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12 BATTERIES

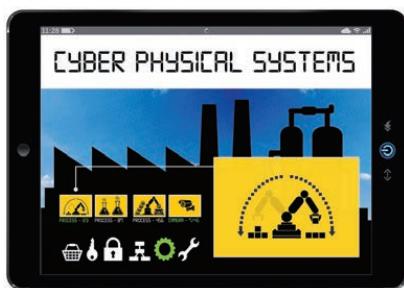
Electrovaya's lithium ion plan will charge up the energy storage segment and contribute to a greener future.



17 POWER CONTROL Maintaining a strong electrical maintenance standard is key to plant safety.



21 LAW How you can use a complex regulatory environment to your advantage.



24 INDUSTRY 4.0 The digital factory is reducing costs and increasing productivity.



27 ENCLOSURES A hybrid power solution solves energy efficiency and recycling issues onboard a deepwater drill ship.

FEATURES

15 ELECTRICITY ICI provides big power users an opportunity to cut energy costs.

CLEAN ENERGY Carbon pricing will drive investment.

16 THINK LEAN Use informal feedback from plant visitors as opportunities for improvement.

20 CCOHS SAFETY TIPS Adapting to an aging workforce.

BIONICS Festo's eMotion Butterflies take flight.

22 TRAINING Don't waste your customers' time with untrained staff members.

23 INSURANCE Why you should top up D&O coverage before disaster strikes.

24 AUTOMATION Trends to watch in machine vision technology.

25 EXPORT REPORT Companies are optimistic about trade, but NAFTA is a wild card.

26 OUTLOOK CEOs are confident about growth.

DEPARTMENTS

- 4 Editorial
- 6 News
- Bulletins
- 8 Careers
- 11 PLANT Pulse
- 27 CIEN feature: Enclosures Supply Lines
- 28 Product focus: Power transmission, motion
- 29 Products and equipment
- 33 Plantware Events
- 34 Postscript

COVER IMAGE: SILVANA METALLO

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Living in interesting times

Now that Donald Trump is officially ensconced in the Oval Office, we can turn our attention to how he intends to disrupt North American trade, and the ramifications for Canadian manufacturers in the automotive sector.

Although Canada's position in global automotive production has slipped over the past decade, mostly in Mexico's favour, it continues to be an important economic driver. Vehicles and parts account for more than 10% of manufacturing GDP and \$85 billion in shipments, mostly to the US. More than 120,000 people are directly employed in the sector and there is an additional 400,000 spin-off jobs.

During the US presidential election Trump derided the North American Free Trade Agreement (NAFTA) as the worst deal ever and promised to renegotiate its terms more in America's favour, or rip it up.

Much of his disgruntlement over lost US manufacturing jobs is aimed at Mexico. We have seen how his late-night tweeting over planned investments there has rattled automakers. He threatened them with import tariffs of 35% on Mexican-made vehicles as an inducement to maintain or add new manufacturing jobs in the US.

This focus on NAFTA and investment in the US raises troubling possibilities for Canadian auto parts makers and assemblers. Investment in the Canadian industry has been stagnant. Although Unifor managed to secure labour agreements worth \$1.6 billion from the Detroit 3, what happens four years from now when the contracts expire is anyone's guess, especially with NAFTA at risk.

But Republican lawmakers are keen on a border adjustment tax as a part of their corporate tax cut (from 35% to 20%), which could be imposed on exports from all countries, and would include vehicles moving from Canada to the US.

An analyst from the Center for Automotive Research (CAR), an automotive research firm in Ann Arbor, Mich., told the *Windsor Star* such a tax could add 20% to the price of vehicles destined for the US market from Canada.

CAR has also tallied the cost of tearing up NAFTA in a recent study (www.cargroup.org), warning it would disrupt the automotive industry's intricate supply chain and end up costing US jobs.

NAFTA allows automakers to take advantage of best-cost production and lower supply chain risk, thus ensuring automotive production remains in North America. Without it, big segments of the industry would have moved to low-wage countries in Asia, Eastern Europe and South America. These options are still available.

On the parts side, China, South Korea and Japan could end up displacing Canada and Mexico. Picking on Mexico jeopardizes the 40.3% of US content in Mexican-built vehicles. The CAR study estimates 20,000 US parts jobs and 11,000 assembly jobs would be lost.

Michigan would be hit especially hard by a withdrawal from NAFTA. Indeed, Trump would be sticking it to the people he promised to protect.

Mexico and Canada are top foreign markets for Detroit. Mexico accounts for 39% of goods exports (\$17.3 billion) and Canada 34% (\$15.1 billion). CAR also predicts the state's high concentration of engineering and automotive-related employment would be at risk to other countries if production shifts outside the NAFTA region.

The CAR study concludes any move by the US to withdraw from NAFTA or to otherwise restrict automotive vehicle, parts and components trade within the region, will result in higher production costs, lower returns for investors, fewer choices for consumers and a less competitive US automotive and supplier industry.

To paraphrase the English expression (myth buster: it's not a Chinese curse), we live in interesting times. For now, as the meter runs out on NAFTA, the only thing we can count on for certain from the Trump administration is uncertainty.

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BULLETINS

Gildan Activewear Inc. has acquired the **American Apparel** brand for \$88 million following a bankruptcy court supervised auction. The sale includes worldwide intellectual property rights and some manufacturing equipment. Gildan will purchase inventory separately. Retail store assets aren't included.

PyroGenesis Canada Inc. has won two new military contracts worth \$1.2 million. The Montreal-based manufacturer of plasma waste-to-energy systems and plasma torch products said its order book now stands at \$13 million, including non-military business.

The **Business Development Bank of Canada** (BDC) is launching a \$135 million fund that will invest in energy and clean technology startups. BDC Capital says the money will be invested in up to 20 Canadian firms that demonstrate global potential over several years. Companies that have received investments from the ICE Venture Fund II are: **D-Wave Systems** and **CarbonCure**.

BioAmber Inc., a manufacturer of sustainable chemicals based in Sarnia, Ont., is setting up a joint venture in China with South Korean-based **CJ CheilJedang Corp.** to produce up to 36,000 tonnes of bio-succinic acid annually and commercialize output in Asia. BioAmber gets a technology royalty and CJ CJ will get a tolling fee for production.

The **Workplace Safety and Insurance Board's** (WSIB's) grants program is accepting applications. The board is inviting proposals for expert research studies and training initiatives focusing on better return to work and recovery outcomes, and that deliver innovation within Ontario's workplace compensation system.

Gray Tools Canada Inc. has purchased a new vertical machining centre, which was the final step in a nearly 18-month expansion project. The \$300,000 investment will allow the company to improve product quality and shorten lead times. The company, a manufacturer of industrial-grade hand tools based in Brampton, Ont., has been in business since 1912.

Ballard fuel-cell buses hit 10M km

Equivalent to driving 250 times around the world



Solaris Trollino low floor trolley bus.

PHOTO: BALLARD

VANCOUVER — Buses powered by hydrogen fuel-cell engines from Ballard Power Systems have logged more than 10 million kilometres (6.2 million miles) of service, which is equivalent to circling the globe 250 times at the equator.

The Vancouver-based clean energy company claims this as a first in the fuel cell industry, thanks to seven generations of its FCveloCity fuel-cell engine deployed in buses in 15 countries on five continents over the past decade.

Ballard has worked with 13 bus manufacturers to develop a variety of fuel cell bus configurations deployed in a wide range of

operating conditions. There are 80 of these buses on the road today: 41 in Europe; 24 in China; 13 in the US; three in Brazil; and one in India. However, there aren't any operating in Canada.

"We did run a large scale fuel-cell bus demonstration in Whistler from 2010 to 2014, but otherwise there has been limited interest in zero emission fuel cell technology," said Guy McAree, director of marketing and IR at Ballard.

He said electrical power in Canada is relatively low cost and there are no significant financial incentives (such as government subsidies) to encourage adoption.

Fuel-cell buses equipped with Ballard engines typically have a 350-kilometre (220-mile) range between refuelling stops, which takes as little as seven minutes. Ballard pegs fuel economy as one and a half times that of diesel and two times CNG buses.

Ballard recently sold 10 of its FCveloCity-HD fuel cell modules. They'll be used in buses made by Polish manufacturer Solaris Bus & Coach.

The 85-kilowatt modules will be deployed as range extenders in Solaris Trollino low-floor trolley buses.

Solaris has signed a contract with Riga Satiksme, the transport operator in Riga, Latvia, for 10 of the buses, which are capable of operating on routes that have no overhead or canary wiring.

The articulated buses are 18.75 metres long, each equipped with a battery. The onboard fuel-cell module, an alternative to diesel auxiliary power units currently used in Trollino buses, will engage as the trolley moves into any portion of its route that does not have canary wiring.

Ballard said deliveries are to start in 2017.

Tsubaki gets a BC base

MISSISSAUGA, Ont. — Tsubaki of Canada Ltd., a manufacturer of power transmission products, is acquiring a BC manufacturer of sprockets and related drive components.

Dia-Saw Manufacturing Ltd. in Maple Ridge, BC has been serving the western Canada market since 1988, first as a manufacturer of shake and shingle mill equipment before evolving into power transmission products.

The company operates a 14,000 square-foot facility.

No financial details were released. David Dueck, Dia-Saw's president, will stay with the company.

Tsubaki of Canada, based in Mississauga, Ont., is a wholly owned subsidiary of the Tsubakimoto Chain Co. (Tsubaki) of Japan, a manufacturer of power transmission products and material handling systems.

Velan awarded nuclear valve contracts worth \$36M

MONTREAL — Industrial valve manufacturer Velan Inc. has been awarded contracts worth \$36 million to supply nuclear-class valves for use by nuclear power companies in China.

The Montreal company's subsidiary in Lyon, France will deliver the valves in 2018 and 2019 to China Nuclear Power Engineering Corp. (CNPEC), China Nuclear Power Engineering Co. Ltd. (CNPE), China Nuclear Energy Industry Corp. (CNEIC), and State Nuclear Power Engineering Corp. Ltd (SNPEC).

The CNPEC orders involve critical nuclear-classified forged valves, and high-pres-

sure gate, globe, and check valves with electric actuators for the two new generation Hualong HPR1000 nuclear plants.

The orders for CNPE and CNEIC, both part of the China National Nuclear Corp., involve nuclear-classified valves for two new nuclear power plants to be built in Jiangsu province. The mainly high-pressure forged valves with electric or pneumatic actuators will be used inside nuclear containment vessels.

Velan Inc. employs 1,900 people and has manufacturing plants in nine countries, with sales of almost US\$427 million last year.

FLIR acquires Prox Dynamics

Nano drone UAS extends its surveillance line

WILSONVILLE, Ore. — Sensor system and thermal imaging manufacturer FLIR Systems Inc. has added to its drone capabilities with the \$134 million acquisition of Prox Dynamics AS.

Prox Dynamics AS, an Oslo, Norway-based manufacturer of nano-class unmanned aerial systems (UAS) for military and para-military use, makes small, light aerial sensors and covert surveillance systems.

The company's Black Hornet aerial sensor and hand controller is a pocket-sized system

that's hand-launched by a soldier in the field.

The Black Hornet uses FLIR's Lepton micro-thermal camera, visible spectrum cameras, advanced low-power rotor technology, and proprietary software for flight control, stabilization and communications. This tiny helicopter weighs less than one ounce, and flies for 25 minutes up to 1.6 kilometres.

The Prox Dynamics business extends FLIR's Airborne sensor product line, which the Wilsonville, Ore. company says will



Pocket-sized drone is hand launched by a soldier.

PHOTO: FLIR

become its UAS business, operating within the surveillance segment.

FLIR has Canadian offices in Burlington, Ont.

EEStor, ASG to develop silicone polymers

TORONTO — EEStor Corp. will jointly develop highly polar silicone-based custom polymers with a Barbados-based R&D firm for use in its capacitor and electrical energy storage technologies.

The Toronto company has signed a binding letter of intent with Alchemy Synergy Group (ASG) Inc., a developer of specialty polymers. These include highly-polarized silanes (chemical compound with one or multiple silicon atoms) for use in antimicrobials applications, and specialty coatings applied to thin films.

ASG will help design what it describes as a "unique polymeric solution" to work with EEStor's composition modified barium titanate, a powder used in energy storage

capacitors. If tests are successful, it will licence the polymers to EEStor and assist with the sourcing of materials for commercial production.

All polymer technologies developed by both companies would be jointly owned with a technology agreement for the cross-licensing. EEStor would also have the right, in certain circumstances, to acquire technologies as they relate to the capacitor and energy storage industries.

EEStor is aiming its polymer capacitors at the architecture, engineering and construction markets, the photovoltaic voltage smoothing capacitor market and the utility grid power factor correction markets.

The company began as ZENN Motor Co. Inc., a Canadian manufacturer of low speed electric vehicles. It changed its name to EEStor Corp. to reflect its current interests and holds the controlling interest in EEStor Inc., based in Cedar Park, Tex., the developer of the capacitor technology.

Blackberry opens autonomous vehicle innovation centre

Will R&D production-ready AV software

OTTAWA — BlackBerry and its automotive technology subsidiary QNX are opening a facility in Ottawa to accelerate the development of connected and self-driving vehicle technologies.

The BlackBerry QNX Autonomous Vehicle Innovation Centre (AVIC) will house research into production-ready software, working independently and in collaboration with industry and public sector partners.

Blackberry QNX expects to hire local software engineering to work on ongoing and emerging engineering projects.

Ontario's transportation ministry recently approved the company's request to test autonomous vehicles on provincial roads.

One of the innovation centre's first projects will support the pilot program and BlackBerry QNX's work with the University of Waterloo, PolySync and Renesas Electronics to build a concept vehicle.



AVIC resides at the BlackBerry QNX headquarters in Ottawa.

PHOTO: MORGARD

Nemak gets \$3M for auto technology

WINDSOR, Ont. — Nemak of Canada Corp. has been awarded \$3 million in federal funding to develop aluminum engine blocks at its Windsor, Ont. manufacturing facility that will add up to 70 jobs.

The company said the new aluminum engine blocks will make cars lighter and more fuel-efficient.

They'll be produced by a fully automated production system.

The funding is being allocated through the Automotive Supplier Innovation Program. It supports research and development activities by small and medium-sized companies that provide components, parts and production systems for the automotive supply chain.

