PLANT | ADVANCING CANADIAN MANUFACTURING

JULY/AUGUST 2019 | WWW.PLANT.CA | $12

HOW YOU'RE PAID

Compare against 2019 EMC-PLANT salary survey findings

Making it in Canada: tips for exporting
Skills for the future include digital competence
Quartic.ai aims to make IIoT adoption painless
Micron's turnkey process scrubs organic waste

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PENSKE

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COVER: ADOBE STOCK

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Make the leap into new export markets

Most Canadian manufacturers are small (under 500 employees) with limited resources, multiple challenges and a disposition for caution. That's why 67% derive most of their revenue from Canada, and 27% from the US, with the remainder of their business scattered among various global markets (according to the **PLANT** Manufacturers' Outlook 2019 study).

Safety first, right? Or maybe this is a good time to do what the federal government and numerous prognosticators and experts have urged manufacturers to do for years: wade into new export markets, and not just the US. Diversify. Spread around the risk.

We're almost three years into the world according to US President Donald Trump and his apparent America Only doctrine that has included threats, tariffs, NAFTA brinkmanship, and a trade war with China. Welcome aboard the crazy train. Little wonder manufacturers have been operating with a yellow caution light flashing. And with a US election on the horizon, expect the crazy train to pick up speed.

Those who export are certainly experiencing some anxiety. The latest Trade Confidence Index from Export Development Canada (EDC) shows confidence at its lowest point since the European debt crisis seven years ago. Tariffs and trade barriers are top concerns with 34% of companies who say protectionism is affecting their export and international investment strategies. Most (90%) see protectionist measures worsening.

Well, there's always the USMCA – or not. When Trump announced in October the successful completion of the trade agreement that would replace NAFTA, he said, "I have long contended that NAFTA was perhaps the worst trade deal ever made."

No surprise, he is wrong. And, oh the irony! If NAFTA was bad, it's replacement is worse for all the participants, according to research by the C.D. Howe Institute. Its analysis shows US GDP will take a US$17.4 billion hit, followed by Mexico ($14.9 billion) and Canada ($10 billion).

That's assuming all of the partners ratify the deal. So far Mexico is the only one of three to do so. The Trudeau government is in no hurry and the deal failed to clear the US House of Representatives before the summer recess. The United States-Mexico-Canada Agreement is unlikely to sail through the House when it does reconvene because the Democrats want changes, and they have the numbers to hold up ratification. Since NAFTA is a better deal for Canada than the USMCA, as long as it remains in place, we're okay. Of course, Trump might decide in a fit of pique to cancel the whole thing and plunge our mutual trade into some kind of chaos.

Whatever. Trump the tariff man has reset the global order. We can expect more protectionist behaviour globally and a move to more bilateral agreements. That's why it's important for Canadian companies to take advantage of the trade deals we have in place.

The CPTPP agreement with 10 countries in the Asia-Pacific region and the CETA deal with the European Union offer huge markets.

Yes, small manufacturers lack resources and expertise, but there is a lot of help available (*see page 20, Making it here*) to speed entry. Benefits? Between 2009 and 2011, EDC says one out of 10 grew at an annual rate that exceeded 20%.

It's no longer business as usual. Don't assume the world will snap back into place if we can just wait out the next American election and Trump is sent packing. He could win, and crazier things have happened (as in the 2016 election). The world has changed and so must small Canadian manufacturers. Assume greater risks to reap greater rewards.

Joe Terrett, Editor
Comments? E-mail jterrett@plant.ca.

PLANT ADVANCING CANADIAN MANUFACTURING

Vice President/Executive Publisher
Tim Dimopoulos
(416) 510-5100
tdimopoulos@annexbusinessmedia.com

Editor
Joe Terrett
416-442-5600 ext. 3219
jterrett@plant.ca

Media Designer
Andrea M. Smith
asmith@annexbusinessmedia.com

National Account Manager
Ilana Fawcett
416-510-5202
ifawcett@plant.ca

Account Coordinator
Debbie Smith
416-442-5600 ext 3221
dsmith@annexbusinessmedia.com

COO
Scott Jamieson

Circulation Manager
Beata Olechnowicz
416-442-5600 ext. 3543
bolechnowicz@annexbusinessmedia.com

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Mailing Address
Annex Business Media
111 Gordon Baker Road, Suite 400
Toronto, ON M2H 3R1

Circulation
Bona Lao
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blao@annexbusinessmedia.com
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The Secret To Keeping Electronics Cool!

NEMA 12 Cabinet Coolers

The NEMA 12 Cabinet Coolers for large heat loads up to 5,600 Btu/hr. are ideal for PLCs, line control cabinets, CCTV cameras, modular control centers, etc.

- **Measures 8" (203mm) high**
- **Mounts top, side or bottom**
- **Enclosure remains dust-tight and oil-tight**

NEMA 4 and 4X Cabinet Coolers

NEMA 4 and 4X Cabinet Coolers for large heat loads up to 5,600 Btu/hr. They are ideal for PLCs and modular controls.

- **Enclosure remains dust-tight, oil-tight and splash resistant**
- **Suitable for wet locations where coolant spray or hose down can occur**

Type 316 Stainless Steel Cabinet Coolers

Type 316 Stainless Steel Cabinet Coolers for NEMA 4X applications are available for heat loads up to 5,600 Btu/hr.

- **Resists harsh environments not suitable for Type 303/304**
- **Ideal for food and chemical processing, pharmaceutical, foundries, heat treating and other corrosive environments**

A bad choice could cost you thousands!

Look Familiar?

When hot weather causes the electronics inside a control cabinet to fail, there is a panic to get the machinery up and running again. The operator might choose to simply open the panel door and aim a fan at the circuit boards. In reality, the fan ends up blowing a lot of hot, humid, dirty air at the electronics and the cooling effect is minimal. If the machinery starts functioning again, the likelihood of repeated failure is great since the environment is still hot (and threatens permanent damage to the circuit boards). Worse yet, that open panel door is an OSHA violation that presents a shock hazard to personnel.

The Real Solution!

c UL us LISTED

Stop electronic downtime with an EXAIR Cabinet Cooler® System! The complete line of low cost Cabinet Cooler Systems are in stock and can ship now. They mount in minutes through an ordinary electrical knockout and have no moving parts to wear out. Thermostat control to minimize compressed air use is available for all models. All Cabinet Coolers are UL Listed to US and Canadian safety standards.

Watch The Video! https://exair.co/18_ccv_ad

CE **The only compressed air powered cooler that is CE compliant!**

An INTELLIGENT COMPRESSED AIR® Product

Hazardous Location Cabinet Coolers

NEMA 4 and 4X Hazardous Location Cabinet Coolers for use with classified enclosure purge and pressurization systems are available for all Class I Div 1 environments up to 5,600 Btu/hr.

- **Maintain NEMA 4/4X integrity**
- **Meet UL classified requirements**
- **CE compliant**

High Temperature Cabinet Coolers

High Temperature Cabinet Coolers for NEMA 12, 4 and 4X applications are available for heat loads in many capacities up to 5,600 Btu/hr.

- **Suitable for ambients up to 200°F (93°C)**
- **Ideal for mounting near ovens, furnaces, and other hot locations**

Non-Hazardous Purge Cabinet Coolers

NHP Cabinet Coolers keep a slight positive pressure on the enclosure to keep dirt from entering through small holes or conduits. For use in non-hazardous locations.

- **Uses only 1 SCFM in purge mode**
- **For heat loads up to 5,600 Btu/hr.**
- **NEMA 12, 4 and 4X**

Jeff Hauck, Lasercraft Inc. Cincinnati OH

"It took us three days to get a replacement computer cabinet and we didn't want to risk another heat failure. Fans weren't an option since they would just blow around a lot of hot air. Freon-type air conditioners like those on some of our other machines were a constant maintenance project of their own. **We purchased EXAIR's Model 4330 NEMA 12 Cabinet Cooler System since it was easy to install and requires no maintenance."**

If you would like to discuss an application, contact:

EXAIR® Corporation
11510 Goldcoast Drive Cincinnati, Ohio 45249-1621
(800) 903-9247/fax: (513) 671-3363
https://exair.co/18_440
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BULLETINS

Portable Electric, a Vancouver-based manufacturer of portable renewable energy systems and VOLTstack power stations, is preparing to launch the world's largest mobile battery power system. The VOLTstack 200k is an alternative to gas and diesel generators. It will deliver up to 200 kilowatts of power, with a 250-kilowatts surge, from 400 kilowatts per hour of battery storage – all on a highly mobile platform. The energy system is used by the film industry.

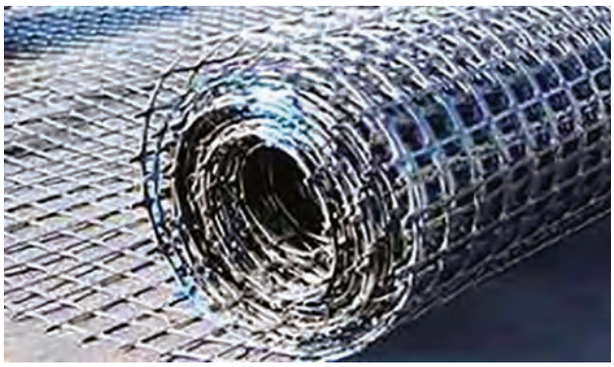
Electrovaya Inc., a developer of advanced lithium ion products and systems, has added advanced features to its proprietary lithium ion EV44 cell, including higher energy density and lower cobalt content. The cell is for use in electric forklifts, trucks and buses. More than 44 amp-hours of capacity and average output of 3.7 volts improve temperature tolerance and cycle life. The cell operates at continuous high charge/discharge rates and has been tested at 45 degrees C over hundreds of cycles, without external cooling. The Mississauga, Ont. company says the advanced features will be available later this year.

A subsidiary of a Cummins, a Columbus, Ind. manufacturer of diesel and alternative fuel engines and generators, has acquired **Hydrogenics Corp.** in Mississauga, Ont., the Canadian hydrogen fuel cell module developer and manufacturer. Cummins said the deal represents an enterprise value of approximately $290 million. **The Hydrogen Co.**, a wholly-owned subsidiary of **L'Air Liquide, S.A.**, will exchange its 18.6% of Hydrogenics shares for shares in Cummins.

Ardent Mills, a Denver-based flour milling and ingredient company, has sold its ingredients mix plant in Burlington, Ont. to **Dawn Food Products Inc.** The global bakery ingredient manufacturer and distributor based in Jackson, Mich. is taking over the sweet ingredient business and expanding its reach into Canada. "This mutually beneficial acquisition allows us to step away from sweet ingredient mixes and concentrate on flour and savory mixes," said Dan Dye, CEO of Ardent Mills.

