friends, \$150, and the internet turned the airline industry upside down.

The trade show features more than 70 sessions and 400 exhibitors covering market trends, products and services. Highlights include:

- A WHMIS Escape Room where your knowledge will be tested through riddles, clues and questions that are answered in time to save a co-worker.
- The Healthy Living Pavilion featuring a variety of displays and demonstrations.
- The High-Risk Display that

will cover areas involving height, transporting dangerous goods, working in confined spaces and more.

- The Distracted Driving Pavilion where delegates will test their skills on a pedal-powered kart while wearing goggles that simulate different types of impairment, including marijuana.
- Bring Safety Home, a platform for parents and other adult influencers of young workers.
- VR at PIP, which explores the world of virtual reality and the shifting landscape of health and safety.

For information about sessions or other details visit www.PartnersinPreventionConference.com.

Comments?

E-mail jterrett@plant.ca.

Workplaces 2015

Lost time claims

232,629: Canada
33,013: Manufacturing

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852: Canada
177: Manufacturing

Source: Association of Workers' Compensation Boards

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Cologne's Ford engine plant shut down a number of times in one year due to defective cooling units. As a result, Ford immediately accepted Rittal's offer to carry out a manufacturer-independent inventory of all the cooling units and to identify potential energy savings. The analysis by Rittal's service specialists showed the urgent need to repair and replace 11% of the cooling units installed. In addition, Rittal drew up a comprehensive energy efficiency calculation, which resulted in savings of more than half a million euros within 10 years, with a payback period of just 2.4 years for the investment in the new cooling units.

Over 220 cooling units from different manufacturers put to the test

The Rittal technicians checked the maintenance status of more than 220 cooling units at the Cologne Ford factory, relating to both Rittal climate control units, as well as third-party equipment. They checked the cooling unit components for dirt accumulation, damage and bearing noise. Then they drew up a maintenance checklist and made a number of improvement suggestions. Analysis showed that of the 220 enclosure cooling units installed, 25 were defective and needed to be repaired or replaced. The majority of these systems were competitor products with an average age of just five years.

Impressed by practical tests with Rittal Blue e+ cooling units

Parallel to the service check, the Rittal team set up a practice-oriented test facility at the engine plant. From July 2016 onwards, the 2.6-kilowatt Rittal Blue e+ cooling unit was compared with a 2.5-kilowatt cooling unit from a competitor. Initial findings show that the Blue e+ unit offers energy savings of 88.9% compared to the third-party system.

Manufacturing plant's maintenance manager impressed by results

Based on the data collected, Rittal compiled a comprehensive efficiency calculation for the Ford plant in Cologne.

Replacing 150 cooling units by Rittal "Blue e" and "Blue e+" systems would make it possible to achieve savings of more than CAD 860,000 and 276.3 tons of CO2 over a useful life of ten years. Deducting the investment sum would result in a brief payback period of just 2.42 years, clearly less than the 3.5 years required.

Its efficient products and consulting service have helped Rittal to get closer to being included in the technical delivery specification again with its cooling units. This represents a major endorsement for the Rittal service team and their new consulting services.



"Rittal's inspection revealed significant savings potentials for our plant."

Helmar Bencker, Plant Engineering & Environment Manager at Ford in Cologne



THINK LEAN

Embed them in the organization to increase value for the customer.

BY RICHARD KUNST

Any successful organization, whether it's company, division, facility, department or a natural work group, has a suite of operating principals. In many cases they may not be documented but should be and widely communicated to all employees.

Here are some potential operating principles and their expected behaviours:

Ensure the health and safety of all people is the top priority. Properly implemented safety programs save lives and prevent injuries.

Maintain a learning, supportive and co-operative culture dedicated to continuous improvement. Opportunities for learning at all levels develop the knowledge necessary to transform the organization through people, teamwork and a supportive, co-operative culture.

The foundation of the learning culture is comprised of the transfer of knowledge, sharing of lessons learned and recognizing mistakes/errors as an opportunity to improve.

Aggressively improve customer response time. Responding more effectively to changing global markets requires a transition from traditional time-based process principals. Processes must continue to evolve to meet customer requests with quality outputs, shorter lead-time, reduced costs and greater value-add content.

Be capable of producing at any volume and be flexible to any request. Replace paradigms regarding mass production with time-based, mixed model, flexible systems. Equipment and people support changes in volume, features within a product family and changes across families of products.

Ensure process measurements contribute to business



Build a culture of continuous improvement.

PHOTO: FOTOLIA

The pursuit of **PERFECTION** OPERATING PRINCIPLES THAT LEAD TO IMPROVED PRODUCTS AND PROCESSES

goals. Establish a feedback system that reinforces decisions based on standard measures. Metrics will cascade down from the business objectives to all levels of the organization. Each individual or team is free to focus on achieving goals knowing they support the overall business plan. Meaningful process measurements will drive performance improvement.

Drive transformation through knowledge and involved leadership. Leadership must champion the creation of an environment for change that gains support across the organization. Leaders must ensure a clear vision, appropriate skills, proper incentives, necessary resources and a realistic master plan are in place to create and sustain successful change.

Define roles and responsibilities. Before transformation comes identification of the structure, roles and responsibilities required to implement process changes. The leader defines the boundaries of responsibilities so

each person clearly understands his/her level of authority. Team members will be empowered to make decisions that are consistent with overall business objectives, beliefs and values. This will lead to improved teamwork, communication and an engaged workforce.

Balance implementation of interdependent elements to impact goals and sustain gains. Each element supports and complements the others to form an interdependent system. Capability must be demonstrated in each element for the system to improve.

Relentlessly pursue the elimination of waste. This will reduce cost and lead time, while improving the competitive positioning to ensure the company's future. Wastes such as correction, over-production, material movement, motion, waiting, inventory, and processing are to be continually driven out of every operation. The key to "relentless pursuit" is to go back a second time, a third time,

and so on...

Common sense dictates that it's impossible to eliminate all waste at one time. Prioritize issues and address them as resource availability and capability dictate. Since cost tends to follow flow, consider issues from a flow perspective to establish these priorities.

Establishing and communicating clearly stated operating principles to all levels of the organization ensures everyone is working towards goals that will ultimately improve products and processes.

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.kunstsolutions.com. E-mail rkunst@kunstartofsolutions.com.

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TAXATION

Focus more on business structuring and reporting while looking to international markets for diversification.

BY MICHAEL OSEEN

When the Trudeau government released its 2018 federal budget, Canadian manufacturers expected it would provide substantive details on repositioning the tax system that would help them plan for the future.

The budget laid out by Finance Minister Bill Morneau fell short in many of these areas. If anything, it increased the uncertainty.