Nemak develops aluminum powertrain and body-structure components for the automotive sector.

Transport Canada approves Bell Jet Ranger helicopter

OTTAWA — Transport Canada has awarded certification to the five-passenger Bell 505 Jet Ranger X helicopter.

The lightweight aircraft, manufactured by Bell Helicopter Textron Canada in Mirabel, Que., is being prepared for global deliveries. It will be used for corporate, utility and training operations.

Transport Canada supervised and performed more than 575 hours of ground and flight testing during the certification process.

Bell says the helicopter is the first of its class to feature a fully integrated glass flight deck and avionic suite.

MDA to supply spacecraft for NASA mission

VANCOUVER — MacDonald, Dettwiler and Associates Ltd. (MDA) will supply a spacecraft platform for a NASA Discovery Mission to explore the metallic asteroid 16 Psyche.

MDA subsidiary SSL will work for NASA's Jet Propulsion Laboratory to support Arizona State University's research of the 210 kilometre diameter asteroid, which is believed to be the only place in the solar system where a

metal planetary core can be studied.

The SSL contract is expected to exceed US\$100 million.

SSL will provide the "power-propulsion chassis," a composite structure spacecraft platform equipped with a high-power solar electric propulsion system.

The spacecraft design is based on the SSL 1300 platform, which has been used on more than 100 missions.

CAREERS

Canadian Manufacturers & Exporters (CME) has appointed **Dennis Darby** president and CEO, replacing **Jayson Myers** who has launched a public affairs consultancy.



Dennis Darby

Darby was previously CEO of the Ontario Pharmacists Association (OPA). His manufacturing experience includes a 24-year career with Procter & Gamble, where he began as a product engineer and advanced to director of North American external relations. Darby is a registered Professional Engineer in Ontario.

Enerkem, a waste-to-biofuels and renewable chemicals producer based in Montreal, has appointed **Dominique Boies** as vice-president and CFO. Prior to joining Enerkem, he was executive vice-president and CFO at RONA. He has also held senior executive positions at RBC Royal Bank and at the Caisse de dépôt et placement du Québec.



Dominique Boies

McInnis Cement has appointed **Hervé Mallet** president and CEO. He joins the cement manufacturer based in Montreal from Dynacast, a die-casting and metal injection-moulding manufacturer with 23 plants worldwide. As vice-president of North America, he oversaw eight production facilities. McInnis is building a plant in Pointe Daniel-Gascons, Que., that will serve Eastern Canada and the New England states in the US.

Clearwater Seafoods has appointed **Don Holdsworth** as vice-president of global marketing. Based out of Clearwater's Bedford, NS headquarters, he will lead the company's global marketing team. He has more than 20 years of consumer packaged goods experience, having held various roles within the Kraft Heinz organization. Most recently, he was based in Ontario as head of the manufacturer's Condiments & Spreads group.

RPB equipment test confirms carbon capture cost savings

QUEBEC — CO2 Solutions Inc., a Quebec-based developer of enzyme-enabled carbon capture technology, has completed a performance assessment of rotating packed bed (RPB) equipment that will reduce carbon capture costs using the company's enzymatic technology.

The program, partly funded by a grant from the Natural Resources Canada ecoENERGY Innovation Initiative, involved testing at the University of North Dakota Energy & Environmental Research Centre.

Results confirmed potential cost reductions.

CO2 Solutions will continue testing RPB on a larger scale for industrial environments within the provincially-funded carbon Valorisation Carbone Quebec cycle project.



Innova Global waste heat boiler being loaded for export to the US.

PHOTO: INNOVA GLOBAL

Innova Global is an Alberta winner

Takes home export award for advanced technology

CALGARY — International emissions and noise control technology developer Innova Global Ltd. has won the 2016 Alberta Export Award for Advanced Technology and Innovation after lifting annual export sales revenue 23.6% in 2016.

The award recognizes companies that have harnessed their intellectual property and know-how to achieve significant growth in export sales or volume over the past year.

Innova makes products for air and noise emissions control, heat recovery, and equipment and infrastructure primarily for oil and gas and power generation customers.

The Calgary-based manufacturer said the strength of its export business growth shielded it from the sectoral impact of the downturn in oil prices over the past 18 months. Its products go to more than 3,500 projects in 50 countries, including primary markets in the US and South America.

"Demand has been driven by emissions regulations which have spurred the conversion of coal-fired power plants to natural gas-fired power plants that provide a cost-competitive cleaner energy source," said Harry Wong, Innova's president and CEO.

Noise generated by power plants is also subject to government regulations that aim to keep it at acceptable levels for nearby communities.

All of this is good for Innova's line of gas turbine system products, including turbine inlet and exhaust silencers, heat recovery steam generators and selective catalytic reduction systems.

Honda to invest \$492M in Alliston, Ont. plants

Government funding totals 17% of investment



(L-R) Brad Duguid, Ontario's minister of economic development and growth; Jerry Chenkin, president and CEO, Honda Canada Inc.; and Navdeep Bains, federal minister of innovation, science and economic development, at Honda's manufacturing facilities in Alliston, Ont.

PHOTO: HONDA CANADA

ALLISTON, Ont. — Honda of Canada Mfg. (HCM) will invest \$492 million over the next three years to modernize and improve the carbon footprint of its manufacturing facilities in Alliston, Ont.

The investments include contributions from both the federal and Ontario governments totalling \$41.8 million each.

The government funding represents 17% of Honda's total investment through the Automotive Innovation Fund (AIF), which supports strategic research and development projects that lead to more fuel-efficient vehicles.

Honda Canada president and CEO Jerry Chenkin said some of the money will be used to build a new paint shop to reduce greenhouse gas emissions by up to 44%. Investments will also be made in the plant's main assembly lines for the next generation of Honda Civic and CR-V models.

The Alliston facilities, which employ more than 4,000 people, currently have capacity to produce 400,000 Civic and CR-V models annually for the Canadian and North America markets, as well as for export.

They also produce 260,000 four-cylinder engines annually.



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Vehicle accommodates seven people, but carries up to 12 in an emergency.

PHOTO: INTERCONN

Hovering rescue craft gets a \$297,000 test contract

Military will check out Amphibious Trimaran with Aerostatic Discharge

MARKHAM, Ont. — The Canadian Armed Forces and National Defence will test a Canadian-made light amphibious rescue craft that hovers over water, land and snow and will go to places helicopters can't reach.

Interconn Development Ltd., manufacturer of the Amphibious Trimaran with Aerostatic Discharge, was awarded a \$297,045 contract through the Build in Canada Innovation Program.

Its light amphibious vehicle uses air cushion technology to transport passengers and cargo during search and rescue missions in harsh conditions that prevent the use of helicopters.

The company, based in Markham, Ont., says the craft's operational range is about 240 to 250 kilometres.

Aerostatic discharge is the layer of 750 to 1,080 Pa pressurized air between the craft's inflatable floats, for hovering up to four centimetres above the terrain.

The craft operates in calm or swift water of any depth and in waves up to two metres, including flooded environments full of debris and underwater obstacles. It also travels over sandbars, mudflats, muskeg, snow and ice, plus short distances over paved surfaces. But it does not operate over steep terrain or where there are obstructions such as rocks and trees.

The vehicle accommodates seven people including the operator but in an emergency it can carry as many as 12. It's also designed to carry a wide range of cargo, plus rescue and emergency equipment including all-terrain vehicles and snowmobiles.

Ontario, BC are top oil sands suppliers

CALGARY — BC is the top supplier outside Alberta serving the oil sands in terms of number of companies, but Ontario is ahead in dollars, according to a bi-annual industry review.

The survey of Canadian Association of Petroleum Producers (CAPP) members shows 1,586 small, medium and large BC companies provided goods and services to the oil sands in 2016, just ahead of Ontario's 1,560.

Oil sands producers spent \$7.6 billion with 5,054 businesses across Canada, \$1.7 billion in BC.

Ontario won \$3.6 billion worth of business followed by BC and Quebec's \$962 million (going to 389 suppliers).

Saskatchewan's 1,218 suppliers' share was \$810 million followed by Manitoba (135 suppliers, \$172 million); New Brunswick (35 suppliers, \$72

million); Nova Scotia (69 suppliers, \$95 million); Newfoundland & Labrador (43 suppliers, \$306 million); the Northwest Territories (12 suppliers, \$12.5 million); and PEI (seven suppliers, \$6 million).

Alberta is not on the CAPP list because the association doesn't separate its oil sands data from conventional oil and natural gas numbers.

A Statistics Canada report in July projected capital spending in Alberta's oil sands to be \$17 billion, but that does not reflect how much was spent with the province's suppliers.

CAPP expects global demand for energy to increase 31% by 2040, with oil demand increasing by 12%.

Western Canada's oil supply is forecast to grow to 5.5 million barrels per day by 2030.

3M Canada awarded ISO 50001 enterprise certification

LONDON, Ont. — 3M Canada has become the first company in Canada to be awarded ISO 50001 Enterprise Level certification. It recognizes 3M's commitments to sustainability, including energy management initiatives that reduce consumptions and greenhouse gas emissions.

The certification follows two more 3M Canada facilities that attained ISO 50001 certifications earlier this year – a manufacturing

plant in Morden, Man. (first in the province) and a commercial building in Montreal – and joins four other 3M Canada facilities already certified.

3M was an early adopter of the ISO 50001 standard, with its Brockville, Ont. tape plant receiving one of the first certifications in North America, along with Superior Energy Performance (SEP) platinum certification in 2011. 3M Canada facilities in London and Perth,

Ont. are also ISO 50001 certified, while the company's Personal Safety Division plant in Brockville is expected to achieve ISO 50001 and SEP certification early next year.

ISO 50001 facilities have achieved average energy savings that are 25% greater than other un-certified 3M facilities with energy management systems.

The Brockville tape plant reduced energy costs by \$350,000 in the first two years after certification.

H2O Innovation wins three contracts

Deals worth \$8M include membrane bioreactors, reverse osmosis system

QUEBEC CITY — H2O Innovation Inc. has added three contracts worth \$8 million to its order book for water treatment technologies.

The two contracts in the US: one for wastewater treatment using its membrane bioreactor (MBR) and the other for drinking water. The third contract is for wastewater treatment in Quebec.

In one of the projects, the Quebec manufacturer of membrane filtration systems for water and wastewater treatment will retrofit the sequential batch reactor process used by Decatur, Ark. with a membrane bioreactor. The system currently has a flow rate of approximately 4,542 cubic-metres per day. Adding the membrane bioreactor will increase capacity to 14,385 cubic-metres. Future expansion will raise the rate to 17,413 cubic-metres. The new system will also incorporate biological nutrient removal.

This installation represents a first for Arkansas, and an opportunity for H2O Innovation to go after a lot more business.

The second MBR project, in Rivière-Beaudette,



High quality water improves the quality and/or efficiency of industrial production processes.

Photo: H2O INNOVATION

Que., will treat up to 421 cubic-metres per day. This is the third MBR system for Quebec.

The drinking water system for Fort Bend County, Tex. will employ reverse osmosis to provide capacity of up to 7,571 cubic-metres per day.

H2O Innovation operates three North American manufacturing facilities: a 62,000 square-foot plant in Quebec; a 37,000 square-foot plant in Minnesota; and a 12,000 square-foot technical service plant in California.

Confident SMEs

Manufacturers to boost investment: BDC

Canadian entrepreneurs have more confidence in the economy and plan to boost investment to \$96.6 billion in 2017, according to a Business Development Bank of Canada (BDC) study. Investments are up 1.6% from the totals invested in 2016.

Seventy per cent of the 3,988 executives at small and mid-sized enterprises (SMEs) surveyed by the Canadian government-owned business bank expect increased business revenue this year. That's a significant jump from 45% last year, with the strongest growth in investment intentions coming from technology businesses, manufacturers and goods exporters.

As crude oil prices stabilize, Alberta SMEs forecast 17.1% increase in planned investments this year over 2016. Ontario foresees a 2.9% rise and Quebec a 0.6% increase, while the Atlantic provinces will maintain last year's level of investment.

Declines are expected by BC and the territories (-5.4%) and the Prairies (-17.5%).

The entrepreneurs list their top investing priorities as growth and productivity projects, led by IT, training, machinery, equipment and vehicles.

BDC reports technology firms show the most optimism, with an average of \$410,000 in planned investments, up 41% from last year. Manufacturers are second at \$340,000, up 17%.

Obstacles to investment are lack of cash flow and lack of qualified personnel. Two thirds of businesses intend to finance investments mainly with working capital or other internal funds, while less than one in four plan to use a loan or line of credit, despite favourable credit conditions.

Businesses that invest more tend to project higher income growth. Those projecting 20% or higher growth plan to invest an average of \$380,000. Even companies expecting zero or negative growth aim to invest an average of \$150,000.

The survey was conducted in August and September. Visit www.bdc.ca to download the complete results.

PLANT PULSE

ECONOMIC DEVELOPMENTS AND TRENDS

PRICES FOR INDUSTRIAL GOODS INCREASE

The Industrial Product Price Index rose 0.3% in November. Higher prices for motorized and recreational vehicles (linked to the depreciation of the loonie against the US dollar) and primary non-ferrous metal products were moderated by lower prices for energy and petroleum products, Statistics Canada reports. Lower prices for crude energy products were the main reason for a 2% decrease in the Raw Materials Price Index.

Index (2010 = 100)



Sources(s): CANSIM

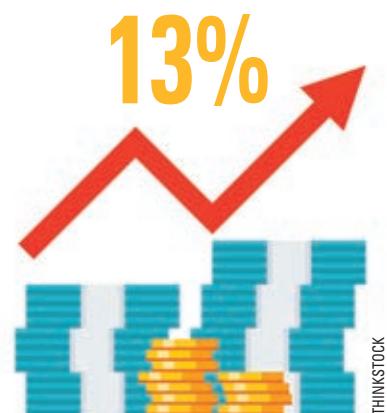
\$614B

The revenue from goods manufactured in 2015, according to the Statistics Canada Annual Survey of Manufacturing Industries. That represents a 1.3% decline from 2014.