EDC loans cleantech firm $5.9M

Geosynthetics market worth more than $260



Fibreglass geogrid. PHOTO: TITAN

OTTAWA — Export Development Canada (EDC) has provided Titan Environmental Containment with a $5.9 million loan to help drive the company's international growth.

The company, based in Ile des Chênes, Man., specializes in geosynthetics, man-made materials that help manage and protect the environment.

These versatile construction materials made from polymer are used in road construction, water and waste management and agriculture, as well as other sectors.

A report by Transparency Market Research pegs the geosynthetics market at more than $260 billion by 2023. Growth will be fuelled by an increasing number of infrastructure projects in developing economies.

EDC is a financial Crown corporation that provides financial services to Canadian companies operating globally.

Groupe Tremblay gets $925,925 steel funding

SAINT-ANICET, Que. — Steel company Groupe Tremblay has tapped into the federal government's Steel and Aluminum Initiative for $925,925 non-repayable funding.

The company, based in Saint-Anicet, Que. will use the money to acquire latest-generation equipment to implement a new cathode plate manufacturing process and automate production.

This funding is awarded under the Regional Economic Growth through Innovation program, announced in March, as a response to steel and aluminum tariffs imposed by the Trump administration.

On May 31, 2018, the US announced that tariffs of 25% on imports of Canadian steel and 10% on imports of aluminum would take effect on June 1, 2018.

Canada immediately responded to the tariffs, announcing on July 1, 2018 surtaxes or similar countermeasures on up to $16.6 billion of steel, aluminum imports and other products from the US. The US tariffs were lifted on May 20.

In 2018, Canada's steel and aluminum industries employed more than 33,500 Canadians.

Eclipse Automation expands into Europe

CAMBRIDGE, Ont. — Eclipse Automation is extending its reach again, this time in Veszprém, Hungary, with the acquisition of an automation company serving the automotive, electronics, food and medical markets.

The Cambridge, Ont. custom automation integrator now has a firm base in Central Europe with Transmoduls Ltd., and 13 other facilities in Canada and the US. The Hungarian systems integrator and automation equipment manufacturer derives more than one third of its revenue from exports to China, France, Poland, Romania, Spain, Mexico and the US.

Transmoduls has 161 employees.

The two companies have worked together since 2016.

Transmoduls will continue to operate under its own name, and branding will remain with Eclipse Automation.

$60,000 fine for injury at aerosal manufacturer

NEWMARKET, Ont. — A worker injured by a moving lift truck has resulted in a $60,000 fine for an Ontario aerosol manufacturer.

A temporary staffer working at K-G Spray Pak in Vaughan, Ont. on May 24, 2018 was tasked with picking finished aerosol cans from the end of a production line and packing them into boxes placed on wooden pallets.

The worker used a manual pump truck to retrieve a stack of pallets from another location in the plant. While walking backwards, pulling the full pump truck behind to the end of the production line, the worker was struck by a moving lift truck operating in reverse, heading in the same direction.

An Ontario Ministry of Labour investigation determined that there were no barriers, warning signs or other safeguards at the end of the production line to protect workers from vehicle traffic.

K-G Spray Pak entered a guilty plea to failing to ensure the proper warnings or safeguards were in place, according to Section 20 of Ontario's Occupational Health and Safety Act.

The court also imposed a 25% victim surcharge as required by the Provincial Offences Act.

Money for energy-saving projects

OTTAWA — Small- and medium-sized enterprises in the four provinces where federal carbon pricing applies can apply to the SME Project stream of the Climate Action Incentive Fund.

Companies in Ontario, New Brunswick, Manitoba and Saskatchewan are eligible to receive funding of up to 25% of the cost of projects that reduce energy use and cut greenhouse gas emissions.

Eligible projects include building retrofits, improved industrial processes, fuel switching and the production of renewable energy.

The funding comes from a portion of the fuel-charge revenue in the four provinces.

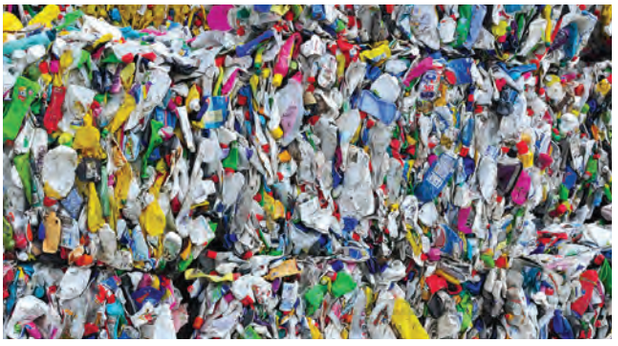
The application period will be open until funding is exhausted or for a maximum of 90 days.

Proposals will be selected on a first-come, first-served basis, and regional considerations and prioritization for the most impacted SMEs will be taken into account.

Funds available in 2019-20 are $72.4 million in Ontario, $3.7 million in New Brunswick, $9.3 million in Manitoba and $21.3 million in Saskatchewan.

GFL to acquire recycling processor Canada Fibers

To operate a new recovery plant in Winnipeg



Canada Fibers describes itself as a Toronto "urban mining" company.

PHOTO: ADOBE STOCK

VAUGHAN, Ont. — GFL Environmental Inc. has entered into a definitive agreement to acquire recycling processor Canada Fibers Ltd. and its affiliates.

The company provides recycling processing services to municipalities across Ontario, including Toronto through its single stream Arrow Road facility.

Canada Fibers has been awarded a contract to design, build and operate an advanced single-stream material recovery facility in Winnipeg, which will begin operations later this year.

GFL, based in Vaughan, Ont., is a diversified environmental services company employing 9,500 people.

It provides non-hazardous solid waste management infrastructure and soil remediation and liquid waste management services.

The company has facilities located across Canada and in 20 US states.

No financial details were provided.

Firan completes Colonial Circuits deal

TORONTO — Firan Technology Group Corp. (FTG) has acquired 100% of the outstanding shares of Fredericksburg, Va.-based circuit board manufacturer Colonial Circuits Inc. for $4 million.

Firan, an aerospace and defense electronics product and subsystem supplier based in Toronto, said Colonial's annual sales of high-quality circuit boards for the military, space and commercial markets is approximately $9 million.

FTG's operating units include FTG Circuits, a manufacturer of high technology, high reliability printed circuit boards; and FTG Aerospace, which manufactures illuminated cockpit panels, keyboards and sub-assemblies.

Operations are in Toronto, Chatsworth, Calif., Fredericksburg, Va., a joint venture in Tianjin, China; and Fort Worth, Tex.

$365,000 CED funding for productivity

SAGUENAY, Que. — Industrie P.H.D. Inc. has received $365,000 Canada Economic Development (CED) funding for an expansion project.

The company, which specializes in sheet metal processing that performs modelling, cutting and bending, will use the repayable loan to purchase and install digitally controlled production equipment.

The project will allow the Saguenay, Que. company to create four new full-time positions. The current project will result in investments of nearly $900,000.

$23.4M for AI workforce training

MONTREAL — SCALE AI has received $23.4 million in funding for 2019-2023 from the Quebec government for training the province's workforce in business challenges, tools and techniques related to artificial intelligence (AI).

SCALE AI, an investment and innovation hub based in Montreal, one of Canada's five innovation superclusters, said more than 25,000 professionals, managers and executives will take part in the programs by 2023.

CAREERS

Lorraine Ben

Lockheed Martin has appointed **Lorraine Ben** vice-president and chief executive for Lockheed Martin Canada in Ottawa. Before joining the defence and aerospace company in 2015, she served in a variety of business development roles with Telus Corp., Accenture and IBM. The Canadian arm of the international company has 1,000 employees spread across more than 10 facilities and customer sites, coast-to-coast.

Colin Osborne

Samuel, Son & Co. Ltd., a Burlington, Ont. metals distributor and industrial products manufacturer, has appointed **Colin Osborne** president and CEO. He replaces the retiring **Bill Chisholm**. Osbourne has been transitioning into the role since October. Previously, he was president of Samuel's service centres. He joined the company in 2015 as president of the manufacturing group, where he led the diversified manufacturing businesses. Before joining Samuel, he was president and CEO of Vicwest Inc., and held senior positions at Stelco.

CEO **Brian McManus** is stepping down as CEO of wood-products producer Stella Jones Inc. after 18 years at the Montreal company. No reason was given for his planned departure. Senior vice-president and CFO **Eric Vachon** will serve as interim CEO.

Kraken Robotics Inc., the manufacturer of underwater robotic systems based in St. John's, NL, has made some changes at the executive level thanks to the company's growth. **Joseph MacKay,** a former telecom executive, joins the company as CFO. **Greg Reid** moves up to the new COO position from CFO; **David Shea** moves up to senior vice-president, engineering from vice-president, engineering; and **Tina Sainsbury**, formerly financial controller, is now vice-president, finance.

TMMC a top auto plant in the world

Cambridge automaker wins two J.D. Power 2019 quality awards

Lexus, under the hood at TMMC. PHOTO: TMMC

CAMBRIDGE, Ont. — Toyota Motor Manufacturing Canada Inc. (TMMC) has won two J.D. Power 2019 Plant Quality awards based on customer surveys, including a platinum award recognizing the world's top automotive plants.

The J.D. Power 2019 US Initial Quality Study covers 2019 model year vehicles purchased or leased between November 2018 and February.

The Cambridge, Ont. North Plant received the highest award (platinum) for the Corolla, and the Cambridge South Plant was awarded bronze for building the RX. This is the third time TMMC has received a platinum plant award, and the fourth time it has received two awards in the same year. The 2019 awards raise TMMC's tally to 18.

TMMC currently manufactures the Toyota RAV4 and RAV4 Hybrid, Lexus RX 350 and RX 450h vehicles at three manufacturing plants in Ontario. It was the first plant outside of Japan to build a Lexus, which received the J.D. Power Award for the top vehicle in its segment.

Corollas, made at TMMC since 1988, are moving to a plant in Mississippi, before settling at a plant to be constructed in Alabama.

TMMC announced in April it will produce the compact Lexus NX and NX Hybrid SUV models for the North American market at its Cambridge, facility.

Partners to build wood pellet plant

VANCOUVER — Pinnacle Renewable Energy and Tolko Industries Ltd. have entered into a limited partnership agreement to build a new industrial wood pellet production facility in High Level, Alta.

The Northern Pellet Limited Partnership plant will diversify Pinnacle's fibre supply using high-quality material sourced primarily from Tolko's sawmill in High Level.

The facility's annual production capacity will be 170,000 to 200,000 tonnes.

Both companies will own a 50% interest in the plant, which will be built on land owned by Tolko.

Production is to begin in 2020.

Tolko is a wood products producer based in Vernon, BC.

Pinnacle, based in Richmond, BC, is an industrial wood pellet manufacturer and distributor.