Beyond the vagueness surrounding Canada's North American Free Trade Agreement (NAFTA) strategy, manufacturers are faced with new questions regarding how to effectively structure passive income investments and how to protect themselves from the effects of changes to the US tax system.

Many business owners believe changes to the treatment of passive income remove an important financial tool.

Passive income investments have long supported a business's ability to weather cyclical downturns and afforded capital flexibility to invest in the skills and innovation necessary to compete successfully in the global market.

While the announced changes were less severe than those proposed in July, they're significant enough to have a serious impact on Canadian businesses. Smaller manufacturers will likely feel the greatest impact, as the passive income threshold will now be tied to the small business tax rate.

Under the new rules, once a company's passive income tops \$50,000, its small business deduction limit is reduced and, when passive income moves above the \$150,000 threshold, the deduction is wiped out.



Changes to the treatment of passive income will affect manufacturers.

PHOTO: FOTOLIA

Federal budget 2018

HOW IT WILL IMPACT YOUR OPERATIONS

Business owners wonder what to do with their passive income investments – whether to trigger a sale before the changes take effect in 2019 or retain these investments for cash flow purposes, regardless of the tax consequences.

Manufacturers need to carefully reassess how they use this income strategy to finance their operations. For companies that rely heavily on passive investments to finance expansion, retooling and innovation, off-loading them based only on tax motivations could put them at financial risk. Companies should

work with their tax advisors to balance business priorities and tax efficiencies under the new regime.

Lack of clarity

In addition to its clampdown on passive income, the government also announced changes to the normal reassessment period for taxpayers with foreign affiliates. The window (three or four years after an initial assessment depending on the type of corporation) will be extended by three years for certain transactions.

While the three-year extension already existed for certain

transactions involving foreign affiliates, now it applies to income arising in connection with a foreign affiliate. This change is intended to capture all transactions with foreign affiliates.

The extension, effective for taxation years ending after Feb. 27, creates added uncertainty for business owners. The CRA has more time to carry out audits and to make changes to a company's tax liability.

The budget was notable for the absence of any clarity concerning Canada's NAFTA strategy, which is viewed by some as giving the US a competitive edge. This lack of direction leaves Canadian businesses at a strategic disadvantage.

Apart from calling for NAFTA's modernization, the budget provided no detail on how this will be put into effect. Instead, the budget highlighted recent trade agreements with other export markets, such as Europe (CETA), Asia-Pacific (CPTPP) and its exploratory talks with China and other emerging markets.

Without a clear North American strategy – and no crystal ball

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to understand the implications of a modernized NAFTA – manufacturers are left to wonder what's next, should the US continue with its strong-arm trade policies.

Think diversification

At this point, diversification is an important strategy when combating the reality of slowed growth and an over-reliance on the US market. Trade relations with the US may take a different form in the short-term, but export strategies should focus on long-term opportunities.

Consider using this period of uncertainty to better position your company in the global marketplace and forge trade channels with markets outside the US – namely in emerging markets where Canadian goods are in high demand. Also turn up the heat up on innovation strategies, not only to reduce operations costs, but to improve prices, distribution systems and remove barriers to entry in foreign markets.

This budget raised more questions than answers. In response, manufacturers should consider revisiting how to fund innovation and growth at a time when Canada's growth is slowing, and how to improve competitiveness in global markets.

Although the budget has made traditional tools – such as passive income – potentially less tax advantageous, when approached strategically, these tools still offer solutions. Look inward to improve innovation and outward to international markets to diversify market opportunities.

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Fear narrows thinking.

PHOTO: FOTOIA

Fear of LEARNING

LOWER THE THREAT LEVELS FOR SOUND DECISION MAKING

Give people lots of choice and encourage broader thinking.

BY HUGH ALLEY

While learning to use a new machine – a table saw – another guy in the shop rushed over and bellowed, “DO YOU HATE THAT SAW?” My reaction? Internal cringing and wondering what I’d done. And he sure told me in a profanity-laced rant about how I was messing up, but not in a way that I could correct. All he managed to do was instill fear in me.

Life and leadership coach Alisdair Smith (www.alisdair-smith.com) recently observed,

“If you want people to narrow their thinking and focus only in one direction, make them afraid. Conversely if you want to broaden people’s thinking, giving them lots of choice and the ability to think for themselves, ... lower the threat levels.”

People need to recognize the range of choices they’ll face in new situations, to think for themselves and be curious about the options.

This is not to suggest they do whatever they want. But you can never devise enough rules to cover every eventuality. Unless you are willing to be at their beck and call, your people must be capable of making sound decisions. They won’t learn to do that if they’re afraid.

What are the fear factors? Here is a partial list:

- Job loss for making a mistake.
- Being deliberately embarrassed for not knowing something and admitting it.
- Someone else getting that promotion.
- Unfair treatment.
- Looking stupid.
- Damaging equipment and the consequences.

Does this apply to your operation?

If you see people hesitant to try things or learn new tasks, wait for direction, blame others, offer excuses or stay under the radar, you’ll know the people in your plant are afraid.

Find out why, then change behaviour – yours, managers and supervisors – because that’s from whom your people are taking their cues.

The most important element of performance improvement is to shift the organization to a culture of learning and inquiry to get at the root causes of failure.

It’s not enough to accept the simplistic answer that “Sam needs to pay attention.” Why isn’t she paying attention? Is the lighting bad? Is she not clear about what to look for? Has she raised the same issue six times and it’s been ignored, so she figures no one in management cares? Find out why and fix it.

Once you start fostering a culture of inquiry, it’s remarkable how quickly fear will give way to learning. Then it becomes worthwhile to invest in training. When your people are not afraid, they learn.

Hugh Alley is an industrial engineer based in the Vancouver area who helps organizations achieve significant performance gains in delivery, quality and cost over a short timeframe. Call (604) 866-1502 or e-mail hughralley@gmail.com.

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RISK

Understand where your business is exposed and develop a plan to manage it.

BY DAVE DOMINY

Canadian manufacturers are increasingly turning their attention to global markets. Whether seeking new customers through growing emerging markets or sourcing lower cost suppliers and specialized equipment from all corners of the globe, opportunity beckons. Establishing this growing global footprint also necessitates sending and receiving cross-border payments in many foreign currencies, thus increasing exposure to unpredictable exchange markets.

For manufacturers lacking in-house expertise to manage currency risks, the potential negative impact on profit margins is real. In fact, 20% of respondents to PLANT's Manufacturers' 2018 Outlook survey identified currency fluctuations as a factor that's holding them back from expanding exports beyond North America.

Managing this risk requires an understanding of where your business is exposed and what solutions are available to help manage it.