THINKSTOCK

13%



THINKSTOCK

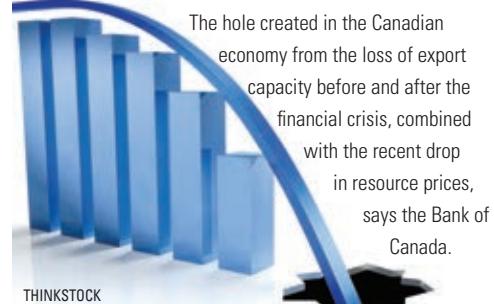
The average increase in profits during 2017 according to 42% of senior executives who responded to PLANT's Manufacturers' Outlook 2017 study.



THINKSTOCK

The number of cigarettes produced by Canadian manufacturers in November, up 16% from October, reports Statistics Canada. Cigarette production is up 25.6% from November 2015.

\$80B to \$90B



THINKSTOCK

The hole created in the Canadian economy from the loss of export capacity before and after the financial crisis, combined with the recent drop in resource prices, says the Bank of Canada.



16th

Where Alberta's combined marginal personal income tax rate stands among the provinces and US states, notes a Fraser Institute study. It was the lowest before the NDP government hiked corporate and personal income taxes in 2015. The corporate rate, once the lowest in Canada, is now 12% (behind BC's 11%, Ontario's 11.5% and Quebec's 11.9%). The lowest combined top personal income tax rate (10%, all incomes) was undone with five new tax rates and a 50% increase to the top rate.

Charging a greener **FUTURE**

ELECTROYAVA'S PLAN TO POWER THE GLOBAL LITHIUM ION INDUSTRY

The Ontario manufacturer is confident its safer and greener technology will overcome concerns about the promising battery technology.

BY JEFF BROWNLEE

It was one of the largest technology product recalls in history and raised additional safety concerns about the global power standard for mobile devices.

The estimated price tag for the 2.5 million Samsung Galaxy Note 7 smartphones recalled worldwide last year due to fires resulting from a flaw in the lithium ion (Li-ion) battery is estimated at more than US\$5 billion.

Samsung isn't alone. In 2006, millions of Sony-made Li-ion battery packs were recalled after several hundred overheated and a few caught fire. Then in 2013, Boeing grounded its entire fleet of the next-generation 787 Dreamliners after lithium batteries on two of the aircraft caught fire.

With all the safety issues why are these batteries the industry choice?

"They're simply so much better

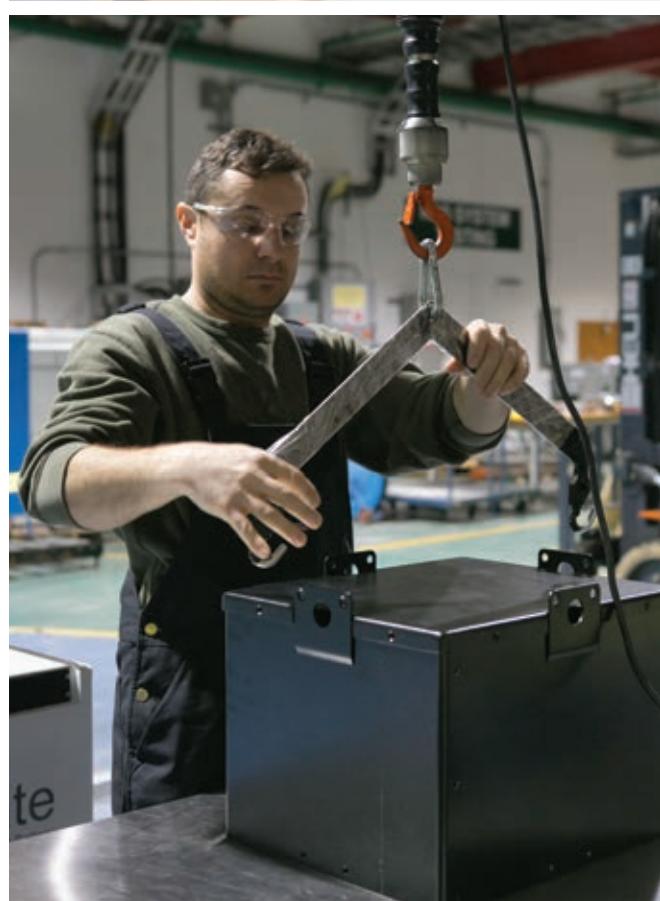
than anything else out there," University of Cambridge Professor Clare Grey told the UK's ITPRO blog last September. In other words, longer lasting and more charge for the batteries' size and weight.

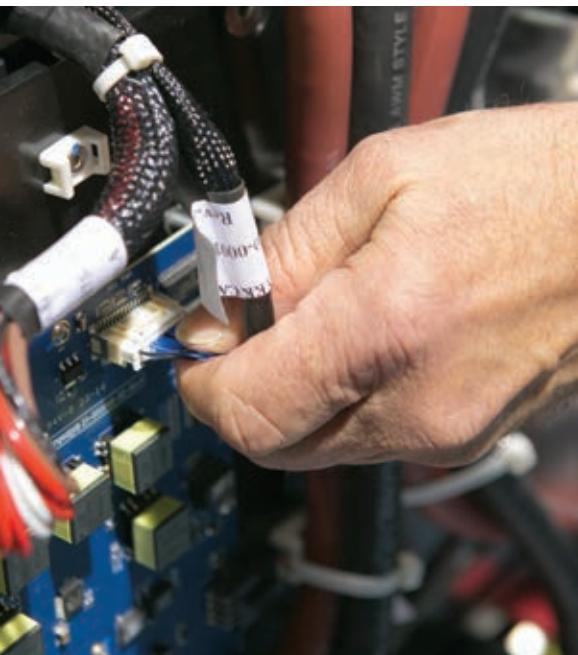
The Li-ion industry is growing rapidly. The batteries power everything from mobile devices, cars and household appliances. According to Bloomberg New Energy Finance, the Li-ion market will reach at least \$250 billion by 2040.

That figure is good news for one Mississauga, Ont. company leading the global charge in Li-ion battery development. Electrovaya Inc. is hoping its safer, green proprietary technology will overcome all safety concerns and become the industry standard across many sectors, particularly for industrial applications.

"We want and are positioned to become Canada's next technology

(L-R) A technician prepares the forklift battery for final assembly; a detailed shot of the final assembly process; the lithium ion battery is connected to an intelligent battery management system; a technician assembles a Lithium-Ion SuperPolymer submodule into a forklift battery assembly.





Electrovaya's Li-ion forklift battery is prepared for final end-of-line testing.

PHOTOS: SILVANNA METALLO

giant," says Sankar Das Gupta, Electrovaya's CEO. "Our revenue could substantially increase in the next 12 months with large potential growth."

Growth trajectory

On the surface, that may appear to be a stretch goal, but if the past 12 months are any indication, it's well within reach. The company's steep growth trajectory started in early 2016 when it inked a deal to purchase the European Union's largest Li-ion battery plant, constructed to supply the demand for power cells for auto giant Daimler AG's electric cars. Daimler decided to close the 150,000-square-foot facility near Dresden, Germany due to tough environmental regulations and insurmountable competition from cheaper Asian imports.

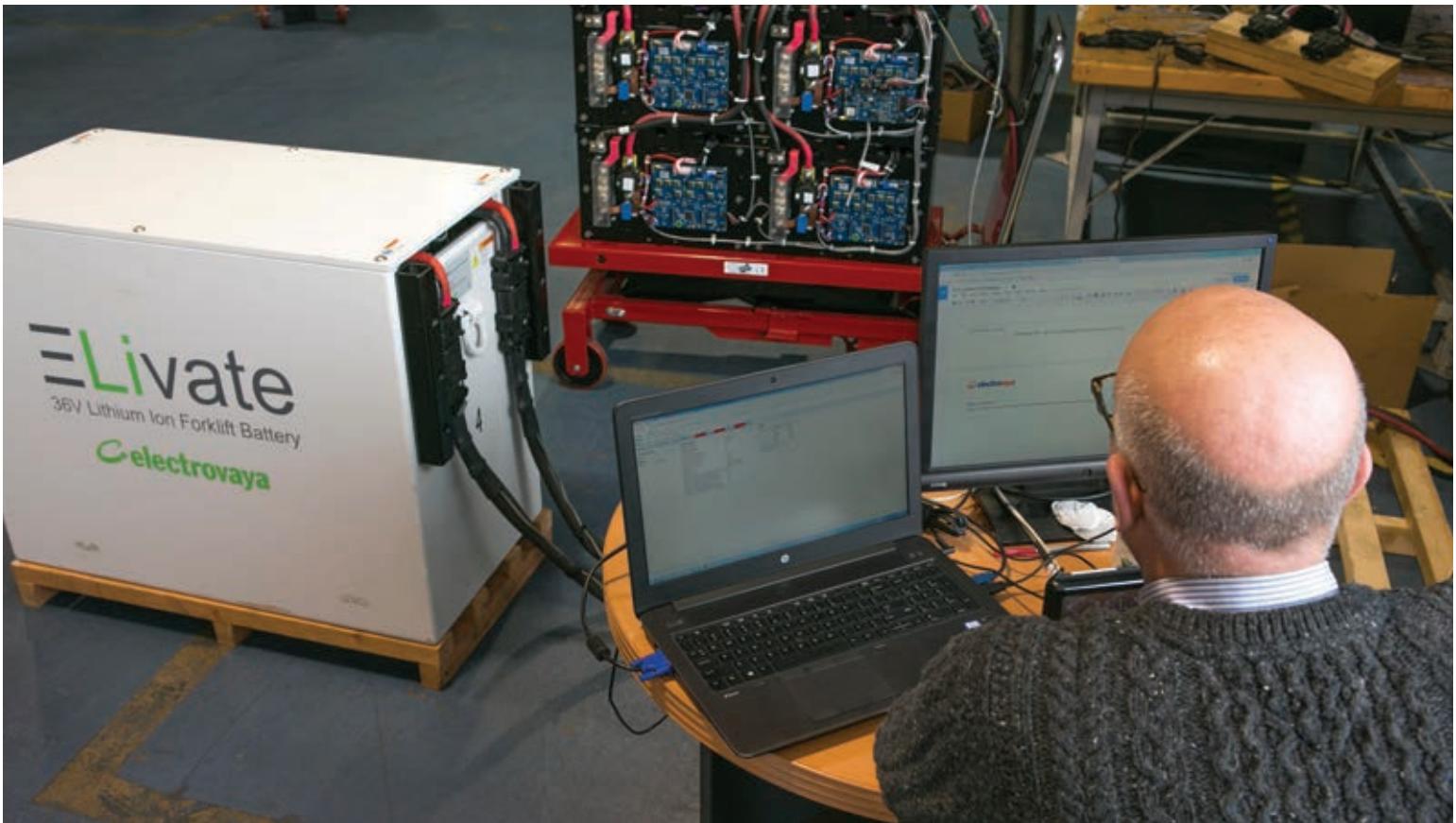
But Das Gupta, with the help of Export Development Canada (EDC), was able to work out a \$1.4 million deal that solidified Electrovaya's global footprint and gave it worldwide access to leading-edge technology.

"It was a perfect marriage and a win-win for both parties," says Das Gupta. "It was felt that our technology was the white knight that could save the plant and keep jobs in Germany."

One hundred jobs to be exact, with an additional 50 employees at its factory in Mississauga, all focused on developing innovative electric solutions for both vehicles as well as stationary power.

Since signing the acquisition, the company is working on deals that over the next four years are potentially worth almost 10 times its gross revenue from the past five years combined.

The marriage of technology – its patented non-toxic, "green" manufacturing process with trademark ceramic separator acquired in the German deal – delivers a competitive advantage.



An engineer oversees system testing of the forklift battery and its Intelligent Battery Management system.

Electrovaya's cells are cheaper to manufacture than most in the industry and can surpass even the most stringent environmental regulations. Battery life between charges lasts almost twice as long.

"We believe manufacturing lithium ion with toxic chemicals is a fundamental design flaw," Das Gupta says. "That's why we think our breakthrough clean technology could give us a major competitive advantage."

Power solution

The company's proprietary ceramic separator, which withstands extremely high temperatures, has also boosted the company's competitive position while extinguishing the safety concerns that have plagued other manufacturers. About 20,000 Mercedes Smart cars powered with the patented SEPARION separator have no safety issues. Adding to the innovative business mantra, Electrovaya has developed a modular battery cell design for use across multiple industries and sectors, in addition to a battery management system that boasts well-engineered software and hardware.

"It's like Lego blocks and helps us diversify our markets so we aren't reliant on just one customer," Das Gupta adds.

The company's clients are truly global with the main markets being in the US and Europe. Electrovaya has worked with many global groups including Chrysler, NASA and steel giant Tata.

Its modular approach has helped it develop a new forklift Li-ion ceramic power solution, ELivate, that Electrovaya believes could revolutionize the industry.

"Everyone with a plant needs better forklifts and our solution is a Li-ion ceramic battery drop-in replacement for lead-acid batteries that can't keep up to the demands of today's warehouse and logistics environments," says Das Gupta. "Increased demands on operational efficiency, 24-hour operations and more advanced vehicles, make a case for better energy solutions. Our ceramic battery may offer up to six times the life cycle of existing lead acid solutions and up to twice the life cycle of Li-ion products."

The company has partnered with forklift manufacturer Hyster-Yale and is working directly with forklift end users to replace lead acid batteries in industrial applications.

One problem the company will have to figure out is finding money to fuel growth.

"That's our biggest challenge right now," says Das Gupta. "We have significant interest in our products and our growth will be limited by the amount of working capital we have."

Overcoming that challenge may lie in Electrovaya's innovative vision of combining perseverance with additional support from Export Development Canada (EDC). The company is currently looking at possible additional acquisitions in Japan.

Das Gupta says that as the world moves

from fossil fuels to electric, how to generate electricity and use it is known, but how to deliver it cost-effectively and efficiently is another matter.

"Electrovaya's Li-ion ceramic battery could be a great way to deliver such electricity," Das Gupta says. "This battery is like solar energy at night, wind energy during calm days and gasoline for cars, forklifts, buses as well as other vehicles. It's mobile power everywhere."

Li-ion is the holy grail of the missing piece of technology to address climate change, he adds.

"A little bit of luck and a lot of perseverance and suddenly, right here in Canada, we now have the keys to the Holy Grail and we believe it happens to be the cleanest and greenest technology available."