Alcoa gets $10M for Deschambault aluminum plant

DESCHAMBAULT, Que. — The Federal government is investing $10 million in an Alcoa aluminum plant as part of an $85 million project that will support more than 520 jobs.

The project will be completed by the end of 2021.

Alcoa's Deschambault Aluminerie plant in Deschambault-Grondines, Que. will acquire cutting-edge technology that will increase aluminum production at a lower cost.

Aluminerie, operating since 1992, was acquired by Alcoa in 1998. It houses the Aluminum Centre of Excellence, a training hub for Alcoa employees from all over the world and it's a centre for the development, transfer and standardization of best practices in manufacturing management.

This investment is being made through the federal government's Strategic Innovation Fund.

Ballard to purchase BC's first hydrogen fleet

Selected employees to buy zero-emission Toyota Mirai FCEVs

Stephen Beatty, (right) vice-president, corporate, Toyota Canada Inc., provides Randy MacEwen, (left) president and CEO of Ballard Power Systems, with the keys to a new fuel-cell Toyota Mirai. PHOTO: BALLARD

BURNABY, BC — Ballard Power Systems is demonstrating its support of hydrogen fuel-cell vehicles with the purchase of BC's first fleet of electrics from Toyota Canada Inc.

The clean energy innovator has arranged for several employees to purchase Toyota Mirai zero-emission fuel cell electric vehicles (FCEVs) powered by hydrogen.

The Burnaby, BC-based company is celebrating 40 years in 2019 as FCEVs are gaining momentum in the province. The country's first publicly accessible retail hydrogen station opened in Vancouver last summer, with another station to open in Burnaby.

Earlier this year, Natural Resources Canada and the BC government announced they are contributing a combined $3 million to build two new retail hydrogen-refuelling stations in the province's Lower Mainland, and it is expected that Greater Vancouver and Victoria will have a network of six stations by 2020.

The Mirai is now available for purchase by fleet operators at 12 dealerships in the Vancouver area making Toyota is the first automaker to bring FCEVs to Canada en masse. The company has been working with other hydrogen stakeholders across Canada to put in place the necessary fuelling infrastructure, training and service to support the sale of the vehicles.

The vehicle is powered by hydrogen fuel cells, uses no gasoline and emits only water vapour from its tailpipe.

It competes with traditional internal combustion engines, with a range of approximately 500 kilometres, and refuels in about five minutes.

PLANT ONLINE

SOUNDING OFF

What readers have to say about breaking news

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

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

Garneau 'disappointed' in airlines' move against new passenger bill of rights
http://www.plant.ca/CJY1Z
↗ I will never understand why the airlines can resell a seat on an aircraft after it has been bought and paid for by me, regardless of circumstance. Should I not receive compensation for my loss if my seat is sold to someone else? I guess this is called legal double dipping.

Federal Liberals, Ontario Tories blame each other for Bombardier layoffs
http://www.plant.ca/24Ds6
↗ Bombardier must be kicked off of the federal government welfare wagon. No more free taxpayer money. It's better (cheaper and more fair) for the federal government to pay the unemployed workers directly rather than give the tax dollars to the rich and well connected.

Indigenous group says Trans Mountain bid could be ready next week
http://www.plant.ca/R3atL
↗ Which Ingenious groups in BC are against the pipeline project? Tell me they do not want younger Canadians to have security.

Fedeli, Thompson, MacLeod demoted in Doug Ford's cabinet shuffle [UPDATED]
http://www.plant.ca/J44xP
↗ I want to remind Ontario the Liberals created the huge deficit and Hydro One. Doug Ford has to bring down deficit. Wake up!

'Beer insiders' fuelling online criticism of Tory government tweets: Fedeli
http://www.plant.ca/2E9s4
↗ Why bother scrapping the deal and incurring costly penalties? Buy your beer at the LCBO or grocery stores. Support Ontario craft brewers.

Small business to get help on energy efficiency upgrades from carbon tax money
http://www.plant.ca/tJuAa
↗ 1). Mandatory Fast DC charging stations for EV dealers, libraries, government places, etc. 2) Mandatory charging stations at each company.

Quebec cattle farmers say Beyond Meat is not meat
http://www.plant.ca/7fimm
↗ I would add one word and call it "plant-based meat alternative" or "plant-based faux meat."

↗ **Canada launches multi-billion dollar bidding process for 88 new fighter jets**
http://www.plant.ca/IhCRf
Boeing's CF-18s have performed admirably. Why not stick with the Boeing product, which has proven itself for decades?

Garbage to green diesel

Feedstock for fuel that will power diesel engines. PHOTO: ADOBE STOCK

Oh, our poor environment. Household and industrial waste is piling up in landfills producing methane emissions; and we're adding to the assault on the climate with the fossil fuel we burn for transportation.

Enter Cielo Waste Solutions Corp., a Red Deer, Alta.-based waste management company.

It's now capable of producing a biodiesel from garbage that reduces the climate effects of landfill and transportation. This high-grade fuel can replace hundreds of millions of litres currently shipped into the country for mixing with Canadian diesel to reduce emissions.

Cielo's first commercial refinery in Aldersyde, Alta. is processing a wide variety of solid wastes, including all seven types of plastics, used tires, food waste, railroad ties, organic wastes, wood waste and grass clippings.

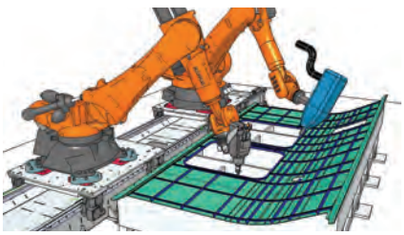
The proprietary thermal catalytic depolymerization technology stews this refuse at about 350 degrees C, which changes the composition of the material by collecting the diesel carbon molecules.

Cielo intends to build green refineries in Grande Prairie, Calgary, Medicine Hat and Brooks, Alta. by late next year. Once operating at full capacity, they'll each produce 2,000 litres of renewable fuel per hour. That will divert 128,000 tonnes of waste from landfills annually.

Only 30.9 million tonnes to go before bringing Canada down to zero landfill waste.

NCR is hot on cold spray

3D printing of metal-based parts is an emerging technology. To assess its potential, National Research Council of Canada (NRC) and Polycontrols, a Quebec-based company specializing in surface engineering solutions, are building a research facility. The idea is to help manufacturers study, adopt, and deploy cold spray additive manufacturing (CSAM) technology.



Poly/CSAM research facility will open February 2020. PHOTO: NRC

So what is cold spraying? Unlike thermal where powders are melted during the spraying process, solid metal, polymer, ceramic, composite materials and nanocrystalline powders (diameter of one to 50 micrometres) are accelerated in a supersonic gas jet. Upon impact the particles undergo plastic deformation and stick to the surface.

The Poly/CSAM facility, located at the NRC's Boucherville site in Quebec, will open next year.

A combination of unique technologies will be offered, such as surface preparation; coating and 3D buildup by cold spray; local, laser-based thermal treatment; in-situ robotic machining and surface finishing; state-of-the-art sensor technologies; extensive data logging and analytics; and machine learning.

Processors are tech savvy

Robotics and automation will be part of the tech mix. PHOTO: ADOBE STOCK

Canadian manufacturers aren't generally recognized as being quick to jump into advanced technology, but that doesn't appear to be the case for processors.

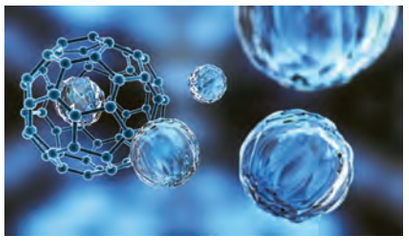
A global survey of more than 900 of these manufacturers by Sage Research finds 62% of the 301 Canadian respondents expect emerging technologies to have the greatest impact on their industries in the next five years. Robotics, Internet of Things (IoT), and automation will be part of the mix and a top priority for 59%.

Many are already taking action.

So far, more than two thirds of the companies had recent or mature deployments of on-premises enterprise resource planning (ERP) software; 55% had recent or mature deployments of cloud-based ERP software; 50% reported implementing advanced and predictive data analytics; 47% reported implementing automation and robotics; and 46% reported using IoT.

> The philosophy of my administration is simple. If we can build it, grow it or make it in the United States, we will.
>
> *US President Donald Trump after signing an executive order requiring federal agencies to purchase products using more American components.*

Thinking small



A nano particle. PHOTO: ADOBE STOCK

Most innovative companies like to think big, but CBN Nano Technologies' aims to be the world's smallest manufacturer – that is, to make products at the atomic level.

The Ottawa-based sister company to Canadian Bank Note Co. Ltd. makes high-tech security solutions for government identification, currency and lottery markets worldwide. Globally, the company employs 1,600 people, with approximately 1,000 in Canada.

Its $220-million nanotechnology project will be the first in the world to undertake atomically precise manufacturing on a commercial scale. Fabricating products with every atom in the right place has specific applications in CBN's core business – new nanoscale fraud-proof security features.

The technology also applies in advanced health care treatments, reducing pollution, building high-performance computing capabilities and producing super-efficient solar energy.

Although thinking small, the company expects big things for Canada in advanced manufacturing.

Growth is 'subdued'

World forecast down 0.1%

For those of you hungering for economic updates, the International Monetary Fund's World Economic Outlook confirms the various trade upsets and other disruptive conditions are "subduing" global growth.

The latest world forecast is down 0.1% from April to 3.2%, picking up to 3.5% in 2020. Canada's growth projection since April is the same: 1.5% this year and 1.9% next year.

The report says households and companies in advanced and emerging economies are holding back on long-term spending. The result is sluggish global trade, which is intensive in machinery and consumer durables. Projected pickup of growth in 2020 is "precarious."

Among the risks is further trade and technology tensions that slow investment.

The IMF calls for multilateral and national policy to place global growth on a stronger footing. That includes reducing trade and technology tension.

"Specifically, countries should not use tariffs to target bilateral trade balances or as a substitute for dialogue to pressure others for reforms," says the report (ahem, Trump Administration).

Get a copy of the *World Economic Outlook* at **https://blogs.imf.org**.

May sales increase

Statistics Canada reports manufacturing sales rose 1.6% to $58.9 billion in May – in 12 of 21 industries – following a 0.4% decline in April. The increase was mainly driven by higher sales in the transportation equipment industry.