Like the stock market, foreign exchange markets are volatile. They're global, they operate 24/7 and rates change on a whisper of political or economic concern. Typically, the factors that impact currency markets include:

- Political and economic conditions
- Rates of inflation or deflation
- Interest rates
- Monetary policies
- GDP
- Fiscal policies
- Commodity prices
- Unemployment rates

In January there was a range of more than 400 points in the US-Canadian exchange rate driven by a number of factors including uncertainty about the future of the North American Free



Understand the economic and political factors that influence currency markets.

PHOTO: FOTOLIA

Doing business GLOBALLY?

DON'T LET CURRENCY RISK STIFLE GROWTH OPPORTUNITIES

Trade Agreement (*Bloomberg 2018-01-10*) and unexpected Canadian labour data (*Bloomberg 2018-01-05*). A 400-point move higher in the exchange rate has the ability to affect any manufacturer doing business in US dollars. A rise in the exchange rate indicates a flagging loonie. While this decline in value gives US buyers more purchasing power, it directly affects the profitability of each transaction when it comes time to exchange those US dollars.

Hedge against uncertainty

When negotiating international contracts or signing deals that have foreign exchange elements, identify your exposure to currency market fluctuations. This aids the development of a plan to minimize, and in some cases, eradicate any risk to the profitability of your purchases or contracts.

You can hedge your currency risk by locking in a forward contract, ensuring you know

the exact exchange rate you'll receive when it comes time to make or receive a payment. It's a valuable tool that protects the profitability of your contracts and allows the purchase or sale of a predetermined amount of currency at a known rate within a specific timeframe.

This ensures you're not relying on the need for a spot transaction, which affect the accuracy of forecasting cash flows and budgeting due to large currency fluctuations.

The downside of establishing a forward contract means you might not be able to take advantage of market highs, but the certainty of knowing the exchange rate in advance can be critical in maintaining profitability.

Targeting your budgeted foreign exchange rate with market orders is another strategy when international payables or receivables have flexible timelines. Market orders, active 24 hours a day, allow you to automatically purchase foreign currency when

the market hits your targeted exchange rate. This allows you to take advantage of favourable currency fluctuations during overseas trading hours. Currency markets are also live 24 hours a day, but trying to pinpoint the more volatile times can be a minefield.

Ensure international payments are transferred to and from your bank accounts quickly and cost effectively. Missed or late payments cause costly delays. Thankfully, most foreign exchange providers quickly and easily confirm transfers – regardless of the financial vehicle used to send the money. This assures your vendor payment is on its way and won't hold up your schedules.

Perhaps you have a list of international vendors. Sending a wire transfer to each one every month could lead to significant spending on fees. Look for more cost-effective forms of electronic fund transfer.

Don't let foreign exchange risk prevent you from expanding your global presence. Currency is complicated, but smart solutions help ensure borders aren't barriers.

Dave Dominy is CEO of Firma Foreign Exchange, a foreign exchange and international payments firm with locations across Canada. Visit www.firmafx.com.

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What you need to know to protect your business.

BY MICHAEL MILNE

Canadian manufacturers are in fierce competition with global imports, while the Trump administration is reacting to the same pressures with various trade remedies on behalf of US industries.

America unilaterally imposed a 25% tariff on all steel imports and a 10% tariff on all aluminum imports. Although the nature and genesis of the tariffs is unusual (they arose from US President Donald Trump's invocation of a national security law) and sit beyond the normal due-process afforded to affected importing nations during the course of a trade case, they do reflect increasing global competition and a corresponding trend towards trade protection.

The Canada-US softwood lumber and Bombardier disputes are examples of the much more common "dumping" or "subsidization" cases being fought all the time. Although Trump touts the softwood lumber and steel/aluminum wins as a product of his America First policy, these tariffs resulted from legal cases launched by US manufacturers seeking protection from "unfairly" low-priced imports.

Canada has had its fair share of wins too: last year, tariffs ranging from 95% to 325% were imposed on US drywall imports destined for Western Canada, at the request of the only Western Canadian drywall manufacturer. The actions of both the US and Canada were the result of a standardized legal process.

Over the last 75 years, Canadian manufacturers have used trade laws with great success to protect investments and jobs against imports from all over the world. Today, the government collects duties on imports ranging from steel pipe to solar cells, chemical resins, sugar and potatoes.

To have duties imposed on your foreign competitor's products, you need to prove that:



Manufacturers needn't lose sales or revenue to unfair competition.

PHOTO: FOTOLIA

Making a TRADE CASE

IS IT RIGHT FOR YOUR COMPANY?

- imports are unfairly traded; and
- dumped or subsidized goods caused financial injury.

These are technical legal terms with complex determinations; however, the basics are fairly simple.

Dumping refers to the sale of a good in Canada at a price that's lower than what it sells for in the country where it's produced. For example, drywall sold in Canada by US manufacturers for \$12 per sheet, but sold for \$14 in the US is likely dumped.

Price vulnerability

Subsidized goods benefit from government programs in the country where they are produced. Examples of subsidies include direct grants, beneficial interest rates on loans, tax exemptions, export financing, and government provision of raw materials or land for less than they would otherwise be worth.

A company producing a good that trades primarily on the basis of price will be vulnerable to the effects low-priced imports have on a market. They can steal sales

or force a company to lower prices, leading to lower revenue and margins. This may force lay offs, defer or cancel investments, or even result in plant closures.

Canada's trade laws can prevent this from happening.

Ordinarily, the largest or second largest manufacturer needs to be involved in the dispute because the assessment of the injury is done across the industry. There are legal thresholds that restrict access to trade protection for smaller manufacturers. However, if the other Canadian manufacturers are also importers, special rules may allow smaller companies to benefit from trade protection.

It takes nine months to complete the legal process. It begins by filing a complaint with the Canada Border Services Agency requesting an investigation. The complaint sets out the product and countries to be investigated, the alleged unfair trade practice (whether the goods are dumped, subsidized, or both), and the alleged injury.

Towards the end of the process,

the Canadian International Trade Tribunal will conduct its own investigation – including a public hearing, usually in Ottawa – and will determine whether to impose import duties. Normally duties are imposed to offset the amount of dumping or subsidization – an amount that varies widely from case to case.

Canada's trade laws are robust, effective and exist to protect Canadian jobs and investments. Manufacturers need not suffer any longer at the hands of low-priced imports.

For information on Canada's trade remedy system, visit www.fin.gc.ca.

Michael Milne is international trade counsel with Cassidy Levy Kent LLP in Ottawa, a boutique law firm specializing in international trade disputes, export control compliance and customs issues. Call (613) 368-4149 (direct) or (613) 368-4170 (main). Visit www.cassidylevy.com.

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SUSTAINABILITY

Drying biosolids improves the environment and creates new commercial products.