Nevertheless, Das Gupta admits taking on giants like Samsung and Panasonic is akin to a very difficult race where the competitors are strong.

"The future is all about energy storage and whoever wins this battery race will be the next major global technology company," he says. "My goal is to make Electrovaya the next global technology company from Canada."

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

Comments? E-mail mpowell@plant.ca.

ELECTRICITY

The Ontario government has expanded the Industrial Conservation Initiative to add 700 companies.

BY PLANT STAFF

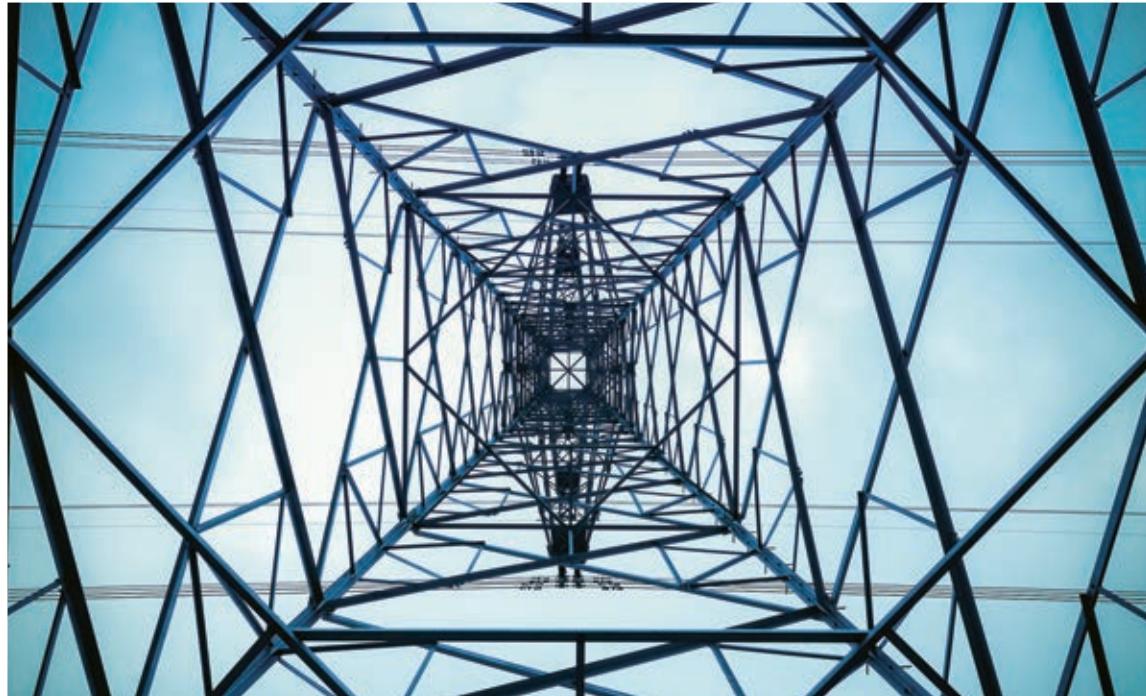
The Ontario government announced that as of Jan. 1 it would eliminate the 8% provincial portion of HST from hydro bills in an effort to reduce skyrocketing costs that are handcuffing households.

The provincial government estimates this will save households about \$130 a year. It has also cancelled green energy plans that will keep \$2.45 a month from being added to bills, scrapped the debt retirement charge, and has deferred construction of two nuclear reactors at the Darlington nuclear generation station (eliminating \$15 billion in construction costs).

But businesses, including manufacturers, are still grappling with almost unmanageable costs to power their facilities.

Electricity costs will also become an important factor for companies looking to establish operations in Ontario, hampering the province's ability to attract new investment.

To address business needs,



Industry can help lower peak demand.

PHOTO: FOTOLIA

Shift your POWER USE

ICI EXPANDS TO ADD BIG USERS

the Industrial Conservation Initiative (ICI) has been expanded to welcome up to 700 additional companies. The program, which started in 2011 and currently has 300 partici-

pants, offers an incentive to large electricity consumers to shift their electricity consumption to off-peak hours and reduce bills by up to 33%.

The Wynne government says by

reducing the electricity system's peak demand, ICI defers the need to build additional peaking generation. Currently, eligible ICI participants include consumers with monthly peak demand exceeding three megawatts.

These consumers are charged a "Global Adjustment" fee based on their share of total system demand during the highest five peak hours of the year.

For example, a plastics manufacturer with an average peak demand of two megawatts that participates in ICI would see its electricity price reduced from \$154 per megawatt-hour to as low as \$102 per megawatt hour. That would result in a monthly saving of \$42,000.

The 300 participants currently in the program reduced the province's peak demand by 1,000 megawatts in 2015.

Comments?

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CLEAN ENERGY

Spending down 15% in 2015

...But carbon pricing will help drive future investment

Despite 2015 being the second best year on record for Canadian investment in clean energy development, spending dropped by \$2 billion and fell 15% short of the \$12 billion benchmark set in 2014, according to a Clean Energy Canada report.

The decrease comes at a time when the federal and most provincial governments are focusing on climate change, and the Simon Fraser University think tank in Vancouver said the slowdown is out of step with global clean investment trends.

Spending in Ontario and Quebec, where existing clean energy expansions have run their course, has slowed. Meanwhile, spending surged in Manitoba and

Atlantic Canada.

Ontario's investments declined 15%, but the province is well ahead of its peers, contributing \$5.3 billion of the total \$10 billion spent last year.

The report says governments must hand down improved climate policies to get spending back on track.

Ontario has kick-started its next wave of clean energy projects, while Saskatchewan and Alberta intend to double and triple their respective renewable capacities by 2030. The think tank also expects a nationwide carbon pricing model will have a significant impact on spending over the next few years.

While the report argued for increased spending, it also noted Canada's power generating industry has already made significant strides. Eighty-eight per cent of its new spending in 2015 was on renewable sources.

Fresh eyes of new employees, suppliers, sales reps and customers are always the best to question or confirm the effectiveness of processes.

BY RICHARD KUNST

People soon become immune to their surroundings, which is why feedback and insights from the first-day impressions of new employees and visitors are so valuable, yet most manufacturers miss out on their fresh perceptions and observations.

Many organizations will spend countless hours prepping for an audit, but informal audits and feedback offer some excellent opportunities for improvement.

Outside eyes are in a position to question processes.

Take new employees. Their minds race to capture knowledge of the processes while remembering practical matters such as the location of the washroom and the lunchroom, and where to park. They're rushed through orientation with the hope they'll quickly migrate up the learning curve to quickly become productive. But a quick debriefing at the end of the first day will provide an honest look at your visual work place.

Suppliers and sales people are frequent visitors who regularly walk through your plant. In many cases their operations are similar to yours. They may not directly share what they see at other locations but they sure can provide you with some excellent hints.

And don't forget your prospective customers. After your boring PowerPoint presentations in the boardroom, take them on a tour of the plant. Asking them to fill out a feedback form will reveal what impresses them and whether it aligns with the value proposition you're pitching.

You can capture their ideas with a simple document. Ask your informal auditors to write down three things that impressed them



Quick debriefings provide an honest look at the visual workplace.

PHOTO: THINKSTOCK

VISITORS: Your best auditors INFORMAL FEEDBACK DELIVERS OPPORTUNITIES FOR IMPROVEMENT

and could be implemented at their facilities.

Also ask for three simple ideas that would be helpful to your organization. And ask for feedback on what they observed, covering categories such as: safety; workplace organization; effective use of space; scheduling; levels of inventory and work in progress; condition and maintenance of equipment and tools; commitment to quality; and any other observations of note.

Be sure visitors complete the form before departing.

What are you missing?

Finally, some thoughts about perception and how we easily miss things when we're caught up in our daily routines.

The *Washington Post* staged an

experiment in 2007 to test people's perception, taste and priorities in a busy subway station on a cold January morning. A man playing a violin performed six complex Bach pieces for about 45 minutes as about 2,000 people made their way to work or to other pressing engagements.

During his concert, only six people stopped briefly to listen, while 20 dropped money in his hat as they passed by. After an hour there was silence. He got no applause but did score \$32.

The commuters didn't know the violinist was Joshua Bell, one of the greatest musicians in the world. He played some of the most intricate pieces ever written on a violin worth \$3.5 million. Two days prior to the subway recital

he had sold out a Boston theatre where ticket prices averaged \$100.

One lesson we can learn from this experiment is that if we don't have a moment to stop and listen to one of the best musicians in the world playing some of the finest music ever written with one of the most beautiful instruments ever made, what else are we missing?

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.

Comments?

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Maintaining electrical SYSTEMS

IS YOUR
WORKPLACE
AS SAFE AS
YOU THINK?



How you manage electrical power systems is key to plant safety.

PHOTO: THINKSTOCK

A good electrical maintenance program is based on the new CSA Z 463 industry standard.

BY STEVE GAHBAUER

Virtually every industrial facility relies on electric power systems to drive production. This includes redundancy and emergency equipment, the proper maintenance of which is often neglected, sometimes to the point where worker safety is compromised. Proper operation of electric power transmission and distribution infrastructure is critical to safety and reliability in any production and processing facility. Failure in these systems

can create unsafe conditions and cause extensive downtime.

"Just because some plant equipment is not giving you trouble does not necessarily mean it is working safely," says Kerry Heid, president and CEO of Shermco Industries Canada Inc.

Heid warns against complacency about properly maintaining electrical warning and emergency devices. With decades of experience in the electrical business, he should know. He's the founder of Magna Electric Corp. in Saskatoon, an electrical projects group providing engineering consulting, electrical testing, and solutions for electric power distribution systems. Magna Electric is part of Shermco Industries, which has service centres in Edmonton, Calgary, Regina and Winnipeg.

Heid is also a past president of NETA, the InterNational Electrical Testing Association, and the chair of Electrical Maintenance Standards of the Canadian Standards Association (CSA).

The CSA recently released Z 463, "Guidelines on maintenance of electrical systems," a new standard that covers requirements for electrical maintenance programs. Heid provided an overview and explored strategies that ensure dependability of electrical power distribution systems at the MainTrain conference in Vancouver, convened by the Plant Engineering and Maintenance Association of Canada (PEMAC).

Heid, who was the technical committee chair for CSA's Z 463 standard, said many plants don't

manage their electrical maintenance program as well as they should to guarantee workplace safety. They do a few things well but lack an extensive reliability program for their electrical power system assets. He noted the problem with electrical equipment performance is not realizing the equipment has failed until it's needed to respond to a system disturbance.

Many times electrical equipment fails without notice, particularly static devices that need to operate when called upon. A good example of this is a power circuit breaker. Circuit breakers will sit idle for months or years, causing mechanical parts to seize up. The lack of exercise or lubrication will render them inoperable. They're called upon to isolate the fault current that flows during a system disturbance, protecting downstream equipment and personnel. When these types of devices do not operate as intended, they can cause major equipment damage that could impact personnel safety.

Amazingly, Canada didn't have a national standard for maintenance of electrical equipment and systems until 2013. Much effort is now put into engineering standards, manufacturing processes, installation codes and safe work practices.

Failure data

In 2008, NETA polled its vast North American membership to gather protective device maintenance testing statistics from field level experts. Many types of facilities and manufacturers with various vintages of equipment were polled. The national survey of approximately 340,000 protective devices yielded astonishing results. About 23% of the circuit breakers had an issue affecting operation. This data closely correlates with failure data presented in IEEE Std. 493-2007. About one in five of the devices in the field will not operate as indicated on arc flash studies.

Here's another alarming statistic: on average, 10.5% of the devices did not function at all

when tested. If a fault were to occur, a no-trip condition would severely impact personnel safety working near the equipment.

If electrical protective devices don't function as designed, the arc flash study is not valid, Heid says. This results in workers having a false sense of security.

TECH TIP

Finding fault

How to put together a management plan

When it comes to motors, there's one thing you can count on – there will always be a condition that leads to a fault.

A motor system will not 'instantaneously' fail. This is a fact, supported by consistent research on reliability, regardless of any negative commercial suggestions to the contrary, says motor expert Howard Penrose in his MotorDoc LLC Newsletter (quoted with permission).



Unknown factors that can't be planned for will quickly degrade equipment condition.

PHOTO: THINKSTOCK

consists of time and the mean time between failure (MTBF), which never quite reduces to zero until the equipment actually fails.

Keeping this in mind, Penrose says a motor management program applies diagnostics and other test systems to evaluate, trend and estimate time to failure.

There are two basic types of motor system failures.

In a passive failure, insulation breaks down leading to winding contamination, and the rotor fractures or voids. As long as the motor is running, these problems may not be obvious until the fault becomes active.

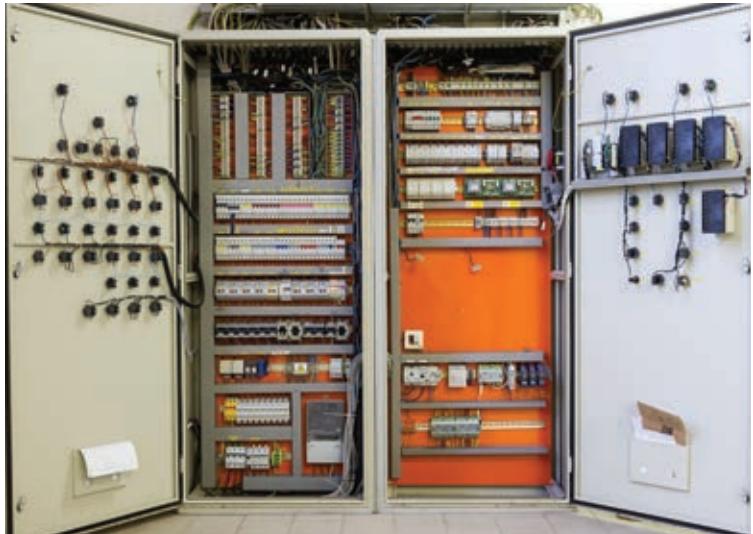
In an active fault, the motor ceases to operate. It may stall or experience the catastrophic failure of some system component.

By applying condition-based monitoring, you observe the motor's performance and condition using instrument measurements. Time to failure estimation begins once degradation is observed.