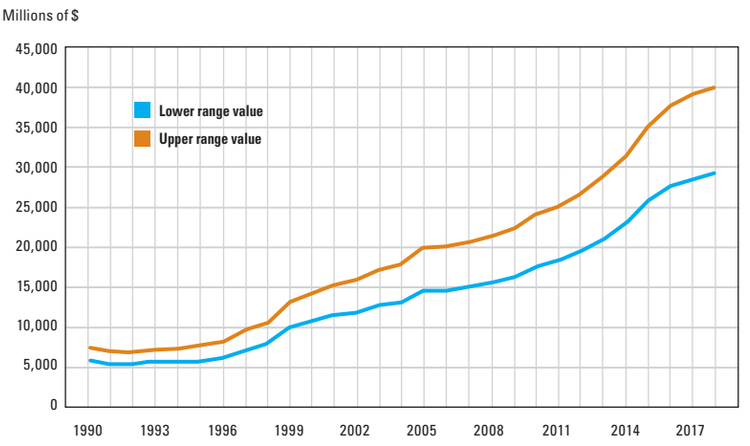
Volumes were up 1.7% and inventories climbed for the sixth consecutive month (0.8%), but the inventory-to-sales ratio declined to 1.51 from 1.52 in April. New orders were up 2.9%, and unfilled orders increased 0.5%.

A TD Economics note describes the increase as an improving domestic picture and healthy rebound in Q2.

But looking ahead, the outlook for the manufacturing and trade sectors remains uncertain due to ongoing trade tensions and moderating growth in China and elsewhere.

PLANT PULSE

ECONOMIC DEVELOPMENTS AND TRENDS



Source: Statistics Canada, CANSIM

VALUE OF DATA

Manufacturers depend increasingly on the collection, processing and analysis of data to make their production processes more efficient and to drive marketing strategies. In 2018, Canadian investment in data, databases and data science was as high as $40 billion, according to Statistics Canada. Average annual growth in data investment from 2015 to 2018 was 6.2%. That's more than the annual investment in industrial machinery (2.2%).

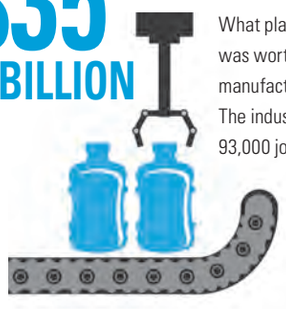
69.8

Exporters' reading on Export Development Canada's Trade Confidence Index. That's a 5.3% drop and almost four points below the historical average. The slide was led by a weaker outlook for international business opportunities, and softer expectations for the Canadian and global economies.

40%

The amount of oil consumption Quebec will reduce by 2030. Part of the plan is to only finance public transit projects that are electric. The Quebec government estimates 1 million electric vehicles on the road could reduce consumption by 6%.

$35 BILLION



What plastics manufacturing was worth in sales of resins and manufactured goods in 2017. The industry supports about 93,000 jobs across more than 1,900 companies, according to Environment and Climate Change Canada.

$1.7 BILLION

Average investment this year in plant expansions and facility upgrades among 66% of respondents to the **PLANT** Manufacturers' Outlook 2019 survey. But most (28%) are spending less than $100,000.

64%

Percentage of 30 Canadian SME manufacturers that are implementing digital solutions, according to a Workplace Transformation Study of 203 Canadian businesses by TELUS Business, partnering with International Data Corp. That puts manufacturers well ahead of other industries (55%) nationally. The study, conducted in October 2018, touches on people, processes and technology. Manufacturers meet the national average in adopting cloud computing infrastructure and cloud-enabled network management, while leading in augmented reality/virtual reality adoption. But they're slightly less likely to work with a consulting or managed security partner.

CAUTIOUSLY COM

The 2019 EMC-PLANT Manufacturing Salary Survey shows less optimism about revenues.

BY JOE TERRETT, EDITOR

When it comes to riding out "interesting times" Canadian manufacturers have proved to be a resilient bunch. Through almost three years of Trumpcapades based on an America Only doctrine that has included threats, global insults aimed at allies, tariffs, NAFTA brinkmanship, and a trade war with China, manufacturers have maintained their confidence, although it's somewhat diminished.

Meanwhile, the challenges and annoyances are piling up. In addition to US President Donald Trump's antics, there are prohibitively high electricity costs in Ontario, regulatory impediments, climate change fees, and worrying developments affecting international trade.

Add to all of that soft economic growth (1.2% in 2019 and 1.7% in 2020) and you have a recipe for classic Canadian caution, which appears to be playing out in the sector's executive compensation.

When asked by the 2019 EMC-PLANT Manufacturing Salary Survey about pay, representatives from executive and manager ranks, for the most part, reported increases that track slightly above or close to inflation (2.3% in 2018, according to Statistics Canada, and projected by the International Monetary Fund to be 1.69% this year).

This national benchmark study was conducted through April and May by **PLANT** Magazine, an Annex Business Media publication, and the Excellence in Manufacturing Consortium (EMC), a not-for-profit organization based in Owen Sound, Ont. Its raison d'être is to help manufacturers achieve operational excellence.

Nothing too surprising in this year's results, notes EMC president Shawn Casemore. "A lot of the key issues remain."

Such as Trump tariffs.

To recap, the Trump administration announced tariffs of 25% on imports of Canadian steel and 10% on imports of aluminum that would take effect on June 1, 2018. Canada responded with restrictive countermeasures of up to $16.6 billion applied to imports of steel, aluminum and other products from the US. On May 17, tariffs imposed on both sides of the border were lifted.

"Although they have been eased, the after-effect of steel and aluminum tariffs is still having an impact on Canadian manufacturers," Casemore says. "For example, the increases in prices across the board when the tariffs were introduced are still up."

EMC members continue to have challenges finding talent and keeping people; while internally, they're trying to meet needs by up-skilling individuals. "Those are things we are dealing with everyday with our members," Casemore says.

Manufacturers are contending with economic and geo-political factors that have raised the level of business uncertainty, particularly as a result of policies emanating from the Trump administration. Casemore says companies have to find new ways to remain profitable and grow their businesses. One way is to set up in the US and he cites two family-owned manufacturing outfits that have purchased or built facilities on the other side

PENSATED

PAY RAISES FOR EXECUTIVES AVERAGE 2.4%

of the border.

"The realization is that if the current state continues, they have to survive and if there is a lot of demand in the US to buy locally, to buy American, many manufacturers will need to have a US presence, and many are doing that," Casemore says.

"This is making their lives more chaotic. There's more travel and there's a lot more to consider regarding supply chains. They are being forced to be more strategic, but that's not a bad thing. Once again manufacturers are doing things they have not done before but doing it well."

How well are they being compensated?

A total of 732 executives and senior managers contributed to the annual study, sharing personal information about what they are paid, bonuses, and how their businesses are faring. Most of the respondents (87%) come from small and medium-sized enterprises.

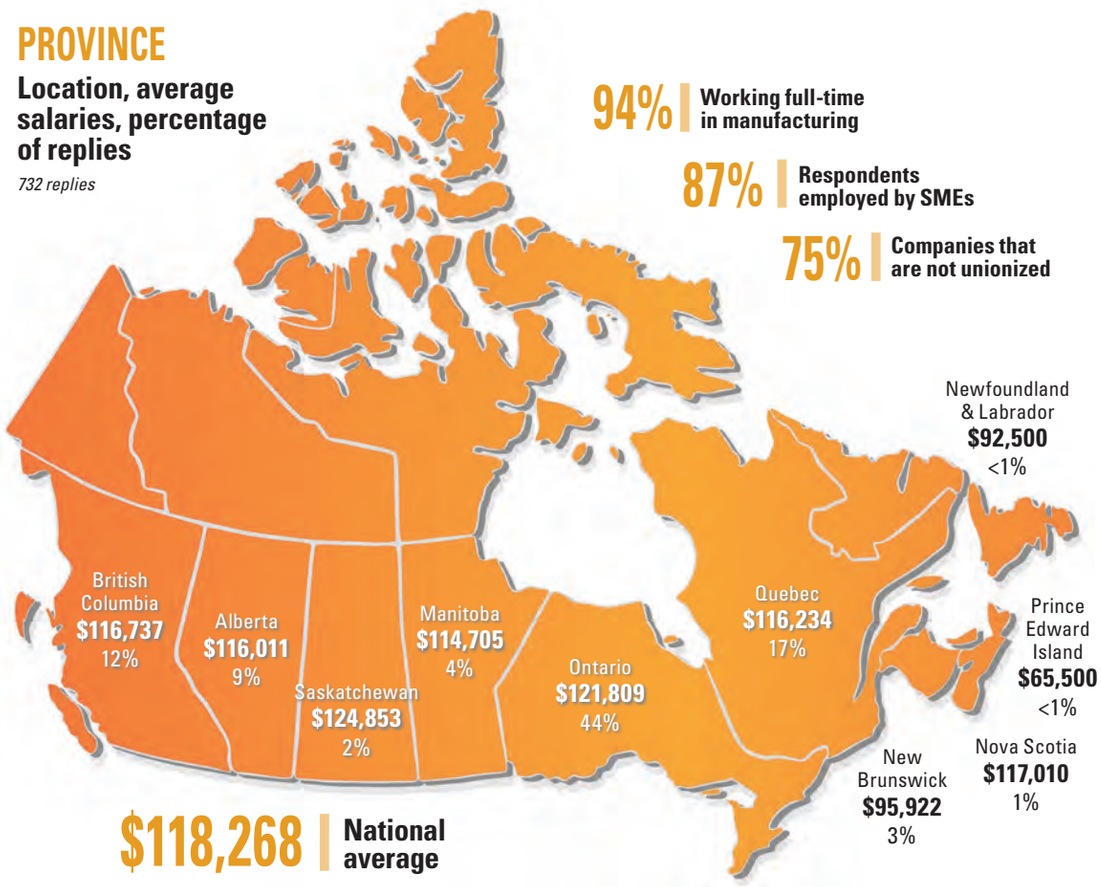
Each year's sample is different for a variety of reasons (employment churn, variances in bonuses), so results don't always align with the previous year's group, but the responses do

Demographics

PROVINCE

Location, average salaries, percentage of replies

732 replies



94% Working full-time in manufacturing

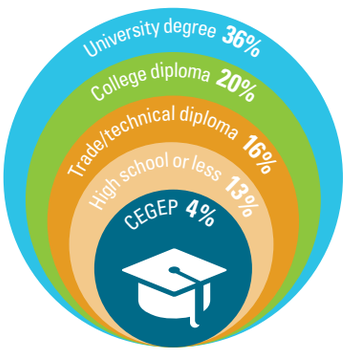
87% Respondents employed by SMEs

75% Companies that are not unionized

$118,268 National average

EDUCATION

732 replies



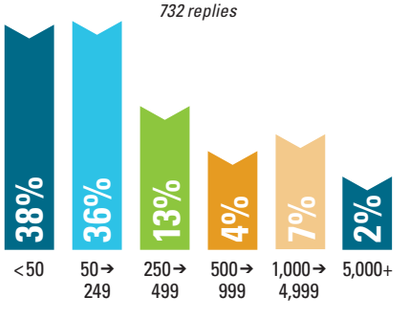
REVENUE

732 replies

$1M → <$5M	19%
$5M → <$10M	13%
$10M → <$30M	18%
$30M → <$50M	8%
$50M → <$100M	10%
$100M → <$250M	6%
$250M → <$500M	3%
$500M → <$1B	3%
$1B plus	4%
Did not answer	15%

EMPLOYEES

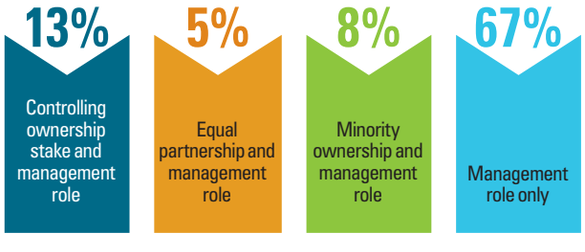
732 replies



Average = 247

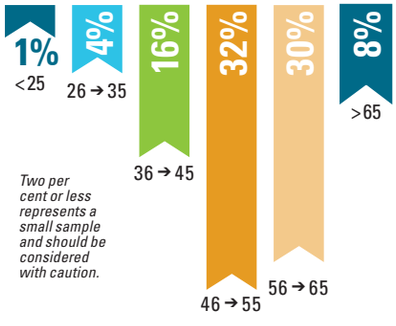
ROLE IN THE COMPANY

900 replies



AGE

732 replies / Did not answer = 10%



Two per cent or less represents a small sample and should be considered with caution.

provide a general measure that will give you an idea how your pay compares.