BY KIM LAUDRUM

Hamilton Harbour is getting a colonic. Formerly known as Burlington Bay and located at the western tip of Lake Ontario, it was listed as an area of concern by the International Joint Commission (IJC), the bi-national organization that oversees the quality of the Great Lakes water basin. It's now halfway to securing a clean bill of health.

Hamilton (just outside the western limits of the Greater Toronto Area), with federal and provincial help (\$100 million respectively), is investing \$400 million to clean up its act.

Among the projects is a \$340-million-upgrade to the Woodward Avenue Water and Wastewater Treatment Plant. City planners hope the upgrades will significantly improve air and water quality and reduce trucking and storage of treated biosolids.

The improvements include elevating the plant's final treatment process from the secondary level to the tertiary level. This will allow the plant to reach strict discharge limits described



A view of Hamilton Harbour.

PHOTO: DAN ZEN

Cleaning up Hamilton HARBOUR

WASTEWATER TREATMENT PLANT GETS AN OVERHAUL

by the Hamilton Harbour Remedial Action Plan for phosphorus, ammonia and suspended solids.

"Any sewage plant geeks like us would love to read about our tertiary plant," says Dan McKinnon, general manager of the Hamilton Public Works Department. Once commissioned, it

will be the largest tertiary filter in North America.

"We were having some issues regarding the quality of our water," he says. Back in 2006 McKinnon was senior director of water treatment for Hamilton. That's when the city developed its biosolids master plan.

Treating sewage

Biosolids are nutrient-rich organic materials resulting from the treatment of sewage in a wastewater treatment plant. The City of Hamilton produces about 38,500 wet tonnes of biosolids per year. The biosolids master plan recommended incineration of the waste that couldn't be stored. "This was supported by council," McKinnon says.

Some of the treated biosolids could be used in the agricultural sector, and restoration of mines, but these were seasonal solutions. In the winter the treated biosolids would be taken to landfill.

"The problem with a Class B

land application program (which allows the spread of treated biosolids in agriculture) is that it relies heavily on your ability to store biosolids in winter," McKinnon says.

Over the years, wastewater treatment technology evolved. In 2009 an unsolicited proposal perked the interest of those on council.

In 2012, the IJC cited Hamilton's water system for contributing to the decline of the fish population. Then in 2013 the private contractor who had been running the Woodward plant for the previous 12 years lost access to landfill storage, McKinnon says. "We still had a bit of anxiety about incineration. What if the technology has evolved? We don't want to be tied to a technology we decided on eight years ago."

A risk assessment was done that identified storage and legal challenges (as the result of pollution or contamination). An affordability cap of \$111 million was established.

"Public Private Partnerships Canada had intake for projects it would fund at that time, so the city submitted one. The feds supported it. It called for the private sector to build the facility, finance it upfront and operate it," McKinnon says.

Hamilton and PPP Canada would split half of the capital costs of the facility once construction is complete. The remaining capital costs as well as



Woodward Avenue Water and Wastewater Treatment plant is getting a makeover.

PHOTO: MIKE GILLINGS

the operation and maintenance fees will be paid by the city over the 30-year term of the project.

Harbour City Solutions, a consortium, landed the contract with a bid of \$106.5 million. The consortium includes a joint venture between Canadian construction firms Maple Reinders Group Ltd. (29%) and Bird Construction (20%); and plant operators Synagro, which manages 10 other facilities in the US.

In a conventional secondary wastewater treatment plant the biosolids are collected, settled in tanks, coagulated, filtered, separated, and disinfected either by chlorine or UV rays. The treated waste is then shipped in cakes for agricultural purposes or sent to landfill. Some of it is also incinerated.

Key to Hamilton's upgrade plan is a biosolids facility, pegged at \$106.5 million. This will eliminate incineration of

biosolids, which upset nearby residents who complained of odour emanating from the plant.

The new facility will use a dryer to create pellets that will be used as a slow release organic fertilizer sold to the agricultural community. They're also usable as a renewable fuel replacement for coal-burning facilities.

Collecting biosolids

Drying is expected to increase the amount of biosolid cakes removed from the system from 22% to 92%. A more concentrated biosolid pellet means shipping much less water, thus reducing the number of daily truck runs to ship treated wastes.

Removing the water preserves all the phosphorous and nitrogen, which is key to producing high-grade fertilizers, reducing volume, and eliminating emissions issues.

"The concept isn't new," says

McKinnon, "but the dryers are different from supplier to supplier."

Synagro, based in Baltimore, Md., will supply the dryer and operate the Hamilton facility. An Andritz drum-dryer system, called the DOR70, evaporates 7,000 kilograms of moisture per hour by applying hot gases, according to Bob Pickett, project manager at Cole Engineering Group Ltd. of Markham, Ont., which is designing the plant.

"It's a pass system. Some of the material that isn't right for the production side is recycled back into the system. Material for production is moved to an airstream and to a pellet storage hawker. It's then loaded into trucks and transported to where it will be used," Pickett says.

There's no storage onsite.

Once the plant is running there will be one truck per day required for shipping versus the

current six trucks.

AIM, the marketing arm of the consortium, will be promoting the products from the facility.

Groundbreaking for the upgraded Woodward Wastewater Treatment Plant began in August 2017. The new plant will exist on the same footprint as the previous one, and is expected to be fully operational in 2020.

With the upgrade of the wastewater treatment plant and the containment of the Randle Reef toxic sediment, Hamilton is hoping to bring the harbour area to the verge of IJC delisting, thus improving the environmental health of the Great Lakes.

Kim Laudrum is a Toronto-based business writer and regular contributor to PLANT. E-mail klaudrum@rogers.com.

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ROBOTICS



Automating bin picking frees operators from repetitive, manual tasks.

PHOTO: TM ROBOTICS

Advantages of 3D VISION

THREE RULES FOR CHOOSING A SYSTEM

Advanced vision systems are a stark contrast to the software of manufacturing's past.

Manufacturers have long relied on human vision for complex picking and assembly processes, but now 3D vision systems are replicating that capability in robotics.

The following are three rules to live by when choosing a 3D vision system for manufacturing.

Rule one: Abandon CAD.

Many existing systems still require professional CAD programming to ensure the robot can recognize shapes. Even so, this software can have difficulties recognizing multiple items at once.

A common application is removing and sorting items from a bin. CAD-based systems identify items but may have trouble recognizing the position of each item when presented in a random order, and have difficulty determining the best method from which to pick them.

Advanced vision systems use passive imaging to enable the robot to automatically identify items, regardless of their shape or order.

Rule two: Mimic human perception. Deploying a robot for bin picking isn't advantageous if the robot can't identify the edges of the bin. Considering the speed and strength of most 6-axis robots, hitting the box sides could easily halt production or damage the product.