Proper implementation of a motor management program eliminates nearly all unplanned failures, but there will always be problems caused by improper operation, 'lightning strikes,' improper maintenance, sabotage and other unknown factors.

These are not high-risk conditions in most environments, so don't regard them too highly. Just consider those conditions you can manage.

An electrical worker reading a label indicating a minimal incident energy level assumes the protective devices are functioning. The worker will dress according to the label and the level of protection indicated in the safety standards. However, that worker could be drastically



Power circuit breakers can sit idle for months or years.

PHOTO: FOTOLIA

burned or killed if the upstream protective devices don't function as intended.

Any facility with a simple radial feed system will be totally dependent on the incoming switch, transformer, cable systems and main distribution switchgear. A failure on any of these devices will leave the facility completely in the dark.

Considering the critical nature of the equipment, massive downtime will result during failures. The ability of protective devices to clear electrical fault conditions requires them to be maintained properly and tested according to the conditions and environment they work within.

Key elements

The new CSA Z 463 standard provides a range of considerations for an effective electrical maintenance program. It helps management and frontline workers determine the key elements and how to apply them to electrical systems. Different types of maintenance strategies are explained. The current "online" and "offline" testing procedures are discussed to show how they are used as part of an overall program.

Other associations have hopped on the bandwagon. NETA has developed a comprehensive ANSI standard for maintenance testing specifications. It contains 250 pages of test procedures, test values and test results for every piece of apparatus in the electri-

cal power system.

NETA has also developed the standard for qualifications of testing technicians. The document lays out the experience, training and safety requirements to certify electrical test technicians that perform routine acceptance and maintenance testing on power distribution equipment. And the Institute of Electrical and Electronic Engineers Inc. (IEEE) has many documents that reference electrical maintenance criticality, such as IEEE Standard 493-2007 and Standard 902-1998.

The take-away here is that electrical devices must be properly maintained. Arc flash studies, incident energy calculations, and proper personal protection assessment become invalidated with improper operation of protective devices.

CSA's Z 463 standard establishes a comprehensive and properly executed electrical maintenance program. Best practices are keeping equipment clean and systems dry, ensuring connections are tight, and moving parts are properly lubricated, and safety of personnel must be the guiding factor.

Steve Gahbauer is an engineer, a Toronto-based business writer and a regular contributing editor. E-mail gahbauer@rogers.com.

Comments?

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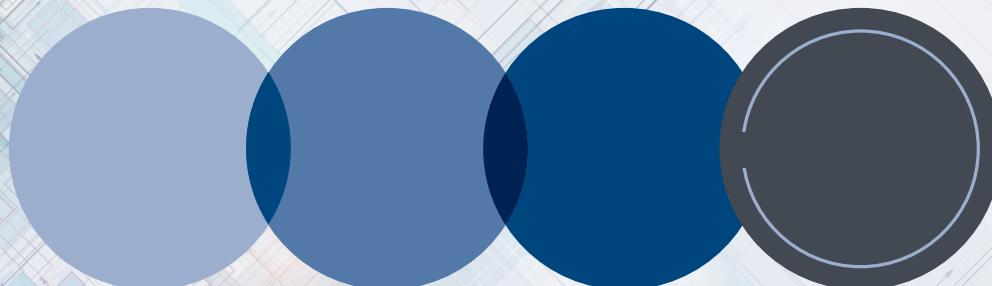


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As manufacturing workforces age, employers will face a number of issues that will have to be addressed.

Canada's aging workers are making up a greater portion of the workforce. By 2021, workers 55 years and older will account for nearly one person in four (24%) of the labour force – the highest proportion for this demographic on record.

What does this mean for employers? Manufacturers could face labour and skills shortages as these workers retire. Accommodating their needs will play a key role in labour and skills retention.

Some companies will retain skilled older workers while others will opt to accommodate those who seek part-time work or other flexible arrangements.

How aging affects workers will vary. Older workers may experience physical, sensory and cognitive changes. On the other hand, they also have experience, knowledge and insight, making them a valuable resource. And studies show their turnover is lower, they're more dedicated and they have positive work values. It may take them longer to complete tasks, but their work tends to be more accurate and they make better decisions.

Fewer injuries

They also experience fewer injuries, although when they do get hurt, injuries are often more severe and take longer to heal. Younger workers tend to get more eye or hand injuries, while older workers report more back injuries. Repetitive motion injuries develop over time so older workers also report more musculoskeletal injuries. And there are other challenges to consider, such as evolving family responsibilities that involve caring for sick spouses and elderly parents.

How should you accommodate them? Matching workstations and



Older engineer showing a young worker how to use an industrial drill.

PHOTO: THINKSTOCK

Your workforce IS AGING

WHAT YOU NEED TO KNOW ABOUT ADAPTING

job tasks to the needs of the individual employees benefits all workers, but here are some specific tips for the older generation:

- Adapt lighting, heat and ergonomics to meet their comfort levels.
- Adjust workstations and match job tasks to their needs, taking into account physical capabilities and limitations.
- Offer flexible work arrange-

ments such as job sharing, flex hours, part time work and other kinds of reduced scheduling that help them balance responsibilities at work and home.

- Design and deliver appropriate education or training to aid learning. Older workers may take longer to learn new material and need more assistance or practice than younger workers, but there's usually no difference in skill

levels once a task is mastered.

- Stimulate interest in their work by broadening the range of their experiences. Encourage them to mentor younger colleagues or facilitate training of other older workers.

- Provide workplace wellness programs with access to services such as employee assistance, fitness and nutrition programs.

Addressing the immediate needs of older workers will go a long way to ensuring an experienced, dedicated pool of employees is in place.

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

Comments?
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BIONICS

Industry 4.0 takes flight

Festo's eMotion Butterflies debut at ADM Expo in Montreal

Festo's ongoing quest for knowledge from nature has led the global automation company's bionics researchers to seek simple, efficient techniques for automating tasks like manipulation, movement and positioning.

One of their latest creations from nature is the eMotion Butterflies, which made their Canadian debut at the Advance Design & Manufacturing (ADM) Expo in Montreal. These elegant mechanical butterflies, which showcase Industry 4.0 technologies, demonstrated how individual subsystems network to form an entire intelligent system. Cameras record the butterflies using their infrared markers and transmit the position data to a central master computer, which coordinates the butterflies from outside.

The bionics team managed to miniaturize the me-

chanical system and the smallest possible power units in the tightest of spaces. Reducing the use of materials created the true-to-nature flying behaviour.

And the takeaway for manufacturers? Industry 4.0 technology employed by bionics creations like the butterflies will create smart processes on production lines, making them self-adjusting, self-diagnosing and self-configuring to improve production efficiency, reliability and product quality.



Festo's bionic eMotion Butterflies in motion.

PHOTO: FESTO

Take advantage of legal issues to boost value and minimize IP risks.

BY JAKE BULLEN AND STEPHEN SELZNICK

Manufacturers must innovate and adapt to succeed in today's highly competitive global marketplace. Effectively managing the inevitable legal issues will enhance productivity and value, while minimizing risk and litigation expenses.

Take the Internet of Things (IoT). It represents the ability to utilize machine-to-machine and machine-to-human systems to collect and monitor data internally and externally. Functionality includes real-time monitoring, deep learning and predictive maintenance. Early adopters are already using IoT to optimize both production processes and consumer targeting. But there are legal challenges and sensitivities to consider.

Collecting internal data to optimize production processes increases exposure to cybersecurity risks. Implementation of any data collection system goes hand in hand with system security audits and upgrades that involve all levels of the organization.

On the consumer side, collecting data to improve the customer experience and focus marketing efforts raises privacy concerns, such as the risk of unauthorized disclosure of personal information resulting from a cyber incident. Minimize potential liability by monitoring and understanding the evolving legal and public policy regime and being prepared to modify compliance, risk management and IoT policies.

More capable and less expensive robotics are contributing to increased automation across a number of sectors to lower operating costs, improve productivity and achieve a higher level of output consistency. As processes further automate and robotics become more prevalent, legal

Leverage legal ISSUES

INNOVATING IN A COMPLEX REGULATORY ENVIRONMENT



Real-time monitoring may increase exposure to cyber risks.

PHOTO: FOTOLIA

liabilities will be magnified.

Companies should deal with custom system providers (or aggregators) that assume contractual responsibility for all aspects of the development, installation, operation and maintenance of their automation/robotics systems. One set of agreements and a single relationship addresses the allocation of any potential liability in areas from personal injury to property damage to IP infringement.

Detailed indemnification and insurance provisions, as well as governing law and forum clauses ensure a manufacturer can enforce its rights in a specific court or with an arbitrator. Also consider requiring a guarantee from a vendor's parent company or affiliate of the vendor if there are financial concerns about the primary supplier.

Provisions, representations and warranties should ensure the licensor has the ability to license the use of the software and that it and the system will perform as advertised. Avoid costly and disruptive disputes by contemplating where they might arise and have solutions prepared.

Protect your advantage

To protect competitive advantages rooted in proprietary processes, systems, methods and designs, appreciate domestic and international IP regimes that apply to domestic and outbound commercial activities.

IP might include patents, copyrights, trademarks and industrial designs; or, surprisingly, trade secrets, which are not registered, but maintain their value by being kept confidential. These rights enable active

enforcement of proprietary interest against infringing third parties and makes the work-around by competitors more expensive.

The assessment and protection of proprietary rights also provides assurance that a manufacturer is not unknowingly infringing on another company's rights through the use of a protected method of manufacture, composition of matter, design, system, process, unique expression or identification of origin.

Risks associated with infringement may extend up and down the supply chain. Even where no intellectual property is owned, have suppliers confirm their equipment, systems and products don't infringe on any existing IP.

Companies that outsource manufacturing to foreign jurisdictions should be aware that most forms of IP protection are determined on a country-by-country basis. Limiting IP protection to only one or a few jurisdictions when sources supply from, sell to, or trans-ship through other unprotected jurisdictions may result in a loss of rights or infringement of third party IP rights.

Protecting your company's IP is also important for building value. A potential investor or buyer will request evidence appropriate steps were taken to protect all IP in the supply chain, and will want details of any adverse IP claims and litigation.

With the shift to advanced manufacturing techniques and processes, companies that want to compete globally are focusing more on innovation. Success is worth protecting through proper legal safeguards.

Jake Bullen is a partner at Cassels Brock, and chair of the Private Equity, Business Law and Technology groups. Stephen Selznick is a partner in the Intellectual Property Group and a certified licensing professional. Visit www.casselsbrock.com.

Comments?

E-mail jterrett@plant.ca.

TRAINING

BY HUGH ALLEY

This is a sign of failure: "Please excuse the delay. Our team is learning new procedures."

It means: the company doesn't value its customers enough to actually train its staff; it's willing to make its employees seem and feel incompetent in front of the public; and it's going to lose revenue when customers go elsewhere because deliveries are late or products are built wrong.

How to deal with this? Here are three tips.

1. Train most people for 90% of conditions. Staff encounter a seemingly infinite number of situations, there are usually fewer than a dozen that cover 90% of what they face each day. Train for those specific situations and let them get good at the routine stuff first. Don't even try to cover off the others.



Engineer instructs trainee on automated milling machine.

PHOTO: FOTOLIA

Learning CURVE NOT ON THE CUSTOMER'S TIME

2. Give them an out for the remaining 10%. This a job for the much maligned super users – those who were involved in designing or helping to

implement the system. Train them to take that 10% off the team's hands. They're the ones who really need prepping for all the unusual variations.

3. Train supervisors so they can coach. Supervisors often don't understand the new work well enough to help staff. They must master the 90% of conditions so they can help.

Doing these three things will raise team morale, lead to fewer errors and reduce the likelihood your customers will feel put out while your people are learning. With a strong base, it won't take the team long before it's capable of tackling that 10%.

Hugh Alley is an industrial engineer based in the Vancouver area who helps organizations achieve significant performance gains in delivery, quality and cost in a short timeframe.

Call (604) 866-1502 or e-mail hughalley@gmail.com.

Comments?
E-mail jterrett@plant.ca.



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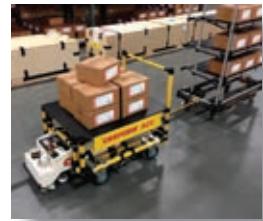
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Company directors and officers sometimes find their personal assets are at risk when D&O coverage protecting the company runs out.

BY RYAN SEAGER

Technology is playing an increasingly important role in manufacturing – from internal business processes to external customer service. Supply chains, too, are becoming highly sophisticated and vital to a company's competitiveness.

But when a manufacturer of any size encounters a crisis such as data breaches, corporate insolvency or large-scale environmental contaminations, members of the company's senior executive may find their personal assets at risk when the limits of their existing directors and officers (D&O) liability insurance coverage are exposed.

In *Baker v. Ministry of the Environment* (a recent Canadian environmental case), the Ontario Divisional Court ruled a group of directors must personally contribute to the costs associated with cleaning up contaminated land. The company did have a D&O policy, but it expressly excluded coverage for claims related to environmental incidents. Since the company had become insolvent, it could not actually afford the remediation costs ordered by the court.

Many executives fail to see the value in this kind of policy, and rely solely on the balance sheet to finance all forms of loss. Some believe a modest policy limit with "all the frills" is enough, but that isn't always the case.

Historically, the traditional D&O policy was written to insure both the entity and the directors and officers who serve it, but all insured parties share such coverage. Statistically, claims brought against the entity are more common, more complex and



Manufacturers face a broadening spectrum of risks.

PHOTO: THINKSTOCK

When disaster **STRIKES...**

TOP UP YOUR D&O LIABILITY COVERAGE

more costly to defend than those brought against individual directors and officers. In fact, certain types of claims can erode an entire policy limit, leaving the personal wealth of directors exposed to loss.

But a Side A Differences-in-Conditions (DIC) insurance policy bridges the gap between unavailable corporate indemnification, an unresponsive or exhausted underlying D&O policy, and the personal assets of directors and officers.

The insurance value is three-fold: limits can never be accessed by the entity, they're dedicated to the directors and officers who serve it; it provides an excess layer of D&O coverage; and its DIC triggers a last line of defence when executives need it most.

The real value lies in the policy's ability to attract and retain highly qualified corporate executives and board members.

As corporate governance continues to evolve, creating and complicating risks to companies

of all sizes, policies must adapt to these changing conditions. Support top talent by investing in the right insurance product.