This year's sample shows average remuneration across manufacturing (all categories) hasn't moved much. It rose 2.4% to $118,268 (compared to 4.2% from 2017 to 2018). Most respondents (42%) are making more than $110,000 a year and 74% project their compensation will increase over the next three years, most (41%) in the 1% to 3% inflation range. Eight per cent expect increases of more than 10%.

Survey results also provide a picture of the typical manufacturing leaders. They're overwhelmingly male (88% based on 656 replies), 62% are between 46 and 65 years of age; and 67% have management roles rather than ownership or partnership positions. The typical manufacturer has been in the business 25-plus years, almost 17 of those at his/her current company and 12 in the same job.

Breaking down age in more detail, 32% of respondents are 46 to 55, 30% are 56 to 65 and 8% are older. Sixteen per cent are in the 36 to 45 group and just 4% are 26 to 35. Under 25s account for about 1% of the total.

Most respondents (62%) report no change to their employment situation, but 17% say more responsibilities have been added to their workload because of reduced staff, which is consistent with previous surveys. Most (36%) have a university degree that's likely a bachelor of arts (52%) and the average workweek is 47.3-hours.

Aside from those who have a management role only in their companies, 13% have a controlling ownership stake, 4% are equal partners and 8% are minority owners.

Predictably, top executives and senior plant floor leaders put in the most time. Vice-presidents average almost 51 hours per week, owners and partners over 50, CEOs and presidents 50, and plant managers and maintenance managers almost 50. Directors average 48 hours.

Less optimistic

Respondents are a little less optimistic about earning higher revenues this year (54% see improvement over 2018 revenues compared to 63% over 2017), and 24% are looking at a decrease from 2018 levels compared to 18% the year before. Fifty-six per cent intend to invest in new production equipment and processes over the next five years, 53% say they will hire new employees and 30% will add new lines of business.

CEOs and presidents are on the low end of increases; in fact, they're showing a 5% decrease compared to 8.4% last year. Owners and partners are taking only 1.4% more from their businesses compared to 5.9% last year.

Vice-presidents are up 3% compared to 7.2% last year, while plant managers will get a 3.4% raise compared to the 3.9% they received in 2018. Directors are expecting 6.5% following a 3.7% increase last year.

Other management titles show administrative management with a 6.1% increase, quality

ON THE PLANT FLOOR

What are the payroll employees in manufacturing making? Statistics Canada watches weekly earnings monthly and as of March, they averaged $1,109 for 37.4 hours per week. That's $57,668 for 52 week and represents a 12-month gain from March 2018 of 1.3%. Most of the 1.6 million employees worked in Ontario (almost 44%) and Quebec (just over 28%).

Trading Economics, a global economics research firm based in New York, analyzes indicators for 196 countries. It reports wages in Canada averaged $20.22 and hour from 1991 until 2019, reaching an all time high of $26.37 in December 2018 and a record low of $14.96 in January of 1991.

In the US, wages are expected to be $22.38 by the end of the quarter, $22.94 in 12 months and $25.11 in 2020.

Salary Comparisons

GENDER

656 replies

JOB TITLE

732 replies

	2019	2018	2017	%	Hours/ Week
CEO/President	$216,863	$228,275	$210,564	6%	50.0
Vice-president	$190,867	$185,373	$172,879	5%	50.5
Owner/partner	$124,392	$122,661	$115,847	15%	50.4
Director	$141,643	$133,036	$128,262	6%	48.2
Plant Manager	$133,220	$128,822	$124,040	12%	49.9
Plant Engineering	$116,494	$114,680	$109,476	3%	48.5
Production/Operations Manager	$105,304	$100,696	$107,368	11%	49.7
Maintenance Manager	$104,327	$103,756	$99,532	6%	48.9
Materials Manager	$95,840	$92,800	$88,740	1%	46.0
Administrative Management	$92,581	$87,229	$82,876	10%	44.4
Purchasing/Supply Manager	$91,006	$87,702	$83,334	6%	43.0
Logistics Manager	$90,800	$86,571	$79,714	1%	44.7
Quality Assurance Manager	$90,709	$87,225	$83,064	3%	44.0
Design Engineering	$90,158	$87,250	$83,665	6%	40.8
Safety manager	$84,395	$84,042	$80,626	3%	45.3
Technician/Technologist	$77,169	$74,369	$73,220	6%	40.5

Two per cent or less represents a small sample and should be considered with caution.

INDUSTRY

732 replies

	2019	2018	2017	% replies
Aerospace product and parts	$130,020	$124,364	$119,580	3%
Beverage and tobacco product	$102,857	$119,714	$105,143	1%
Chemical	$125,875	$125,471	$118,958	4%
Clothing manufacturing	$71,380	$82,640	$83,298	1%
Computer and electronic product	$120,517	$116,190	$142,852	4%
Durable goods industries	$105,885	$101,038	$98,346	2%
Electrical equipment, appliance & component	$110,522	$108,097	$102,914	7%
Environmental	$158,188	$140,250	$134,625	1%
Fabricated metal product	$116,547	$113,345	$109,122	20%
Food manufacturing	$116,391	$117,940	$104,726	5%
Furniture and related product	$125,398	$113,261	$105,283	3%
Leather and allied product	$89,846	$87,096	$87,297	1%
Life Sciences	$127,606	$118,794	$116,550	2%
Machinery	$106,272	$106,929	$99,873	8%
Miscellaneous manufacturing	$102,189	$98,266	$92,571	11%
Motor vehicle	$74,800	$73,000	$72,200	2%
Motor vehicle body and trailer	$106,800	$104,200	$102,200	1%
Motor vehicle parts	$96,845	$93,844	$92,622	4%
Non-durable goods industries	$100,500	$99,500	$96,500	>0%
Non-metallic mineral product	$125,333	$122,833	$138,000	>0%
Paper manufacturing	$128,656	$125,673	$121,163	6%
Petroleum and coal product	$105,585	$107,638	$104,823	2%
Plastics and rubber products	$113,137	$110,845	$104,645	11%
Primary metal	$171,786	$171,595	$161,214	3%
Printing and related support activities	$103,911	$103,057	$100,337	6%
Railroad rolling stock	$128,730	$165,480	$152,580	1%
Ship and boat building	$100,750	$100,500	$99,625	1%
Textile mills	$138,100	$134,400	$129,800	1%
Textile product mills	$224,033	$209,183	$205,833	1%
Transportation equipment	$99,060	$104,600	$100,008	3%
Wood product	$110,941	$109,987	$101,107	9%

No response from 7%. Two per cent or less represents a small sample and should be considered with caution.

assurance managers (4%), purchasing/supply managers and technicians/technologists (3.8%), production operations managers (4.6%), design engineers (3.3%), material managers (3.3%) and plant engineers (1.6%). Safety managers are on the low end at 0.4%.

Thirty-six per cent of respondents have a university degree, 20% have a college diploma, 16% a trade or technical diploma, 13% a high school education or less and 4% a CEGEP.

Higher education is good for income. University grads score the highest wage rate at $132,628, almost 18% ahead of the next best-paid group – college grads – at $110,790.

Looking at salaries based on industry, many show modest increases, a few were unchanged while life sciences showed a healthy increase, as did environmental, although the sample size is unreliably low. Clothing manufacturing and beverage/tobacco products showed declines, but sample sizes are low, therefore unreliable. Also showing decreases were railroad rolling stock, food manufacturing, paper manufacturing, petroleum and coal products and transportation equipment.

Owners, senior executives, plant, production and engineering managers top the $100,000 annual pay level. CEOs and presidents are the highest earners averaging $216,863, followed by vice-presidents ($190,867), directors ($141,643), plant managers ($133,200) and owners/partners ($124,392). Technicians/technologists are at the bottom ($77,169).

Investing in the business is a priority for companies over the next five years. Fifty-six per cent will put money into new production equipment and processes, 53% will hire new employees, 30% are adding lines of business, 27% are expanding their plants, and 24% are entering new geographic markets.

The survey highlights the usual list of executive concerns, which is topped by skills shortage (53%), cost control (46%), technology upgrades (34%) and capacity utilization (27%).

Skills stood out for Scott McNeil-Smith, EMC's national director, projects and partnerships. For a second consecutive year, it has been the top concern of respondents, ahead of cost control, which for many years was the previous leader.

"The skills shortage has two facets: a lack of skills and experience, but the largest is an actual lack of applications (according to the Manufacturing GPS, which tracks labour and market information in real time, **www.maufacturinggps.ca**)."

That's causing manufacturers to look for alternative sources of candidates. They include women whose participation in manufacturing is low; and non-traditional sources such as Indigenous people, those with disabilities, youth, and foreign-trained candidates, a project EMC has been working on.

"The foreign piece is definitely picking up," agrees Jean-Pierre Giroux, EMC's national director, skills and national development. "Go back 10 years and it's a totally different story, but now it's a hot topic."

He says that's especially true for small and medium companies looking at ways to talk to foreign-trained workers while aligning their strategy and recruitment efforts.

Giroux sees good news for SMEs. Salaries according to revenue show increases among smaller firms – normally in the 1.5% to 2% inflation range – touching on 3%, 4% and 5%.

"Smaller firms have to compete harder for qualified people, but it also speaks to profitability. If they want to be more attractive they have to be more progressive with salaries, and with benefits," Giroux says.