Motion stereo systems imitate a human's perception of an item

SUPPLY LINES

SUPPLIER OF THE YEAR

E.B. Horsman & Son, a Vancouver-based electrical distributor operating in Western Canada has proclaimed Rittal its Supplier of the Year. Rittal Systems Inc. is the Canadian branch of the German manufacturer of enclosures, and other industrial products. The two companies have been working together for more than 20 years. Rittal won the annual award based on significant and strategic sales wins, teamwork and marketing campaigns.

SRP'S UK PARTNERSHIP

Superior Radiant Products (SRP) has partnered with UK heating and ventilation products manufacturer Powmatic. The developer and manufacturer of infrared heating technology based in Stoney Creek, Ont. said the new venture gives Powmatic exclusive rights to sell SRP's EUA and EUAV radiant tube heaters in the UK.

PROCESS TECHNOLOGIES

Endress+Hauser Canada, a manufacturer of instrumentation, has partnered with the Intrepid Group to provide a single source for process controls in Alberta. The deal gives the Calgary-based process automation company access to measurement technologies from Endress+Hauser, a global manufacturer with Canadian operations in Burlington, Ont.

LIFT PARTNERS

Liftow, Toyota's largest forklift dealer in North America, has acquired a controlling interest in MasonLift, a provider of mobile material handling solutions in BC. MasonLift in Delta, has a staff of 130 and operates out of 10 BC locations representing Toyota, Kalmar and Load Lifter forklifts, Ottawa terminal tractors and Atlas material handlers. Liftow has 20 branches and 525 employees in Eastern Canada and Wisconsin.

using one camera, usually mounted on a robotic arm, to move and take two or more photographs of an object.

However, these systems require absolute precision. Even the slightest movement causes disparities in data and skews the measurement.

Manufacturers automating box-picking processes should identify whether the system has a collision avoidance function. Advanced systems enable programming according to the size of the bin, ensuring the robot dives into the box without a hitch.

Rule three: Simplify installation. Automation for jobs such as bin picking are designed to free manual operators from repetitive and menial tasks and speed up operations. However, some traditional vision systems create multiple hurdles, including longwinded installation methods and high levels of technical know-how.

When using 3D vision systems for bin picking, cycle times are as fast as 0.7 seconds. But these productivity gains are useless if implementation of the software generates high costs for time and staff resources.

When choosing a system, strike a balance between potential productivity gains and the resources required for installation. Opt for software that anyone, even those with minimal training, can understand.

Eyes are a testament to evolution's creativity. While vision systems all have the same basic duty, the more advanced they are, the more information they acquire. When choosing a vision system, consider how it will improve a process, manage complex requirements and how easy it is to understand and implement.

This is an edited version of an article contributed by TM Robotics, a partner of Toshiba Machines, a manufacturer of robots based in Japan. Toshiba Machine Co. Canada Ltd. is based in Markham, Ont. Visit www.toshiba-machine.com.

Comments?

E-mail jterrett@plant.ca.

SAVE PALLET POOL SPACE

Mazak system uses 40% less room

Mazak Corp.'s HCN-5000 horizontal machining centre adds a Multi-Pallet Pool (MPP) automation system that saves a considerable amount of floor space for shops that can't accommodate a conventional linear horizontal pallet stocker.

The Florence, Ky. manufacturer of machine tool solutions notes this new automation system's carousel design takes up to 40% less room than the Mazak PALLETECH System.

Loading and unloading is stable thanks to servo motors on each axis, as well as two-levels that keep each pallet the same distance from the centre of the stocker.

The system's standard 10-pallet stocker reconfigures to house sixteen 500 square-metre pallet workpieces up to 800 mm in diameter and 1,000 mm high.

SMOOTH MPP software within the HCN-5000's MAZATROL SmoothG CNC control allows operators to easily monitor production status with scheduling functions, tool storage monitoring and system use analysis that's accessible from the capacitive multi-touch screen. And there are options for network access to allow remote monitoring of production.

www.MazakUSA.com



An MPP automation system.

More than 16,000 robots use ZDT.



AVOID ROBOT DOWNTIME

ZDT identifies potential failures

FANUC America's ZDT predictive analytic service is now available to manufacturers who purchase the Rochester, Mich. company's robots.

It identifies potential failures so maintenance and repairs can be scheduled before downtime occurs.

A data collector located inside the plant securely transfers messages from the robots to analytic programs to review data in the

cloud and automatically send out notifications with recommended actions.

ZDT is available for R-30iB Plus, R-30iA and R-30iB robots with the latest software version.

www.fanucamerica.com/zdt



GET OTTO SMART

Industrial API makes the connection

Making your plant smart can be complicated, but Otto Motors in Kitchener, Ont. has come up with an easy way to connect equipment and PLCs from different vendors to its self-driving materials handling vehicles.

OTTO Industrial API seamlessly accesses data as OPC tags and integrates them with OTTO's built-in components and scripting. Web-based automation software from Inductive Automation is integrated into the API architecture that translates the different protocols to communicate with PLCs, closing the automation loop.

OTTO Industrial API is available now.

www.ottomotors.com



Seamlessly access data.

REAL-TIME INSIGHTS

Database for machine manufacturers

CrateDB from Crate.io in San Francisco makes machine data applications that were previously only possible using NoSQL solutions available to mainstream SQL developers.

The database helps machine manufacturers plan preventative maintenance, identify upsell opportunities and improve product planning.

Columnar field caches and a fully distributed planner perform complex queries in real time. The database handles machine learning and predictive analytics, on-time series, full text, JSON, geospatial, and other structured and unstructured data without having to use different database engines.

And CrateDB runs as a cluster of containers for easy scaling with Docker, Kubernetes, or Mesos container platforms.

<https://crate.io>



Counter measures for cyber risks.

PHOTO: FOTOLIA

A TOUGH TABLET

MTB-7 handles the harsh

Working in rough industrial environments requires a tough tablet. Chassis Plans, a manufacturer of computers, LCDs and storage arrays in San Diego, Calif., has a sleek one.

The MTB-7 guards against the water, dirt, smoke and dust and runs up to 15 hours at a time on Windows 10 or Android.

View maps or images on its 7-in., extra-bright PCAP touchscreen. Capture a photo or record a video, input field notes using a stylus or a keyboard, or capture a GNSS location, and then analyze the collected data. Or you can transfer it to another computer or network.

www.chassis-plans.com



Data on the move.

IMPROVE IIOT SECURITY

Guidelines for endpoint best practices

The Industrial Internet of Things (IIoT) is revolutionizing manufacturing but all that digital access and critical information flying around creates a cybersecurity risk.

The Industrial Internet Consortium (IIC) simplifies security with its Endpoint Security Best Practices white paper for equipment manufacturers, integrators and others to reference countermeasures and controls for IIoT endpoint devices. In the manufacturing world they include edge devices such as sensors, actuators, pumps, flow meters, controllers and drives.