Ryan Seager is senior underwriter, executive and management liability with RSA Canada, a general insurer based in Toronto. It offers a DIC product called Ironclad. E-mail ryan.seager@rsagroup.ca.

Comments?
E-mail jterrett@plant.ca.

AUTOMATION

Machine vision trends

IIoT, CoaXPress will impact the technology

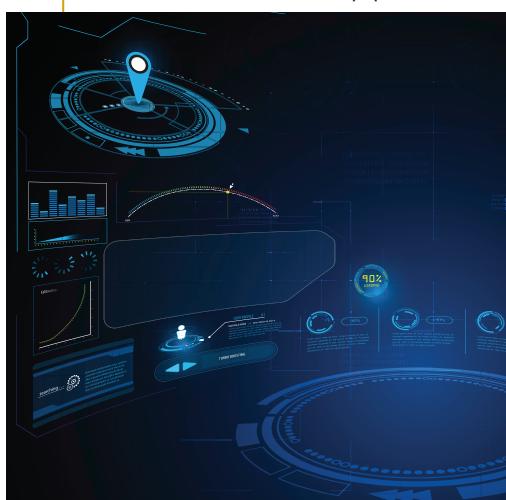
Five technology trends set to significantly impact, or even disrupt processes in the machine vision industry point to the need for investment by manufacturers who risk falling behind as late adopters. BitFlow Inc., a machine vision technology developer based in Woburn, Mass., identifies the following tech trends:

Industrial Internet of Things (IIoT). As the IIoT gains traction, machine vision will get a dramatic boost. IIoT links production with information technology to provide actionable information.

CoaXPress (CXP). This asymmetric, high-speed serial communication standard transmits and receives data over coaxial cables between cameras to computers via a frame grabber. Next-gen, lower-priced CXP single-link cameras have smaller footprints, lower power requirements and produce less heat, encouraging integrators to design systems based on the CXP interface.

Non-industrial sectors. Lower costs and ongoing improvements in vision components, such as 3D colour cameras and machine learning techniques, will expand machine vision into other applications, such as driverless car systems, IP video surveillance, intelligent traffic systems, logistics, agriculture and guided surgery.

Ease of use. Standardization will help integrate and run vision systems while also providing cost trade-offs for exchangeability of devices. Interfaces will walk users through a simple process of setting up applications, locating and inspecting parts, and configuring results with communication to HMIs, PLCs and robotic equipment.

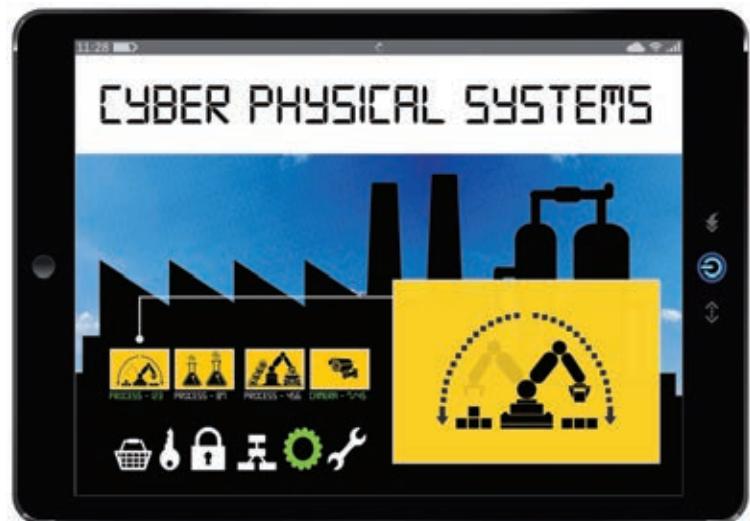


Machine vision tools will play an important role in smarter, digital factories.

PHOTO: THINKSTOCK

Germany and the US are adopting smart factory technologies.

PHOTO: FOTOLIA



Playing it SMART GERMANY, US JUMP ON THE DIGITAL FACTORY

Most companies see it as key to reducing costs and increasing productivity.

BY PLANT STAFF

Canadian manufacturers who aren't giving a lot of thought to Industry 4.0 take note: companies from two of the world's leading industrial nations – likely some of your competitors – have a jump on the adoption of new smart, digital technologies.

The Boston Consulting Group studied the status of 4.0 adoption at 627 companies from the US and Germany (revenues of more than \$50 million). Most respondents to the March 2016 survey (75% from Germany, 66% from the US) see it as increasing productivity and cost reduction, and many of them (48% in Germany and 43% in the US) associate it with revenue growth.

The study found German companies were off to a faster start: 19% of them have implemented a full concept (such as a smart factory) or first measures toward a concept (such as the introduction of autonomous robots). That compares to 16% of US companies.

German companies are better prepped to adopt Industry 4.0: 47% have developed their first full concepts, and only 18% are not prepared to introduce the digital technologies. The US lags at 29% for first concepts with 41% unprepared.

German manufacturers are also ahead on applying, or planning to apply advanced technologies. About 60% have applied (or intend

to within the next one or two years) digital factory logistics or predictive maintenance. That compares with approximately 40% of US manufacturers. The Germans lead in robotics adoption (292 industrial robots per 10,000 workers as of 2014) compared to 164 per 10,000 US workers. Canada weighs in at 118 per 10,000 workers (as of 2013).

Although there are no comparable numbers for Canada, **PLANT**'s Manufacturers' Outlook 2017 shows companies (mostly SMEs, well below the \$50 million level) continue to lag in the adoption of advanced and smart technologies. For example, 76% are not applying Industrial Internet of Things (IIoT) technology, 38% say it's not applicable and 34% aren't familiar with its capabilities. Thirty-two per cent aren't using advanced technologies such as CAD/CAE/CAM, data acquisition, computerized manufacturing or robotics technologies; and only 30% use automated data collection, analysis and review; while 28% don't measure shop floor data.

American manufacturers' more enthusiastic adoption of Industry 4.0 technologies threatens to further widen the productivity gap with Canadian companies.

A study by the Business Development Bank shows the gap is already considerable. The federal Crown corporation found SMEs generate 73% as much output as their US peers. That's down from 90% in the 1980s.

BDC warns lagging productivity erodes corporate profits and discourages capital investment.

Comments? E-mail jterrett@plant.ca.

Companies are still optimistic about sales but many are concerned about potential US protectionist policies.

BY JOE TERRETT

What a year 2016 was for exporting. Canada was on track for a freer trade relationship with Europe (CETA) and the Asia-Pacific region (TPP), both of which adding to an already lucrative free trade zone in North America under NAFTA. Then Brexit disrupted the European Union, Belgium almost torpedoed CETA and Donald Trump happened, letting the air out of the Trans-Pacific Partnership and promising mischief with the NAFTA deal.

How is all this affecting the mood of ambitious manufacturers? Will trade get Trumped?

Prior to the celebrity real estate developer's election in November as the 45th president of the United States, Canadian manufacturers participating in the **PLANT** Manufacturers' Outlook survey were feeling confident about their business prospects in 2017. The outright optimistic accounted for 36% of the companies, but 55% tempered their enthusiasm with caution.

It turns out caution is a good call. Most of the companies are SMEs with the bulk of their sales coming from Canada (62%) and the balance from exports, 25% to the US. As in past surveys, they intend to mostly focus on North America for new markets.

However, as the grumpy Trump administration lumbers into action with a promise to renegotiate the North American Free Trade Agreement or rip it up, Canada's business with the US may encounter some disruption. Or not. Much depends on whether Trump is more concerned with Mexico, and the Canadian government is busy working the diplomatic channels to avoid trade hostilities.

A hard right to "America first"

Will trade get TRUMPED?

PLAY IT COOL WITH 'AMERICA FIRST'



The Trump administration's "America first" trade policy could mean taxes on imports.

PHOTO: FOTOLIA

protectionist policies is worrying many Canadian exporters although there's also a feeling there will be a benefit from strong post-election growth, according to the Bank of Canada's Winter Business Outlook for 2017.

Its November-December survey of senior executives at 100 companies shows they're anticipating faster sales growth this year. Indicators such as future sales and new orders were

widespread and at least partly attributed to the recovery of activity in areas affected by the oil price shock. Domestic demand is also improving. Several exporters noted a weaker dollar is boosting past and future sales volumes, but most haven't lowered their foreign pricing, which has boosted their margins.

Regulatory hurdles

The loonie and US demand are supporting companies' sales expectations but the Bank of Canada report notes several companies identified regulatory hurdles or trade barriers were limiting export growth and many are concerned about the risk of protectionism, which is leading them to maintain or strengthen a foreign presence.

Several companies cite opportunities related to increased oil and gas production in the US

and there is optimism about infrastructure and military spending.

But NAFTA is a wildcard. Much depends on whether Trump is more interested in channelling his trade ire against Mexico, although there are things that could attract his attention on this side of the border.

Among them is the automotive sector. Trump has threatened Ford, GM and Toyota with tariffs for producing vehicles in Mexico destined for the US market. Ford cancelled plans to build a plant in Mexico, although it cited market forces as the reason.

Meanwhile, America's northern amigo is expecting investments worth \$1.6 billion from the Detroit Three, stemming from their labour deals with Unifor. Jerry Dias, the union president, is in line with Trump on NAFTA, referring to the 1994 trade deal as

RESOURCES

- **PLANT** Manufacturers Outlook 2017 report
www.plant.ca
- Bank of Canada Winter Business Outlook Survey
www.bankofcanada.ca
- EDC: getting the most from free trade agreements white paper
www.edc.ca

a disaster for US workers. Yet he optimistically expects the Canadian investments to go ahead.

So far Ford and Fiat Chrysler are holding steady on their plans for Canada, while Stephen Carlisle, president of General Motors of Canada Ltd., is leaving room to wiggle. He told the *Globe and Mail* GM is waiting to see what might or might not be in play, but is proceeding with planned projects.

Except there's another red flag. Republican lawmakers are keen on a border adjustment tax (BAT) as a part of their corporate tax cut from 35% to 20%. It would involve imposing a tax on imports and subsidizing exports to encourage production of goods in the US. This has Canadian energy companies concerned since most of their crude is destined for the US market. And the Trump team has indicated such a border tax could be imposed on vehicles moving from Canada to the US.

Border tax

A research note released by National Bank Financial Markets said a proposed 10% BAT on imports could cause total US-bound Canadian goods to fall by about 9%. And it warned that Ontario and New Brunswick would likely feel the most pain from the implementation of such a tax.

Meanwhile the softwood fandango continues. Canada and the US are facing off again after the latest agreement expired and a one-year period of refraining from litigation ran out in October. Canadian exports are now at risk of rippling tariffs in the 25% range.

Softwood lumber is a major export for BC and the US is its biggest customer. Most of the lumber feeds into America's housing construction industry, leading to endless complaints from the US lumber lobby that the wood is subsidized, under-priced and dumped.

Canada exported \$4.7 billion worth of lumber to the US last year, according to the US Commerce Department. Now that a US trade commission has ruled Canadian wood products are harming American producers, the stage is set for the imposition of duties with the potential for job losses and plant closings.

The Canadian government is working on a deal that will avoid tariff fallout, but it could wind up being part of the NAFTA file. Stay tuned.

On the upside, with the US economy showing signs of life, there is opportunity for Canadian manufacturers. And keep in mind; much of the Trump-generated trade rhetoric could be a pre-negotiating tactic from the self-styled deal-maker to soften up the targets.

Or the prelude to economic chaos. Who knows? In the meantime, exporters should play it cool. Continue to pursue business in the lucrative US market while exercising some caution as "America first" plays out.

Comments? E-mail jterrett@plant.ca.

CEOs confident about GROWTH BUT THEY'RE CONCERNED ABOUT THE IMPACT OF PROTECTIONISM



CEOs expect almost 80% of their business growth to come from the US.

PHOTO: FOTOLIA

Despite many challenges that lie ahead, CEOs from around the world feel confident about growth prospects, according to a PwC survey of senior executives.

Canadian CEOs are among the optimists. More than a third (38%) are confident about growth in the next 12 months while 59% agree it's tougher to compete amidst growing protectionism. They expect 79% of their growth to come from the US, despite concerns about what the Trump administration might mean for their businesses.

Fifty-nine percent of the Canadians are concerned about the impact of protectionism worldwide but 54% (versus 70% globally) are less worried about the speed of technological change and its threat to growth.

Drivers of growth and profitability are ranked as new strategic alliances and joint ventures (74% versus 48% globally), collaboration with entrepreneurs and start-ups (49% versus 28% globally) and outsourcing (28% versus 17% globally).

"It is a fairly optimistic outlook held by Canadian CEOs, in spite of increased

uncertainty," said Bill McFarland, CEO of PwC Canada.

But he warned this uncertainty may reinforce Canada's already conservative business culture.

"There may be a tendency to be more risk averse as Canadians, along with many of their global counterparts, wait to see what changes in the new US government, China and the Eurozone will bring in an increasingly disrupted market," he said.

He advised Canadian business leaders to look beyond the US for growth and create alliances and forge partnerships in order to tap into new talent, ideas and markets.

Most Canadian CEOs (89%) believe technology will completely reshape competition in their industries over the next five years, but they aren't prioritizing innovation (10% versus 23% globally).

The speed of technological change isn't seen as a significant threat to their growth prospects compared to their global counterparts (54% versus 70% globally).

Download a copy of *20 years inside the mind of the CEO... What's next?* at www.pwc.com/ceosurvey.

ENCLOSURES



Enclosures on the floor at AKA's PEI facility.

PHOTO: AKA

Drill ship POWER CHALLENGE

HYBRID SOLUTION SOLVES DISTRIBUTION ISSUES

AKA and Rittal collaborate to solve energy efficiency and recycling issues related to a deepwater drill ship installation.

Manufacturers in the marine and offshore space face unique challenges. Aspin Kemp & Associates (AKA), a manufacturer of electrical power and control systems headquartered in Montague, PEI, encountered one with its hybrid power

initiative, the first hybrid drill floor destined for installation on ultra-deepwater drill ships operated by Transocean, Swiss offshore drilling contractors.

Before AKA's technology, diesel generators would experience power load fluctuations in accelerating and decelerating work loads. Even a momentary loss in the main AC power source could cause difficulties in the rapid transfer of the energy needed to accommodate an unplanned disconnection of the

diesel engine.