Asked about what skills they need most to do their jobs, 36% of senior executives and managers cited management/supervisory, followed by interpersonal problem solving (29%), industry-specific technical skills (28%), with project management and communication cited by 27%.

Additional training requirements include technical (software, programming), financial, productivity/continuous improvement, people skills and specific technical skills.

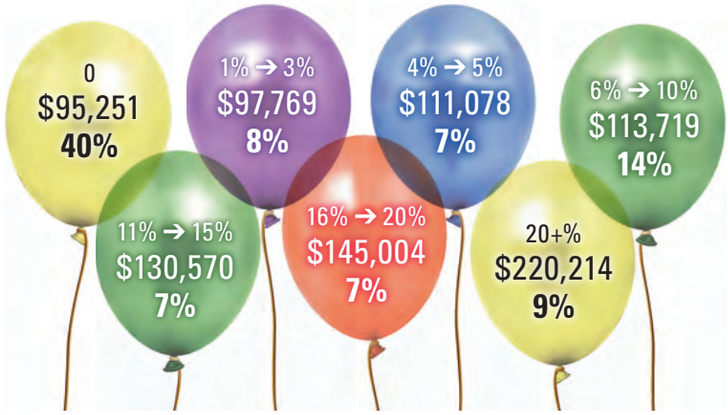
REVENUE

732 replies	2019	2018	2017	%
$1M → <$5M	$90,261	$88,715	$85,169	19%
$5M → <$10M	$113,566	$108,263	$102,448	13%
$10M → <$30M	$118,717	$115,104	$115,813	18%
$30M → <$50M	$124,297	$120,848	$117,324	8%
$50M → <$100M	$145,679	$142,084	$133,789	10%
$100M → <$250M	$146,163	$147,283	$139,656	6%
$250M → <$500M	$134,617	$132,175	$123,608	3%
$500M → <$1B	$116,364	$110,264	$106,414	3%
$1B plus	$145,102	$141,816	$137,623	4%

No response from 15%.

2019 BONUSES & INCENTIVES

732 respondents / Did not answer = 7%



EDUCATION

732 replies	2019	2018	2017	%
University degree	$132,628	$130,503	$123,374	36%
CEGEP	$92,317	$91,090	$83,199	4%
College diploma	$110,790	$106,237	$102,036	20%
Trade/technical diploma	$106,884	$104,428	$100,941	16%
High school or less	$106,654	$103,729	$109,067	13%

No response from 10%.

YEARS OF EXPERIENCE

732 replies	2019	2018	2017	%
1 → 4 years	$86,648	$79,086	$78,155	4%
5 → 9 years	$84,120	$82,880	$96,597	7%
10 → 14 years	$117,417	$108,802	$103,922	7%
15 → 19 years	$108,045	$102,993	$98,513	11%
20 → 24 years	$118,386	$113,572	$107,908	15%
25 → 35 years	$128,827	$125,909	$119,774	37%
36+ years	$122,876	$125,822	$118,166	19%

AGE

732 replies	2019	2018	2017	%
Under 25	$60,400	$59,250	$52,500	1%
26 → 35	$92,946	$85,531	$81,369	4%
36 → 45	$102,778	$96,340	$90,954	16%
46 → 55	$125,286	$121,073	$119,125	32%
56 → 65	$124,831	$125,142	$119,648	30%
Over 65	$103,173	$102,827	$99,246	8%

No response from 10%. Two per cent or less represents a small sample and should be considered with caution.

One thing manufacturers are doing right is retaining their management talent, says McNeil-Smith, noting only 4% of respondents report moving to a different company. "But that's compared to what we know now is the turnover ratio of production staff, which is much higher and a greater challenge they're still dealing with and a key piece to address."

Retention is a hot topic among manufacturers, Giroux says. How are they ensuring executives and production workers stick around? Aside from compensation and benefits, they are being creative and investing more in the work-life balance. Like bussing in employees and returning to the wellness programs of the 1980s, such as having medical staff on hand. Or how about a 100-plus-year-old company that added an employee lounge?

Indeed, Scott-McNeil Smith emphasized the importance of culture. One BC manufacturer hired a chef and a fully staffed, subsidized food service for employees.

"Another topic is how do we define a work week? Is it 40 to 50 hours or take a more flexible approach for (especially) supervisors and production people? Can we look at 30, 35 hours to accommodate millennials and new workers? Part time is hot as well. Companies are looking at embedding these into their HR practices."

Keeping the best

There's another inducement keeping plant managers and executives on the job. Casemore says it has been some time since they've been allowed to make significant investments in their plants, but for many sectors demand and volumes are high enough to replace old equipment and bring in new technology. "They're staying on the job to see projects through."

He cited one company that has doubled in size and invested millions in automation. "You walk into any plant today, I defy you to find one that hasn't invested in some level of new equipment over the past two years."

With investing in new technology comes new tools for learning on a continuous basis and Giroux has observed more companies looking at opportunities to do so. "When you have a progressive philosophy, and investment on an ongoing basis, while exploring ways to be more productive and more effective, that comes with some tools for employees."

In fact, these are qualities that candidates look for when they consider working for a company, says McNeil-Smith. "They see companies that invest in the future have a future, and those that don't will likely be disadvantaged or not around."

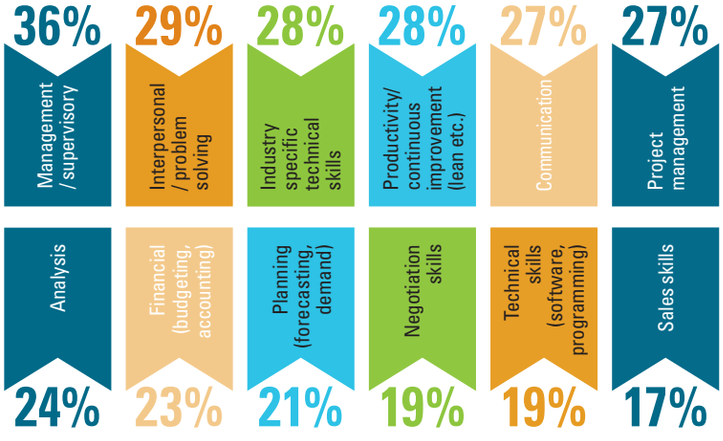
Preeti Dayal, senior business manager, manufacturing and supply chain at Hays Canada, a recruitment firm with offices across the country, says succession, retention and internal training starts with selection and hiring for the next position. "Maybe [the company] is hiring a supervisor but looking for management qualities, someone who can be trained for progression planning."

There are additional moves employers can make to deal with skills shortages on the production floor. Dayal suggests focusing more on skills sets and less on soft skills. "Send them to school, and share tuition, that's a big thing. And more cross training. People are hungry to learn and it helps with retention.

Management Issues

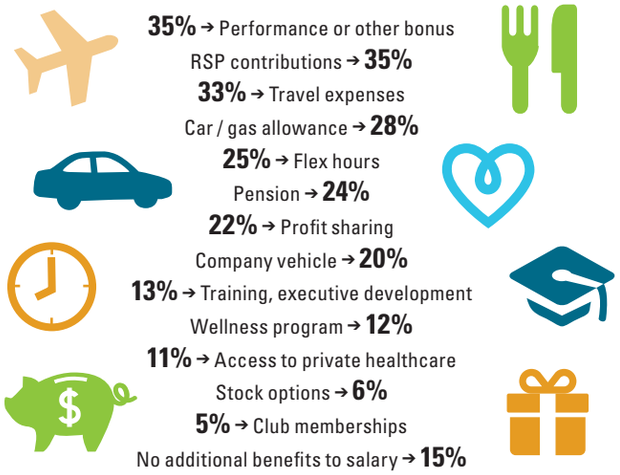
MOST IMPORTANT SKILLS

677 replies



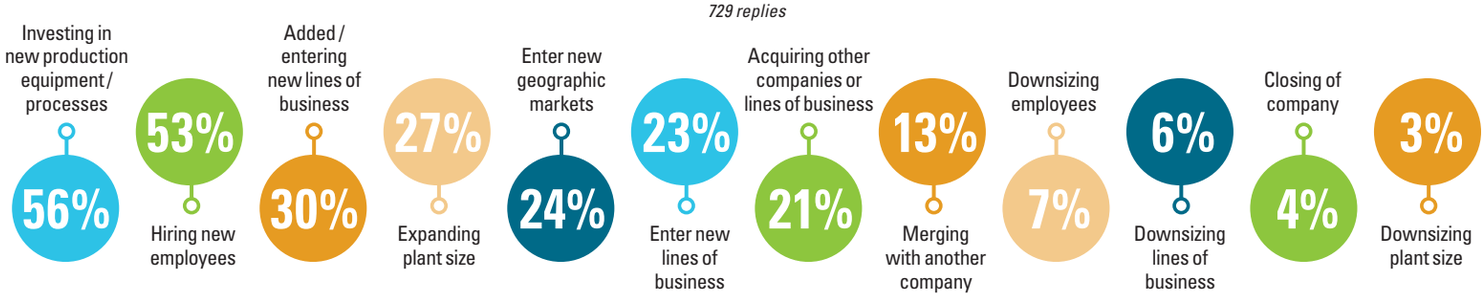
PAY PERKS

729 replies



CHANGES NEXT FIVE YEARS

729 replies



MOST SIGNIFICANT ISSUES

729 replies

SALARY FEEDBACK

Manufacturing executives responding to the 2019 EMC-PLANT Manufacturing Salary Survey were invited to add comments about compensation issues and like last year's survey, their remarks ranged from salaries progressing to stagnating (many). But there were also interesting observations about trends, including the role of incentives to address skills gaps, plus attitudes and expectations of newer employees. Here are some of the almost 300 insights provided by respondents:

Trends

- Automotive manufacturing salaries continue to be very attractive, but need to be in order to retain talent due to the high demands of the field.
- Due to the shortage of skilled workers and trades, I see salaries going up short term but with the slowdown on the horizon, I see wage freezes a year or two out.
- Salary increases have outpaced CEO and key management contributions to profitability in larger organizations, compared with shareholder and infrastructure returns from capital investment.
- Harder to find experienced people in key fields – mechanical designers, controls engineers.
- More reliance on computerization of jobs and equipment. Also electrification and automation of hydraulic systems.

Salaries

- Executive salaries have risen faster than blue-collar workers' pay. Technology advances will force retraining of personnel.
- Companies have to be more competitive with salaries to secure talented project managers.
- Salaries in our company are following skills but there is a gap in entry to expert levels, so large wage disparity that's hard to defend. Newer staff members are so much more junior and lack hands-on skills to apply to problem solving for process failures and improvement methods.
- Salaries are all over the place. It's very difficult to determine if you are bringing people in at the right salary point. There is also a huge problem with the variability in skills and knowledge of journeyman trades people.