The 13-page white paper distills key information from industrial guidance and compliance frameworks, such as IEC 62443, NIST SP 800-53, the IIC and IISF.

Pick it up at the IIC website.

www.iiconsortium.org



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PRODUCTS AND EQUIPMENT

AUTOMATION

NETWORK COMMUNICATES AS ONE WITH A SINGLE PLC



Mastering a PLC.

A new technology from Turck creates a high-density I/O network that uses a low cost PLC.

BEEP (Backplane Ethernet Extension Protocol) pulls together up to 33 devices – one master and 32 slaves – or 480 bytes of data that appears as a single device to the PLC on a single connection using a single IP address.

The master is created via the device webserver. BEEP then scans the entire network and creates a new data map that includes all of the downstream devices, with all configuration options saved in the master.

The technology also supports drop-in replacement. The master automatically recognizes the device, assigns it an IP address and downloads the parameters to it.

BEEP is compatible with all standard ethernet components and does not require special equipment.

Turck is a supplier of automation products based in Markham, Ont.
www.turck.ca

LINEAR TABLE SLIDE TRANSFERS MACHINE PARTS



Drop-in replacement.

DESTACO's T110 linear pneu-

matic table slides complement the G110 gripper to improve speed and reliability of high-speed machine part-transfer, pick-and-place operations, and machine tending applications.

An industry-standard footprint allows for drop-in replacement.

There are 44 model configurations for machine tending applications; various stroke options ranging from 10 to 150 mm; smooth operation using a high-quality cross roller bearing system; and shock absorbers or rubber stops for fine end-of-stroke adjustment.

Startup kits ensure OEMs and machine builders have everything they need for slide integration into their machines. They include sensors, stroke adjusters, shocks and stops necessary for installation.

DESTACO makes automation systems in Auburn Hills, Mich.
www.destaco.com

FORCE-GUIDED RELAYS ARE FAILSAFE



Mechanically linked contacts.

AutomationDirect has added Dold force guided relays to its product lineup.

The electromechanical switching devices mechanically link contacts to ensure they move at the same time, and prevent movement if any contact is immobilized.

Each has at least one NC and one NO contact set.

They come with up to six poles in several NO/NC combinations with 5 A contact rating, and provide a large wire cross-section (12-24 AWG) to reduce thermal load on wires.

Mounting options include 35-mm DIN rail mount integrated relay modules or mounting

socket with plug-in relay.

Relays include diode protection and modules provide LED indication.

AutomationDirect is a distributor of industrial automation products for electrical control systems based in Cumming, Ga. www.automationdirect.com

MOTORS INCREASE MACHINE TOOL PRODUCTIVITY



Increased torque precision.

The IndraDyn S series MS2N synchronous servo motors from Rexroth improve the consistency of path velocity thanks to significantly reduced torque ripple. And with the MS2N motors as a data source working with IndraDrive control units, new applications for the higher availability of machine tools in a networked environment are possible.

Intelligence reaches all the way up to the motor: individual measurements of each motor, as well as saturation and temperature data, are stored in memory and automatically processed by controllers. This information increases the precision of the torque and reduces the tolerance range to a fraction of previously accepted values. The servo motor

also provides data. This allows machine tool operators to implement Industry 4.0 applications, such as condition monitoring and predictive maintenance, without additional components.

Machine manufacturers use these more compact motors in existing drive tasks or use more power within a given motor compartment. Up to five times overload capacity guarantees the fastest acceleration for all sizes.

The motors come in six sizes, each with up to five lengths at power ranges from 4 to 360 Nm maximum torque and 0.8 to 148 Nm continuous torque at standstill.

Bosch Rexroth Canada, based in Burlington, Ont., is a supplier of factory automation technology. www.boschrexroth.ca

SAFETY TECH COMBINES INTO ONE SOLUTION



Failsafe used with machine PLC.

KEB America Inc.'s latest safety automation products have been combined to form a full system solution.

The Safety PLC is a fail safe over EtherCAT (FSoE) master

used in tandem with the machine PLC to execute and monitor machinery safety functions. FSoE uses a black-channel approach for use with other bus systems. KEB's Safety PLC connects with other FSoE slave modules such as Safe I/O and Servo Drives with Safe Motion functionality.

Safe I/O modules monitor safety devices with the Safety PLC. Each FSoE slave has four safe inputs, two safe outputs, and four OSSD outputs. One FSoE master controls up to 65,535 devices.

KEB is a manufacturer of automation technology based in Shakopee, Minn. <http://kebblog.com>

METAL WORKING

TUBE FORMING FOR AUTOMATED CELLS



Four models.

R&B Machining Inc.'s new line of all-electric, servo technology presses includes four standard models (15, 30, 50, and 100 ton

capacities).

The presses are controlled with a standard Allen Bradley or optional Siemens PLC.

Digital, ethernet-based control provides advanced diagnostics, maintenance reminders, and available production information.

The presses are designed for automated cells and load dies from the front or back of the machine.

Several options include quick-change die features, interlocked safety maintenance blocks, die sensors, and lubrication system.

R&B is a supplier of tooling for tube forming and bending applications based in Wilmington, Ohio. www.rbmachining.net

MACHINES STREAMLINE MOULD PRODUCTION



Table capacities up to 50 tons.

USC and USC-M Series 7-axis machines from UNISIG combine deep-hole drilling and milling to reduce setup time, increase accuracy and eliminate mould design restrictions associated with traditional machining centres.

Process large and small parts



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sewcan.ca/allin

PRODUCTS AND EQUIPMENT

with four-sided machining capability in a single setup.

The machines use a spindle for gundrilling and BTA drilling, and a CAT 50 spindle to generate accurate holes in large work pieces.

Available in table weight capacities up to 50 tons, the machines are suitable for mould plates and frack pumps. Milling spindles and rotary tables are also available for increased part processing.

Control on the M-Series machines utilize the B, A, X, Y

and Z axes for 5-axis machining operations, the W-axis for the combined gundrilling and BTA deep-hole drilling spindle, and the U-axis for machining.

This provides 3 plus 2 machining to make deep-hole drilling and machining of compound angles faster and easier.

UNISIG, based in Menomonee Falls, Wis., manufactures deep-hole drilling systems and technologies for metalcutting industries. [http:// UNISIG.com](http://UNISIG.com)

VERTICAL CENTRES FOR TUBE, PIPE MACHINING



Easy loading and unloading.

FlexDrill CNC's TRD vertical

machining centres drill, mill, tap and bevel large or long parts in a single set-up.

Alternately, the long open bed, coupled with the movable safety light curtain, allows multiple set-ups. While the TRD is machining one part, another is being loaded (or offloaded) to increase uptime.