Stringent green power and disposal issues offered an additional hurdle. The variation of gases in quantity, temperature and chemical content, such as those produced by diesel, does not allow modern equipment to effectively capture or modify this output. Since PEI levies steep recycling charges for the disposal of metal or other waste products, modifications on site would be very costly.

AKA's solution – to couple diesels

SUPPLY LINES



SKF to manage brands.

PHOTO:SKF

BEARINGS SUPPORT

SKF Canada Ltd. is now handling sales and technical support of Kaydon and Cooper bearing brands in the Canadian market.

Global bearing supplier SKF Group acquired the Kaydon and Cooper operations in 2013, but a distributor managed the brands.

Kaydon provides custom and standard thin-section ball bearings, as well as slewing ring bearings.

The Cooper niche brand focuses on split-to-the-shaft bearings.

NANOVATE DISTRIBUTOR

Integran Technologies Inc., a manufacturer of nanotechnology-enabled metallurgical products, has appointed Christian Koenen GmbH to act as its exclusive distributor of Nanovate SMD solder stencil foils in Europe.

Integran, based in Mississauga, Ont., makes electroformed hard nickel foils for the North American market.

ADVANCING 3D VISION

Cognex Corp. based in Natick, Mass., has expanded its 3D vision capabilities with the recent acquisition of two companies.

EnShape GmbH is a German manufacturer of advanced 3D vision software and sensors. It uses fast image capture at high resolution without moving objects in front of the device.

AQSense, a provider of 3D vision software based in Girona, Spain, provides a library of field-tested 3D vision tools.

ENCLOSURES



Enclosures for AKA's hybrid power solution.

PHOTO: AKA

generators with ultracapacitors to resolve the problems in the power distribution network – called for dozens of industrial enclosures.

The intermediate power storage system absorbs and delivers energy at a rate faster than the process can use or return it. The hazards of the E-stop are controlled by allowing operation without the main generator connection. The diesel operates continuously at high output without compromising performance or requiring a “spinning reserve” of power.

Enclosures for the power storage system had to exceed traditional use standards since the application is unique in the maritime and offshore market. AKA worked with Rittal Systems Ltd., a manufacturer of enclosures and racking systems. The desired enclosure system would improve reliability, save energy, reduce emissions, lower maintenance costs, enhance safety and support maritime regulations. Since on-site modification was impossible and scrap recycling of any modifications was unacceptable, the enclosures had to arrive ready-to-install.

Getting results

To meet project requirements, Rittal supplied a total of 114 TS 8 enclosures, including standard, modified and electromagnetically compatible models. The enclosures were modified prior to shipping and arrived ready to go, meeting all marine class regulations, including DNV and ABS.

The TS 8s were delivered to AKA's PEI headquarters for eventual installation in the Deepwater Thalassa at the Deawoo Shipping & Marine Engineering shipyard in South

Korea. The drilling ship will be deployed in the Gulf of Mexico, but it could be sent anywhere in the world.

After months of testing and operation, AKA has catalogued a number of its hybrid power system improvements:

- The enclosures reduced fuel consumption, which lowered fuel costs and emissions.
- An effective combination of diesel and intermediate power storage reduced the release of harmful gasses into the atmosphere.
- A common bus that allows some generators to remain in standby condition rather than in constant operation reduced hours of machine wear and fouling on each generator.
- Increased standby time has reduced part wear resulting in lower replacement costs, fewer hours spent on maintenance, increased reliability and greater availability.
- The TS 8 construction reduced scaling and corrosion on wetted parts and helped retain heat transfer efficiency. This lowered maintenance hours.

There was also a safety benefit. With fewer diesels in operation, there was a significant reduction in injuries and spills associated with fuel and other fluid handling, while smoother transitions in E-stops protected the workers from sudden engine stops.

This application story was provided on behalf of Rittal Systems Ltd., a supplier of enclosures and racking systems with Canadian offices in Mississauga, Ont. Visit www.rittal.com.

Comments?

E-mail jterrett@plant.ca.

PRODUCT FOCUS POWER TRANSMISSION, MOTION

SPHERICAL ROLLER BEARING GETS AN UPGRADE

SKF's Explorer spherical roller bearings for vibratory applications have been upgraded to provide longer service life.

Typical applications involve high vibration and exposure to contamination, and/or poor lubrication conditions. The bearings also accommodate very heavy radial and axial loads, for applications where misalignment or shaft deflections may occur.

The bearings are made from high-quality, super-clean, tough steel; heat treatment has been upgraded; and they integrate a special cage design. These factors combine to extend service life, lower operating temperatures, improve resistance to wear and contamination, perform at high speeds, and reduce risks of fretting corrosion and induced axial preload. Re-lubrication intervals are also extended.

A wide range of bore sizes



Extends service life.

feature: greater dimensional precision; two hardened steel cages with an outer ring centred guide ring; and C4 internal radial clearance. And optional PTFE-coated cylindrical bores reduce fretting corrosion on the shaft. Custom products can also be developed to meet the most demanding requirements.

SKF Canada Ltd., based in Toronto, is the Canadian division of the SKF Group, an industrial products manufacturer headquartered in Sweden.

www.skf.com

DRIVE NUTS ELIMINATE JAMMING



Runs on a smooth shaft.

Amacoil-Uhing Model RS drive nuts provide smooth backlash-free linear motion in automated machinery.

It runs on a smooth shaft, which eliminates the potential for debris to become trapped in threads and cause a clog or jam. If material does fall onto the shaft, it's easily removed by wiping the shaft with a clean cloth.

Should an object somehow become caught between the nut and the shaft bearing end support, the drive simply slips until the operator removes the

obstruction. This prevents damage to the nut and other components in the system.

Options include a stainless steel housing and shaft scrapers that wipe off the shaft while the nut moves.

Special sealing is available for food processing machinery to meet regulatory standards.

Axial thrust is from 22 to 449 lb.

Each of the 10 sizes come in five different linear pitch settings. Shaft rotational speeds may be up to 10,000 rpm depending on the size of the drive. Linear travel speed ranges from 0.5 ft./sec. up to 4 ft./sec. depending on the size of the drive and weight of the payload.

Amcoil, based in Aston, Pa., is the exclusive North American distributor for Uhing rolling ring linear drives

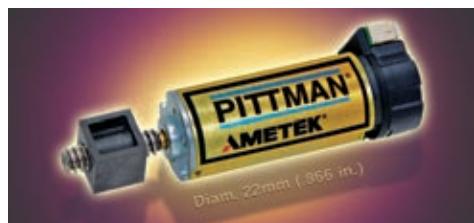
www.amacoil.com

CONTINUOUS TORQUE TO 0.141 NM

Pittman's DC022C Series 22-mm diameter motors come in three lengths with continuous output torques of 0.0056 to 0.141 Nm for high-tech motion applications.

The motors come with eight standard windings, speeds up to 10,000 rpm and DC bus voltages up to 36 VDC.

They have a 2-pole stator with neodymium magnets, 5-slot skewed rotor and sintered



Speeds up to 10,000 rpm.

also available.

Various options for applications such as lab automation, communications equipment, semiconductor processing equipment and aerospace systems include an encoder and gearboxes with reduction ratios from 4:1 to 429:1.

Pittman is a manufacturer of DC motors based in Harleysville, Pa.

www.pittman-motors.com

HANDLE HEAVY RAILCAR LOADS



Reduces wear rejection.

This will be of interest to manufacturers rail and freight cars: Timken's AP-2 rail bearing for the heavier loads reduces bearing set outs, fuel cost and bearing

failure due to water ingress.

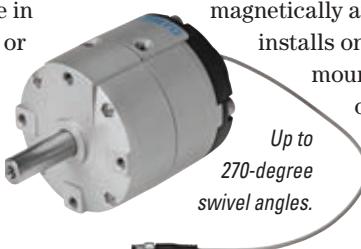
It also reduces component wear rejection and axle fillet damage, decreasing potential axle failure and ultimately reducing the occurrence of axle grooving.

Access Timken's catalogues through a new app. Go to <http://timkencatalogs.squawqr.com>.

The Timken Company, based in North Canton, Ohio, manufactures bearings and mechanical power transmission components. Timken Canada LP is based in Mississauga, Ont.
www.timken.com

ings are protected with a shaft seal.

An optional, matching position transmitter SRBS senses rotary vane end positions magnetically and without contact. It installs on either side of a foot mounting kit in a number of orientations. The DADP-ES stop kit allows infinite swivel angle adjustments.



Festo is a manufacturer of industrial automation technologies with Canadian operations in Mississauga, Ont.
www.festo.com

improve equipment reliability.

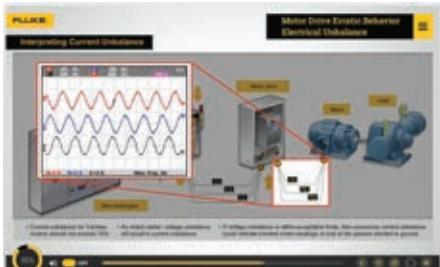
The online course is designed for maintenance pros who have a working understanding of motor drive systems. They'll learn how to:

- improve motor/drive inspection and diagnostic skills for quick repairs;
- evaluate component failure, installation issues, and deeper system level issues; and
- identify the root cause of failures.

Modules cover how to assess erratic problems in motor-drive systems; how to assess repeat problems; and how to prevent problems from recurring.

Fluke Electronics Canada LP in Mississauga, Ont., is part of Fluke Corp., a supplier of test tools and software.
www.fluke.com/motor-drive

ONLINE TRAINING FOR MOTOR-DRIVE DIAGNOSTICS



For maintenance pros.

Do your technicians lack the diagnostic skills necessary to troubleshoot motor and drive problems?

Fluke's Motor and Drive Troubleshooting Course builds the skills needed to better understand motor/drive system health and

enhance food safety with EDT Corp.'s Poly-Round

GET SMART ABOUT DRIVE CHOICES

Selecting the right drive is not always straightforward. Sometimes special requirements are involved. Siemens' free Sinamics Selector app lets you assemble components with an iOS or Android smartphone.



App assembles components.

Version 5.0 displays the entire collection of products from the portfolio of low-voltage frequency drives — Sinamics V20, G120C, G120 and G120P — on the most popular smartphones. Use it online or offline in regions where cell phone coverage is spotty.

More technical values such as resistance, peak performance and continuous power ratings have been integrated into the logic. And the app is product- and application-specific. Either the user knows which frequency drive is required, or the app provides step-by-step guidance to the right drive by asking for key parameters.

Because data is centrally located, information is continuously updated.

Siemens is a German manufacturer of industrial technology. Siemens Canada Inc. is based in Oakville, Ont.

www.siemens.ca

POLYMER BEARINGS OPERATE CLEAN

Enhance food safety with EDT Corp.'s Poly-Round metal, x-ray and optically detectable blue polymer plane bearings.



Help detect foreign materials.

They directly interchange with standard mounted bearings, have no balls, grease, cages or seals and they operate clean.

If a failure occurs, the metal detectable characteristics of EDT's 'ON' polymer aid in the detection and recovery of foreign materials.

Shaft sizes range from $\frac{1}{2}$ to $1\frac{7}{16}$ in., in machined- or cast-stainless housings.

EDT is a bearing manufacturer based in Vancouver, Wash.
www.edtcorp.com

PRODUCTS AND EQUIPMENT

VALVES

VALVES, MANIFOLDS OPERATE IN SYNC

AutomationDirect has updated its NITRA pneumatics line of products with two additional valves and manifolds.

BVS-3 series modular solenoid valves are body ported (three-port poppet valves), available in two-position, normally open or normally closed configurations



3, 5, 12 or 24 VDC coils.

with 12 or 24 VDC, or 120 VAC coils. They have 8 mm micro DIN connectors, and most models have removable flying leads for

use with BVM manifolds.

Low current models are available with 3, 5, 12 or 24 VDC coils.

BVM series manifolds mount easily and simplify wiring of BVS solenoid valves. They're made from glass-reinforced thermoplastic and equipped with DIN rail mounting clips. Push-to-connect air connections speed up tubing installation.

They come in four- and

eight-station styles for mounting BVS-3 series valves and have a 9-pin D-sub connector for single-cable wiring.

NITRA pneumatic control distribution blocks connect a bank of AVS or BVS-series valves to a controller. Added accessories include replacement solenoid coils, aluminum manifolds and blanking plugs.

AutomationDirect is a supplier of industrial automation equipment based in Cumming, Ga.

www.automationdirect.com

MACHINING

MILL INCREASES TOOL LIFE BY 50%

Low vibration susceptibility.



Walter Tools' MC251 solid carbide mill optimizes stainless materials machining while increasing tool life by up to 50% in austenitic stainless steels and nickel-based alloys.

It handles materials from the ISO M group and secondary applications in ISO S. The tool operates most efficiently on machines with an external coolant supply.

A tough carbide substrate (WK40RC) enhances reliability, while processing is boosted by incorporating asymmetrical helix angles between 35 and 38 degrees to reduce vibration.

A titanium aluminum nitride coating increases tool service life and minimizes cutting edge build-up.

Walter is a manufacturer of machining and cutting tools based in Waukesha, Wis.

www.walter-tools.com.

MATERIAL HANDLING

LEVER HOISTS IMPROVE OPERATOR SAFETY

Columbus McKinnon Corp.'s CM Tornado 360 ratchet lever hoist reduces repetitive wrist action providing a 360-degree range of motion.

Double-reduction gearing and

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high-quality bearings decrease pull force by up to 30% to minimize operator fatigue.

The lever hoist is available in 3/4- and 1-1/2-ton capacities, with standard lifts up to 20 ft. They meet the ASME B30.21 manually operated hoist standard.

Columbus McKinnon is a manufacturer of material handling products based in Getzville, NY.

www.cmworks.com

BRACING ENHANCES UNLOADER INTEGRITY

Flexicon's BULK-OUT bulk bag unloader's seismic bracing enhances structural integrity and operator safety.

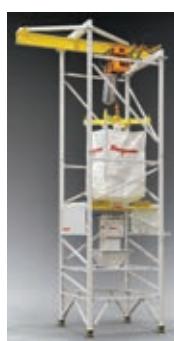
The BFC model discharger frame has a cantilevered I-beam, an electric hoist and trolley to position bulk bags without a forklift. The bag lifting frame has Z-CLIP bag strap holders for rapid insertion and removal of bag straps.