Attitudes

- Lots of people are not interested in working weekends and overtime. They want their personal time. Unfortunately, this is not always conducive in our industry. We have to hire more people to cover off shifts.
- Millennials want top dollar without a proven track record or all the required skills. Their enthusiasm is refreshing; however, their [perception] of what's needed and where they are in relation to the need is either lacking or not appreciated.
- In the engineering/technical areas of manufacturing, education programs should really stress the importance of adhering to company standards, procedures and technical workflows rather than the hard theory of calculations.

Incentives

- Increasing gap between administration and operations. Also increasing between unions (better wage) and staff. New hires are paid better with better perks than existing, experienced staff.
- Industries are more interested in incentive-based performance for competitive pay.
- It's evolving rapidly and we need to make sure employees are up to date to ensure proper performance. Salaries and compensation need to be equal to the current market, which is moving due to lack of employees.

WHAT COMPANIES PAY FOR

664 replies

Also formalizing training is very important."

Of course, salary, benefits and perks help to keep key people engaged. Fifty-three per cent of those responding to the survey reported a portion of their pay was made up of bonuses and incentives. Those showing the highest percentage (20% or more) earn an average of $220,214. Most are in the 6% to 10% range, with salaries averaging $113,719.

Fifteen per cent get no perks or extras, but of those who do, 35% report performance or other bonuses, and RSP contributions, 33% get travel expenses, 25% enjoy flex hours, 24% have pension plans and 22% receive profit sharing benefits.

Most respondents (70%) put work-life balance ahead of all other desired work conditions, including job security and compensation (54% each), vacation time (50%), and a comprehensive benefits package (44%).

Almost all (90%) are satisfied with the job overall (90%) and their job security (86%), but 30% are less satisfied with career support.

Almost two-thirds (61%) of the companies pay for educational courses, 47% cover memberships in professional associations and

42% pay for professional certification programs (but 27% don't pay for any of these).

Much depends on the organization, whether it's privately held or a huge corporation. Dayal says compensation, better benefits, and pension plans have all gone up, but not everyone can pay top dollar. In fact, many smaller companies don't offer benefits. Yet there are things a company can do to make it more attractive, such as flex hours, Fridays off and creating an attractive corporate culture. She cites, for example, management and support staff all working on the production floor. Everyone in it together! And inclusiveness is strengthened with social events – a summer barbecue that brings management and production staff together.

Casemore predicts a spike in compensation levels is on the horizon as senior plant executives retire. "When I think about all the plant managers I know, I would say 80% are retiring within the next five years, and of those, 50% will retire within the next two years."

He says a lot of manufacturers will hire from within, and selecting people who have been working with these plant managers. The spike will come from bringing other people in who will demand higher compensation. And manufacturers won't have a lot of options. "You can't automate the plant manager. You might put automation on the production floor but you need a champion leading the whole thing. [He/she] is not going to take less money."

Moving up

Some plant managers will be looking to move up as senior executives move on. Giroux notes EMC has been looking at this issue for some time. It's conducting a campaign to train supervisors and managers (Manufacturing Essentials Certification, **www.emccanada.org/mec-essential-skills-certificate**) who could fill leadership vacancies as upper level executives retire. He warns of an impending talent gap, 40 to 55 years of age.

"This goes to succession planning: being ready and providing opportunities for your high potentials best suited for senior level jobs. Growing these young leaders into a senior role has to be on the radar. That's why they're investing in leadership training and coaching."

"Some companies aren't planning for succession as much as we would like them to, but at the same time a lot of companies are keeping it in mind," says Dayal. "They know someone will be retiring in the next one to three years and there's an opportunity to transfer knowledge during an overlap of the replacement and retiree."

She says some companies may have to trade off years of experience with education and training, but that can be a good thing.

"Maybe the last incumbent wasn't so open to change. With new technology it's good to have someone new, who can be champion of change. That's important, too."

Since there's no mandatory retirement age, 65-year-olds can carry on. They may be healthy, happy with their compensation and enjoy what they do. However, these are not the people Dayal sees in her practice. She does see people who have retired and want back in. "After six months we see their resumes, so maybe they've taken a good break, they've cut the lawn enough times, but now they're open for contract work or full-time permanent."

Looking ahead, manufacturing is facing major changes, something EMC's conference will be addressing (Future of Manufacturing Conference, Oct. 8-10, Vaughan, Ont., **www.futureofmfg.ca**). The upgrading of equipment, advanced manufacturing, automation digitization, robotics – all of that is putting pressure on the skills side, says McNeil-Smith. "Industry is adding dashboards, sensors and equipment to facilitate automation or digital environment and that requires a new skill set. But it also opens up another area – digital security. Particularly in an automated production environment where there are digital controls that are accessible remotely through, say, a parent company. They can be infiltrated, hacked, shut down, and IT stolen; so it's not just a manufacturing skill set, but areas that involve security and how to maintain these environments."

In other words, there's more to it than bolting on a new piece of equipment. People need to be taught how to use the technology, it must be properly integrated into production and there needs to be a strategy behind it, says McNeil-Smith.

Despite all the challenges, Canadian manufacturers are finding ways to block the punches. But the survey and other indicators point to ongoing skills and executive shortages, especially as those who have the desired qualities leave the workplace. Although average compensation is sticking close to the rate of inflation, be prepared for the cost of salaries, benefits and other inducements to rise as demand for the right people continues to outpace supply.

Comments?
E-mail jterrett@plant.ca.

BENEFITS

Wellbeing in the workplace

RBC Insurance finds Canadians want personalized programs

Wellbeing in the workplace is increasingly important, and linked to better performance and productivity, according to a RBC Insurance poll.

The survey found the majority of working Canadians (80%) report their overall wellbeing would improve if their employer were to offer a personalized wellness program related interests and goals.

The poll also revealed that 94% of respondents are more likely to work for an employer that cares about their overall health and wellbeing.

Other aspects of daily life they say would improve if offered this type of program include physical health (78%), favourable opinions of their employer (77%), job satisfaction (73%), mental health (71%), and job productivity (68%).

Flexible and customized programs preferred.

PHOTO: ADOBE STOCK

In particular, the poll revealed when it comes to group benefits overall, flexibility and customization are important. Nine in 10 respondents value choice in their group benefits plan, especially women (92% female versus 87% male).

Nearly as many (84%) agree they would be more likely to participate in a workplace wellness program that's customized to their specific wellness goals.

The poll was conducted by Ipsos between May 7 and 10 with a sample size of 1,501 working Canadians 18 years and older. The poll is accurate to within ±2.9 percentage points, 19 times out of 20.

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PRESSURE POINT

Understand the risks and mitigate them through diversification.

BY KIM LAUDRUM

Made in Canada, a respected international brand. PHOTO: ADOBE STOCK

Making it HERE

...AND TAKING IT GLOBAL, DESPITE TRADE UNCERTAINTY

Global markets for Canadian manufactured goods are rapidly expanding due to negotiations and recent ratification of several trade agreements. Trade barriers are falling. Thankfully, US tariffs on Canadian steel and aluminum – seen to be contributing to a sag in an otherwise booming economy – were recently lifted. And growing demand for goods due to emerging middle class consumers in nations such as Mexico, India and China offers opportunities for Canadian manufacturers.

But the new trade scenario is not without risks. For manufacturers, understanding what they are and how to mitigate them is key to success.

Risks exporters run into include changes in economic activity, foreign exchange volatility and supply chain disruptions. "These are the top three challenges to keep an eye on when looking at risks that impact the manufacturing sector," according to Andrea Gardella, senior economist at Export Development Canada (EDC).

Economic uncertainty is chief among trade risks, Gardella says. Such uncertainty can hit demand for what you are exporting. Just ask soybean farmers caught in the middle of a huffing and puffing contest between China and the US, which have raised tariffs against each other to win big in an ultimate trade pact expected this year. Once that and the North American deals are finalized, she says worldwide economic trade tensions should ease.

"Foreign exchange is probably one of the risks that's most difficult to predict especially for smaller companies. The main risk is that it hits the margin directly," Gardella says. "It really puts pressure on buyers when there is a significant change and more so on the depreciation side of foreign exchange. Most contracts are done in local currency and then there has to be some exchange factor that happens. So predicting the movement is quite difficult."

Gardella notes a manufacturer's supply chain is only as strong as its weakest link. "Any type of trade uncertainty really impacts investment flows. It impacts business decisions. [Manufacturing] is a highly globalized sector and highly interlinked, so it's difficult to predict what's going to happen within that context and how it could impact the manufacturer's business and how it could impact financial performance."

TRADE DEALS

The Comprehensive and Progressive Agreement for Trans Pacific Partnership (CPTPP) is between Canada and 10 other countries in the Asia-Pacific region: Australia, Brunei, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore and Vietnam. Once fully implemented, the 11 countries will form a trading bloc representing 495 million consumers and 13.5% of global GDP, providing Canada with preferential access to key markets in Asia and Latin America. Canada signed the agreement Dec. 31, 2018.

The Comprehensive Economic and Trade Agreement (CETA) is between Canada and the European Union and its member states. CETA entered into force provisionally Sept. 21, 2017, meaning it's mainly in effect, with some member states expected to ratify soon. Intended to eliminate trade barriers, it covers virtually all sectors and aspects of Canada-EU trade. With CETA, 98% of EU tariff lines are now duty-free for Canadian goods. The EU government procurement market is worth $3.3 trillion.

Spread the risk

What's a manufacturer to do to succeed? Diversifying markets is crucial to mitigating risk when exporting, according to Gardella. Manufacturers would do well to consider exporting, period. Even for small- to medium-sized companies it's a good idea. The **PLANT** Manufacturers' Outlook 2019 survey shows only 10% of respondents' export revenues come from overseas. The survey, in partnership with Grant Thornton LLP and SYSPRO Canada, shows most revenue (67%) comes from domestic sources, followed by the US (27%). Of those that do export, one out of every 10 companies grew at an annual rate of more than 20% between 2009 and 2011, according to EDC.

A little homework helps identify countries where Canadian products would have good growth potential. Gardella advises manufacturers to focus on more than one country to spread the risk of non-payment or foreign exchange volatility. She also recommends diversifying by sector. Think about whether

the product can be adapted or sold into different market segments. Sensors, for example, can be marketed to automotive, security or aerospace sectors. Look to those countries where your target market sectors do well.

Consider also that while Canada's new trade deals open more markets for Canadian-made goods – a respected global brand, by the way – it also opens our door to increased competition from abroad. How are you going to compete with that?

The Canadian government is encouraging manufacturers to export and offers help and incentives to those who want to expand into countries where Canada has trade agreements.

Here are some tips for exporters and those who could be:

1. **Stay informed. Do your homework.** Even for SMEs, it's a good idea to assign risk management to at least one person who keeps an eye on developing trends in the market. Build a risk-mitigating strategy, which will help prepare for change, and plan for uncertainty," Gardella says.