The open design provides unrestricted access, which makes loading and unloading easier and faster. With a 2-ft. bed width and lengths from 10 to 80 ft. the TRD machine is suitable for long products such as tube, pipe, cutting keyways, and more.

A monoblock welded steel frame has high rigidity and a t-slot machine bed. Spindle taper of CT or BT 40 are available, in speeds from 2,000 to 6,000 rpm, with a max torque capability of 184 ft.-lb. Maximum travel rate is 1,181 in./min. along the x axis, 984 in./min. along the y axis and 165 in./min. along the z axis. Spindle nose to table distance is from 8.75 in. to 24.75 in.

The standard unit runs on 480 V and includes mobile light-curtain safety barriers, frame with chip conveyor and t-slotted table, flood coolant pump and tank, and automatic tool calibrator. Flex-Drill CNC, based in Wapakoneta, Ohio, makes CNC machines as well as tapping arms, die grinding arms, torque arms, assembly and part manipulators.

www.flexdrillcnc.com

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Inc. takes the foot pumps and hand cranks out of transporting drums.

An electric/hydraulic lifting system (in 20 and 36-in. lift heights) is activated by a simple pushbutton to manually transport steel, plastic and fibre drums weighing up to 1,000 lb.

Options include non-sparking packages, alternate coatings and Liftomatic's exclusive Double Parrot-Beak clamping system.

Liftomatic, based in Buffalo Grove, Ill., makes material handling products.

www.liftomatic.com

CAPTURE AIRBORNE DUST FROM UPSTREAM



Seven-litre hopper.

Flexicon's Stand-alone Dust Collector removes airborne dust from upstream processes, and discharges

it into containers positioned below the collection hopper to protect operators and improve plant hygiene, while eliminating material waste.

The housing is equipped with a 15-mm diameter side inlet port, dual filter cartridges, a 2 hp (1.5 kW) fan motor, a 70-litre collection hopper with flanged slide gate valve and automated controls.

Any upstream processes that generate dust vents to the system through hard piping or a flexible connection, drawing dust onto dual filter cartridges. An automatic reverse-pulse filter cleaning system releases short blasts of compressed plant air inside the filters at timed intervals, causing dust build-up on the outer filter surfaces to fall into the hopper.

An indicator light on the collector's control panel notifies the operator when the receiving hopper is full.

The slide gate at the hopper outlet opens manually, allowing collected material to discharge into a container.

Cleaning is made easy with a stainless steel housing and support structure, together with NEMA 4X water-resistant controls and wash-down-duty fan motor.

Flexicon makes dust collection systems in Bethlehem, Pa.

www.flexicon.com

VISION

GV 4000: NEXT GEN VISION



Multi-camera system.

Teledyne DALSA Inc.'s GV 4000 multi-camera vision system offers more memory resources, power-enabled camera ports and a small step-up in for applications (such as final inspection of large assemblies) using multiple large format Genie Nano cameras.

A low power, Gen6 Core i7 processor and 16 GB of RAM handle high-speeds with ample resources to manage multi-camera applications.

Each of the four (4) gigabit compliant ethernet camera ports connect internally through independent data lanes to alleviate bandwidth bottlenecks and each port is expandable by using external switches to accommodate larger camera configurations.

The camera ports are compatible with a range of GigE cameras, including Teledyne DALSA's newest high resolution Genie Nano and Linea models.

Teledyne DALSA, based in Waterloo, Ont., makes vision systems.

www.teledyne.com

PLANTWARE



Learn from historical data.

PHOTO: FOTOLIA

Predict the future

A new digital productivity platform that's augmented with artificial intelligence aims to help manufacturers get ahead of problems on the plant floor. While it monitors the current status of production and factory assets, Sensai also predicts future conditions.

It integrates into old and new machinery with the installation of non-invasive wireless sensors that interconnect through a smart mesh network of gateways. The platform collects data through its IIoT hub, gateways and sensors, and instantly sends it to the cloud or an on-premise location to be processed and secured.

Operations teams are always aware of production status, machinery requirements and needs via user-friendly dashboards, mobile applications and cloud-based connectivity to machinery. But now the differentiator: it learns the process and systems with coaching from machine operators, process and maintenance engineers. It then makes recommendations based on repeating patterns that were previously undetected.

The platform assesses the team's experiences and historical data from the knowledge base and cross-checks patterns of previous failures against a real-time feed.

Sensai, based in Monterrey, Mexico, is privately funded and used by Metalsa, a manufacturer of automotive structural components.

The company is looking for US manufacturers to pilot the platform, but the platform is available to Canadian companies too.

www.sensai.net

EVENTS

STLE 73rd Annual Meeting & Exhibition STLE

May 20-24, Minneapolis

The annual meeting of the Society of Tribologists and Lubrication Engineers (STLE) includes technical presentations, education courses, plus an exhibitor trade show. Visit www.stle.org.

Energy Summit 2018 EMC, NRCAN, CIPEC

May 30-31, Vaughan, Ont.

Presented by the Excellence in Manufacturing Consortium, Natural Resources Canada and the Canadian Industry Partnership for Energy Conservation. The focus is energy efficiency and maximizing profitability, reducing maintenance costs and combating climate change. Visit

www.emccanada.org.

PTDA 2018 Canadian Conference PTDA

June 6-8, Toronto

The Power Transmission Distributors Association (PTDA) presents its annual Canadian Conference featuring education sessions, keynotes and networking. Visit www.ptda.org.

2018 National Apprenticeship Conference Canadian Apprenticeship Forum

June 10-12, Montreal

Initiatives, programs and strategies that contribute to Canada's world-class apprenticeship system. On-the-ground approaches that reflect how traditional models and methods are evolving will be showcased. Visit <http://caf-fca.org>.



Clear and present danger to Canada's prosperity

BY JASON CLEMENS

The “straw that broke the camel’s back” is an idiom that describes a minor or routine action that causes a large and sudden reaction because of the cumulative effects of many other small actions. This describes the state of business investment and entrepreneurship in Canada.

After years of mounting tax and increased regulation, coupled with a decidedly anti-business rhetoric from many capitals across the country, it seems the back of business investment and entrepreneurship in Canada has been broken.

The question is whether governments in Canada are interested in repairing it.

The list of policy changes that have made Canada a less attractive place to do business is significant. In recent years, the federal and many provincial governments increased already uncompetitive personal income tax rates to the point where the top combined rate now exceeds 50% in seven provinces, with the remaining provinces just below 50%. And because Canada’s capital gains tax is linked to personal income taxes, these rate changes have also increased capital gains taxes.

The federal and several provincial governments have also added more complex and burdensome regulations on labour, energy, infrastructure projects, environment, health and safety, and finance, to name just a few.