A manually operated iris valve atop a hopper intake chute cinches the bag spout and keeps the drawstring untied before gradually opening the valve to avoid uncontrolled bursts into the receiving vessel.

Four-sided cross-bracing strengthens the frame against deformation and reduces structural failures.

Flexicon is a manufacturer of material handling equipment based in Bethlehem, Pa.

www.flexicon.com



Cross-bracing eliminates deformation.

JOINT SETS HANDLE HEAVY-DUTY INSTALLATIONS

Creform Corp.'s structural metal



Easy assembly.

joint sets connect pipe up to 42 mm used to assemble heavy-duty structures such as worksations, flow racks and carts in a number of shapes and configurations.

The sets are nickel plated for anti-static applications or e-coated black. They're delivered as LJ (42/42mm) and LEJ (42/28mm).

The components, made of cold-rolled, 10 gauge steel, are joined together with high strength socket head cap screws and nuts. The joints hold the nut so only a hex head wrench is required for assembly or disassembly.

Creform is a manufacturer of material handling systems based in Novi, Mich.

www.creform.com

WELDING

PURGE FILM ELIMINATES WELD ZONE FLOODING



Water soluble.

Huntingdon Fusion Techniques' Argweld Weld Purge Film kits deliver a water-soluble solution for open assemblies and closing welds with an impenetrable purge barrier.

The film minimizes gas use to cut costs and reduces the time taken to purge. It also helps to eliminate weld zone flooding.

After welding, the film is washed away during the hydrotest cycle or by flushing of the pipe interior and dissolved down to molecular level.

Huntingdon is a manufacturer of weld purge products based in Carmis, UK.

www.huntingdonfusion.com

NETWORKING

I/O MODULE SUPPORTS IIOT

Moxa has updated the firmware for its ioLogik E1200 remote I/O to support etherNet/IP and a RESTful API program interface for IIoT applications that interact with the cloud.

The modules, which provide an alternative to expensive proprietary I/O modules, come with a range of input and output types, including voltage, current, digital, pulse, frequency, RTD, and thermocouple.

Updated ioLogik units collect sensor and device data via etherNet/IP, Modbus, and active ethernet I/O, and share data with IT platforms over SNMP, RESTful APIs



Range of input and output types.

and MXIO.

Moxa manufactures networking, computing and automation technologies in Brae, Calif. www.moxa.com

COMPUTING

DATA LOGGER ENHANCES SECURITY

Watlow's D4T data logger has a range of removable I/O modules and a 4.3 in. high-resolution colour touch panel that allows channels, alarms, inputs and outputs to be personalized with user-defined names.

Data logging complies with regulatory standards with the ability to choose encrypted, .CSV or both types of file formats for tamper-proof records. There are



Software archives controller setup.



Family you can choose.

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EURODRIVE**

PRODUCTS AND EQUIPMENT

lock-out security levels for different user groups and record-keeping management is simplified by archiving records to the cloud or a PC.

COMPOSER graphical configuration PC software archives and documents controller setup, speeds up and simplifies commissioning and connects with controllers via ethernet.

Watlow is a manufacturer of industrial heaters, temperature sensors, controllers and supporting software based in St. Louis. www.watlow.com

POWER CONVERSION

REGULATORS DELIVER 1 A OUTPUT CURRENT

MicroPower Direct's MSR-7805WUP miniature, switching voltage regulators provide up to 1 A of output current and are pin-compatible with linear regulators.

Four models come with inputs



Inputs from 6 to 36 VDC.

from 6 to 36 VDC, delivering regulated outputs of 3.3, 5, -5, 12, -12, 15, or -15 VDC. Efficiency is as high as 95%, and EN 60950 approved models have continuous short circuit protection.

The 5-, 12- and 15-V models are easily configured to produce a negative output.

Each model is specified for -40 to 85 degrees C. Cooling is by free-air convection.

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

www.micropowerdirect.com

HAND TOOLS

STRIPPING TOOL KEEPS WORKERS SAFE

ITC Electrical Components' Allround pocket stripping tool for flat or round cables fits easily in a worker's pocket without dangerous protruding edges or blades.

Applications include commercial, industrial, control and communication systems, lighting and building wires, data, coaxial cables and wires.

It's also used on single conductor or multi-conductor, solid or stranded cables.

ITC Electrical Components is a distributor of electrical components based in Concord, Ont.

www.itcproducts.com



Strips flat or round cables.

clean environments such as assembly, testing, laboratory and pharmaceutical manufacturing.

It's digitally activated by binary signal to ease start and integration into existing facilities.

The tool provides autonomous gripping and swiveling, adjustable gripping force and adjustable angle of rotation. An electric powertrain makes the device energy efficient, and eliminates programming costs.

Schunk is a manufacturer of clamping technology and gripping systems based in Lauffen am Neckar, Germany. Its Canadian office is in Mississauga, Ont.

www.schunk.com



Autonomous gripping.

ENCLOSURES

CABINET HEATERS PREVENT CONDENSATION

Hammond Manufacturing has added a high power, 1,300 W, thermostatically controlled cabinet heater to its FLH line for outdoor equipment exposed to wide temperature swings.



Built-in thermostat.

SET UP PERSONALIZED WORKSTATIONS EASILY



Saved to specific user accounts.

Rousseau Metal Inc.'s Bay Design tool allows automotive manufacturers to set up personalized technician workstations in four steps.

The tool configures a workspace by choosing components required for specific tasks.

Configurations are saved as PDFs and saved to specific user accounts for future reference.

Rousseau is a manufacturer of industrial storage products based in St-Jean-Port-Joli, Que.

www.rousseaumetal.com

An enclosure without thermal insulation is particularly prone to condensation. It leads to premature aging, corrosion and equipment failure.

The cabinet heaters, in 120 V 60 Hz and 230 V 50/60 Hz versions, deliver output powers to match the volume of the enclosure and maintain temperature levels above equipment minimums.

A built-in thermostat is adjustable from -18 to 38 degrees C, and an internal fan runs constantly or automatically from an embedded thermostat.

Hammond is a manufacturer of electrical enclosures and cabinets based in Guelph, Ont.

www.hammondmfg.com

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Industrial Literature Reviews

PLANTWARE



Fast reaction times.

I/O FIELDBUS SUPPORTS SIX PROTOCOLS

Wieland Electric Inc. has developed a flexible, compact and efficient modular I/O fieldbus system. ricosFLEX combines up to 64 user modules on a single bus coupler to send I/O using PROFIBUS, PROFINET, CANopen, Modbus TCP, EtherCAT, or ETHERNET/IP protocols.

Modules in this system (which mounts on a standard 35 mm DIN rail) include bus couplers for each of the six most common protocols; analogue input and output modules with resolutions of up to 16 bits; and digital input and output modules with 2 to 8 channels per module.

Fast reaction times (20 µs) are possible with the integrated 48Mbit/s backplane bus.

LED indicators provide diagnostics and channel status at a glance.

Programming is fast thanks to DIP switches. Individual channel assignments are indicated on the front labelling strips, and the wiring terminal assignments are printed on the module face.

Wieland Electric is a German manufacturer of electrical interconnect technology products with a Canadian location in Oakville, Ont.

www.wieland-electric.ca

PLC CHIP PROVIDES CLOUD CONTROL

Divelbiss Corp.'s P-Series PLC on a Chip is now IOT-enabled and when linked with VersaCloud M2M, it completes end-to-end cloud monitoring and control solution.

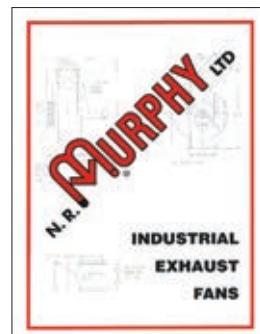
Monitoring, data logging and control are easily applied via ethernet, Wi-Fi, cellular or satellite to the VersaCloud M2M dashboard.

The chip has a temperature range of -40 to 85 degrees C and embeds into electro-hydraulic and mobile equipment, motor drives, HMIs, packaging equipment and telematics.

Divelbiss, based in Fredericktown, Ohio, manufacturers industrial electronics.

www.divelbiss.com

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downtime and high scrap rates. Ideal for a wide range of coating, moistening and lubricating applications, the bulletin includes case studies and detailed specifications at

www.spray.com.
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EVENTS

IFPE 2017

AEM

March 7-11, Las Vegas

An international exposition and technical conference that's dedicated to the integration of fluid power with other technologies for power transmission and motion control applications. Visit www.ifpe.com.

2017 Dare to Compete

[un]Conference

CME-Manitoba

March 21, Winnipeg

The event hosted by CME-Man-

itoba is organized around the Industrie 2030 themes: human resources and skills development; technology and innovation; trade and business development; and the business environment. Experts will deliver real-world solutions. Visit <http://mb.cme-mec.ca>.

ADM Expo

UBM

May 16-18, Toronto

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

CPES2017 Conference and Exhibition

CPEIA

May 24-26, Toronto

Presented by the Canadian Printable Electronics Industry Association. Visit www.CPES2017.ca.

WMTS 2017

SME

June 6-8, Edmonton

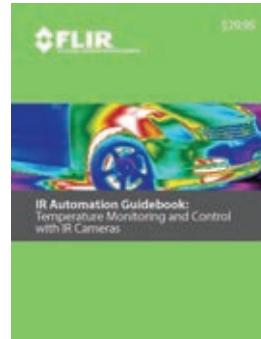
Keynotes, panel discussions and interactive technology exchanges on the event floor of this Western Canada manufacturing event will connect stakeholders and cover timely topics that impact the region. Visit www.wmts.ca.

2017 COMPREHENSIVE TIMING BELT CATALOGUE B212



BRECOflex Co., L.L.C.'s comprehensive 2017 Polyurethane Timing Belt B212 catalogue is 182 pages of technical information, part numbers and scaled drawings for metric and English pitch timing belts. Self-tracking belts, profiles, belt backings, pulleys and accessories are also included. Call (732) 460-9500 for free samples, catalogues and technical support. www.brecoflex.com/literature
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Flir



Carbon pricing a triumph of ideology over reason

BY GWYN MORGAN

Canada's political and business leaders are pursuing an emissions-reduction agenda that will harm our nation's citizens and economy. And it's an agenda that defies prevailing world trends.

The COP 22 Marrakech Climate Change Conference began on Nov. 7 and included pro-emissions-reduction delegations from Canada and the US. Imagine their shock when, just 24 hours later, they learned that Donald Trump would be the next US president.

Trump believes that man-made global warming is a "hoax" perpetrated by China and other countries wanting to steal American jobs. He opposes carbon taxes and wants to notch up production of America's oil resources to reduce imports from the Middle East and Venezuela. And he plans to scrap former president Barack Obama's deal with Chinese president Xi Jinping to shut down American coal-fired power plants while allowing China to commission several new ones each week.

In Russia (emitter No. 3), environmental matters don't appear on the radar screen. In India, population growth, corruption and a rich-must-pay attitude means continuing emissions growth.

So the four countries responsible for more than half of global emissions are going to raise, not lower them. Adding other countries with no intention of playing the COP game – including most of Asia, Iran, Saudi Arabia and Venezuela – means emissions from countries representing over two-thirds of global emissions are going to go up, not down.

The African nations' only objective at COP 22 was to convince others to buy carbon credits in return for their promises to plant or avoid cutting a few trees, with dubious results once the cash is paid.

So who's left to save the planet from the predicted global warming Armageddon? Just the European Union, Japan and Australia, with a combined global emission share of 15%. And, of course, Canada, with our minuscule 1.6% share.

Prime Minister Justin Trudeau has anchored part of his "Canada is back" rhetoric to fighting global warming. All his mandate letters to cabinet ministers include emissions reduction as a headline item. Tellingly, there was scant mention in those letters of stimulating private sector investment to drive economic growth.

And Trudeau's recent announcement of a national carbon tax isn't the only measure hitting consumers and businesses. Note the provincial subsidy programs for green power producers that drive up electricity rates. These measures impose a dead

weight on an already struggling economy.

Adding to that economic burden is Trump's avowed intent to rework the North American Free Trade Agreement, which accounts for 90% of Canada's trade. There couldn't be a worse time to hand another competitive advantage to the Americans.

Pricing carbon has always been based on the notion that, while Canada's emissions are small, we should do our part of a worldwide effort. Yet going it alone while our trading partners refuse would be a triumph of ideology over reason.

We expect that from political leaders, but at least business could be counted on to herald the dangers of those leaders' ill-advised paths.

So imagine my surprise when a recent morning's news carried a "Letter to First Ministers from Major Business and Civil Society Leaders," many of whom I know and respect. It offered support for "putting a price on carbon".

The statement alleges, "The world's most advanced players are hard at work forging cleaner, more innovative economies fuelled by a desire to compete in a changing global market place." With less than 17% of global emissions being restrained?

The statement adds, "Clean technology companies can tap into a fast-growing global market." A growing market it may be but not for Canadian manufacturers. Take wind power, the darling of the green energy advocates. Five of the top 10 wind turbine manufacturers are in China. America's GE Wind is the next largest manufacturer.

Ontario's disastrous green power plan has driven electricity rates in Canada's manufacturing heartland from among North America's lowest to one of the highest.

Piling on a carbon tax will make certain beneficiaries of that "fast-growing global market" are not Canadian workers. Far from being a visionary effort to build a "high performance economy," the statement reads like an economic suicide pact.

The most important responsibility of political and business leaders is to create an environment for Canadians to gain productive employment and continue to enjoy higher living standards.

It's time for our leaders to heed that 17th century Latin admonition to medical students, *primum non nocere*. Translation: First, do no harm.

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

Comments? E-mail jterrett@plant.ca.

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CLEANING TIME

A manufacturer automated the cleaning of its ribbon blender with two TankJet® 75 tank cleaners. The units provide quick and effective cleaning despite internal blender obstructions. Production time increased by two hours per shift. The equipment cost was offset in less than one week.

95%
LESS SCRAP

A commercial bakery using an AutoJet Modular Spray System to apply egg wash on hamburger buns cut maintenance time in half. The system's PulsaJet® nozzles provide clog-free performance. Plus, uniform coating has reduced the bakery's reject and scrap rates.



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