In addition, Ottawa continues to push forward with national carbon pricing despite the US and other competitors such as Australia reversing course. Even advocates for carbon pricing have criticized Canada for an overly complex approach.

Most of these policy changes were enacted before the recent sweeping tax reforms in the US, which for the first time in more than 20 years mean Canada’s business taxes are no longer competitive with the US.

US reforms will lower the effective tax rates on new investments from 34.6% to 18.8%. Canada’s comparable rate on new investments is 21.2%, and both Prime Minister Justin Trudeau and the Finance Minister Bill Morneau have flatly stated Canada will not respond until there’s clear evidence of the need to do so.

Given Canada’s dismal business investment and entrepreneurship performance, it’s not clear what additional information they require.

Since peaking at the end of 2014, total business investment – excluding residential housing and adjusted for inflation – is down almost 17%.



Tax and regulatory increases impair the willingness to invest in Canada.

PHOTO: FOTOLIA

Private-sector investment in factories and other structures is down 23.3% and investment in machinery and equipment is down 6.6%.

Moreover, a 2017 study by Philip Cross, former chief analyst at Statistics Canada, ranked Canada 16th of 17 countries for business investment between 2015 and 2017 compared to eighth place from 2009 to 2014.

And finally, investment in Canada by foreigners has collapsed. Foreign direct investment in Canada in 2017 was \$31.5 billion, just 56% of 2013 levels, when it totalled \$71.5 billion.

This is all bad news for Canada’s prospects for growth. Private-sector investment is the lifeblood of new and existing companies. It provides the resources for new equipment, innovation, new products and, ultimately, sustainable and prosperous employment for Canadians. The decline in private-sector investment is surely one of the reasons that economic growth is expected to slow markedly in coming years.

It seems clear that tax and regulatory increases, coupled with policy changes in the US (including uncertainty over the North American Free Trade Agreement) have impaired the willingness of businesses and entrepreneurs to invest in Canada. Even more worrying is that most of the country’s political leaders seem oblivious to this clear and present danger to Canadian prosperity.

It’s high time we start repairing our business and investment environment by removing policies that have broken the backs of businesses and entrepreneurs in Canada.

Jason Clemens wrote this article with Milagros Palacios and Niels Veldhuis. The writers are economists with the Fraser Institute and co-authors of the End of the Chretien Consensus. © Troy Media 2018

Comments? E-mail jterrett@plant.ca.

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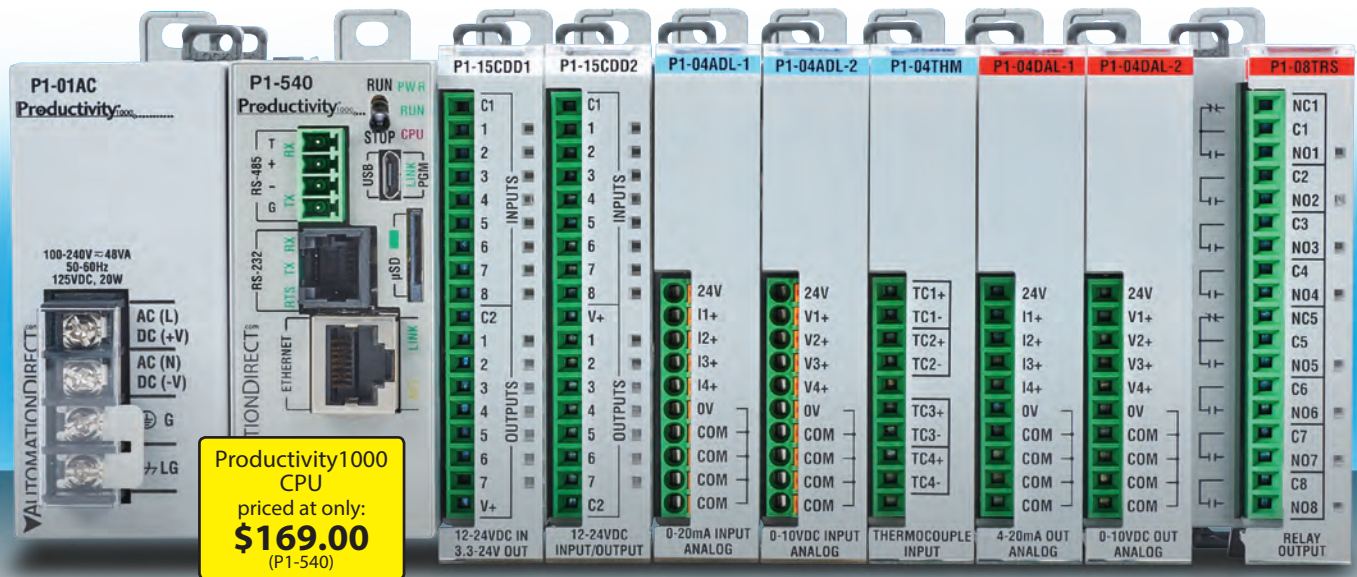
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CPU and I/O Comparison	AutomationDirect Productivity1000	US. Allen-Bradley Micro850	Allen-Bradley MicroLogix 1100
CPU/PLC (with Ethernet)	\$169.00 P1-540	\$442.00 2080-LC50-24QV8	\$704.00 1763-L1688B
(40) 24VDC Inputs (Built-in I/O included)	\$295.00 (5) P1-15CDD1 combo	\$586.00 (1) 2085-IQ32 + (2) 2085-OV16	\$872.00 (1) 1762-IQ32T + (1) 1762-OB32T
(32) 24VDC Outputs (Built-in I/O included)	\$67.00 (1) P1-04ADL-1	\$222.00 (1) 2085-IF4	\$405.00 (1) 1762-IF20F2 combo
(4) Analog Inputs (Built-in I/O included)	\$95.00 (1) P1-04DAL-1	\$222.00 (1) 2085-OF4	
(4) Temperature Inputs (Based on thermocouple inputs)	\$119.00 (1) P1-04THM	\$343.00 (1) 2085-IR14	\$564.00 (1) 1762-IT4
Total Length DINrail space consumed mm [in]	170mm [6.7"]	349mm [15.50"]	270mm [10.63"]
Total Hardware Cost Includes required terminal blocks, end caps, terminators, etc.	\$787.50	\$1,830.20	\$2,545.00
Programming Software	FREE PS-PGMSW	FREE Connected Component WB	\$5,890.00 9324-RL0700XENE*

All prices are U.S. published estimated retail prices. AutomationDirect prices as of 12/13/2017. Allen-Bradley hardware prices taken from www.rockwell.com, 10/11/2017. Allen-Bradley software price taken from www.lexipol.com, 10/11/2017. *The price for the MicroLogix 1100 software assumes the professional version, which includes RSNetWorx for EtherNet/IP configuration. No EtherNet/IP = \$2,670.

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