A good resource is EDC's Global Financial Markets, a weekly publication that reports macroeconomic information for developed and emerging markets. It covers currency exchange rates, stock markets and government bond spreads for more than 50 countries in Latin America, Asia, Africa, Middle East and emerging Europe, as well as other key markets.

2. **Leverage partners. Work with your bank. Work with your buyers.** "Have an open dialogue with your buyers to prepare for uncertainty, for example, on the foreign exchange side or the supply-chain side. If you have good dialogue with your partners to understand where the vulnerabilities are, you're better equipped to plan for those risks and challenges," Gardella says.

BY THE NUMBERS

Manufacturers export more than $354 billion each year, representing 68% of all of Canada's merchandise exports. Close to half of what Canadian manufacturers sold was exported. More than 75% of exports were destined for the US.

Export plan

Whether a large company or an SME, there is help available to create an export plan, reach new markets, innovate products, tap funding and mitigate financial risks. Banks are one example. Also check out:

Export Development Canada (EDC). It offers help on the financing and insurance side of mitigating risks. For example, accounts receivable insurance offers protection against buyer non-payment. It can also be used to leverage more capital from your bank. EDC also offers a foreign exchange facility guarantee. The Crown agency offers the following advice: protect your intellectual property by registering your IP in Canada and in the international market; ask each new customer to complete a credit application; and protect against non-payment with credit insurance.

Business Development Bank of Canada (BDC). It provides financing, advisory services and capital. BDC recommends offsetting currency fluctuations by:

- finding foreign suppliers in the country to which you are exporting;
- setting up a foreign bank account;
- adding foreign operations, which can smooth out currency differences, making a company more competitive; and
- using financial instruments, such as forward or future contracts to hedge currency fluctuations.

Trade Commissioner Service (TCS). For more than 120 years, the TCS at Canada's Global Affairs department has been helping companies navigate international markets. Offices are located in more than 160 cities worldwide. It offers funding and support programs; introductions to potential business partners and clients through trade missions and events; marketing assessment; and information on trade agreements, country and sector markets, tariffs, sanctions and export controls.

Check out its CanExport program designed to give small businesses across Canada funding incentives to develop and diversify their sales abroad. There's also the Forum for International Trade (FITT) program. It helps more Canadian companies diversify and compete globally, and provides a Certified International Trade Program (CITP) designation for developing global trade professionals.

Diversifying markets is crucial to mitigating risk. PHOTO: ADOBE STOCK

World Trade Center. It offers the Trade Accelerator Program, a six-week course for Canadian SME manufacturers that want to develop a strategy for exporting. The hands-on program is offered in several cities across Canada.

"You don't have to take six weeks away from the office. It's four days spread across six weeks," so it's ideal for small- to medium-sized companies, says Gwenaele Montagner, senior director, international trade development, World Trade Centre – Toronto.

Participants gain access to export experts. Company size ranges from those with annual revenues of $1 million to $20 million. "By the time it is finished, participants have a strategic plan for exporting," Montagner says. "The United States is the number one destination for Ontario exports at 77%, but when companies come through TAP that number drops to 30%."

She says there are "many, many pots of financial assistance available to exporters. They can access it if they have a good strategy." TAP helps them develop a plan.

Companies with minimum annual revenue of $500,000 and in business more than two years are eligible for the program.

Diversification is key to protecting your company. The impact of policy changes will be minimized, Montagner says. "If you stay at home or limit yourself to one market you are subject to policy change that can have a detrimental effect on your business. It all boils down to doing your homework."

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

Comments?
E-mail jterrett@plant.ca.

Use standard work to describe the best way to do a task.

BY HUGH ALLEY

Describe the best way to do a task.

PHOTO: ADOBE STOCK

Signs and REMINDERS

DON'T ASSUME THEY'RE READ

Sign, sign, everywhere a sign

The 1971 song Signs by the Canadian Five Man Electrical Band complained about the proliferation of signs, and the way they limit behaviour. Still true today. Just unpack any piece of equipment to see all the warning labels.

No doubt some lawyer has decreed that this limits the vendor's liability. But if you are running production, it's likely the signs and labels aren't helping performance. They're an attempt to guide behaviour to avoid adverse consequence.

So what's an alternative to relying on signs and labels to guide behaviour?

Your starting point should be standard work. Describe the current best way to do a task, and include the tips, tricks, safety issues and make-or-break points that make your employees successful.

Cover these points in training. If you use a proven instruction methodology, such as Training Within Industry's Job Instruction, during the course of that training, you'll be verifying whether or not the learners have actually grasped the key points.

There are other advantages associated with incorporating these key points as part of standard work. First, it's much easier to assess staff and correct them when you have a point of reference. Second, as you audit their work, you're not concerned what they're doing will work, but whether they're conforming to the standard. Third, with a standard, you aren't judging their knowledge or skill, only whether they're performaing a task using the prescribed method.

Have a performance problem to fix? Focus on building standard work and using that as the basis for training.

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

Comments?
E-mail jterrett@plant.ca.

Innovative turnkey system ramping up for commercialization.

BY PLANT STAFF

Micron founder and chief technology officer Dr. Bob Bushman. PHOTO: MICRON WASTE TECHNOLOGIES

Organic WASTE

MICRON PROCESS ELIMINATES THE TRIP TO LANDFILL

Manufacturers operating in the food and the fast-growing cannabis industries have to deal with organic waste that for the most part winds up in landfill. But an innovative Vancouver biotechnology company has onsite turnkey waste systems for both industries that do no harm to the environment.

Micron Waste Technologies Inc., developer of the Organivore (for food) and Cannavore (for cannabis) industrial-grade organic waste processors, has been busy securing US patents, opening an R&D centre in Delta, BC and beginning production of the units as a promising market awaits.

About 58.8% of the food produced in Canada (35.5 million tonnes) is wasted (Second Harvest report). The manufacturing process loses or wastes 4.8 million tonnes and there's about 56.6 million tonnes of CO2 equivalent to consider. Food waste that ends up in a landfill produces methane, the second most potent greenhouse gas, never mind the emissions produced hauling it to the dump. The company claims its system is 35% more cost effective than current waste management practices and the end result is clear, potable water that's safely returned to the environment.

This is where Canadian innovation helps. Mircron Waste's onsite digester arrives in a shipping container (20-foot, 1,200 kilogram capacity or 10-foot, 700 kilograms, according to the website). The process involves hardy microbes and enzymes that convert organic waste into grey water (for a visual, go to the company's website, **https://micronwaste.com**, and check out the short video). What's left is 5% of undigested material that gets additional treatment in a four-step process.

It starts with a special blend of microbes and enzymes that are mixed into the grey water to eliminate the biochemical oxygen demand (BOD) and total suspended solids (TSS).

The second stage involves special soil microbes mixed into the grey water to further degrade TSS and chemical oxygen demand (COD).

A special blend of bio-organisms to remove BOD, fats, oils and grease (FOG) and COD elements is used at the third stage. And in the final step organic additives are mixed with the grey water to conclude the cleaning. What's left is recycled back into the digester and used for non-potable applications or dumped in the sewer (yes, it meets municipal standards).

The Organivore will target restaurants, hotels, cruise ships, food processors and hospitals.

In April, Micron Waste and BC Research Inc. (BCRI) announced an expanded collaboration that would speed up commercialization of the second-generation food waste processing system. BCRI, based in Richmond, BC, provides engineering and equipment to the chemical, pulp and paper, minerals processing and electromechanical sectors. It's located near the Micron Waste Innovation Centre in Delta, BC.

Next step

"Our prototype Organivore has already been successfully tested under commercial conditions. The next step is to make the system turnkey for customers," says Bob Bhushan, Micron's founder and chief technology officer. "We have worked closely with BCRI on the Cannavore and know they can hit the ground running and compress our timelines to install next-gen bio-processing, upgraded computer systems, safety systems, customized housing, temperature controls and automation."

On the cannabis side, there's a growing market serving medical and recreational use. The Brightfield Group cannabis report projects the market size in Canada for both to be worth $5 billion by 2021.

Micron's Cannavore system has successfully operated at Aurora Cannabis Inc.'s Mountain facility near Calgary. Edmonton-based Aurora is one of the largest licensed cannabis producers with eight licensed production facilities, five sales licences, and operations in 24 countries. It has committed to installing Micron's technology at its other facilities.

The waste system integrates a shredder, microbial digester and water treatment system. Organic waste is pulverized and rendered, then combined with Micron's microbes and enzymes that denature the active pharmaceutical ingredients. Effluent from the digester is further treated and the clean greywater is reusable in growing operations, or safely discharged.

The Cannavore's management systems employ advanced computer science for remote real-time diagnostics monitoring and control. The mobile units operate on-site within a 40-foot shipping container, outside the facility. Safeguards prevent biological contamination in the cultivation facility.

With commercial promise beckoning, Micron is aiming to expand its digesting technology into new product verticals such as food processing, brewing and spirits, pulp and paper and biological pharmaceuticals.

Comments?
E-mail jterrett@plant.ca.

Canada continues to lag in development efforts.

BY STEVE GAHBAUER

Young plant workers getting metallurgy training. PHOTO: ADOBE STOCK

Skills for the FUTURE

DIGITAL COMPETENCE WILL BE ESSENTIAL

Maintenance is constantly changing, driven by emerging technologies. What does not change are the basic issues that force maintenance pros to adjust their thinking and approach the work. Case in point: skills and job training.

Much has been written about the lack of appropriate skills development for plant operators and maintenance professionals. There are many obstacles – including political lack of will and corresponding support – although Switzerland and Germany have come up with successful solutions. Governments, businesses and schools partner to combine classroom and workplace learning.

In this country, the struggle to find our way continues. Despite plenty of debates and some good will, nothing much has changed. This lack of progress is exacerbated by today's evolving work environment. More sensor capabilities and digital technologies demand education and training on a more inclusive level.

Over the next decade, close to half of Canadian jobs will undergo massive change in the type of skills needed. Digital competencies will be essential to pretty much all of the new jobs. Indeed, Kevin Peesker, the president of Microsoft Canada, says it doesn't matter how advanced the tools are if maintenance professionals don't have the technical talent and digital savvy to use them.

"We often talk about the digital skills gap, projected by the Information and Communications Technology Council, that declares that by 2020 more than 200,000 jobs will go unfilled because of it. We need to invest in Canada's digital workforce for the most in-demand skills," Peesker says. In 2019, some 40% of digital transformation initiatives will use artificial intelligence (AI), and 75% of enterprise applications will use it by 2021.

On the positive side, efforts are underway to attract young people to trades. Skills Ontario, a non-profit organization based in Waterloo, Ont., educates and empowers youth, including women and Indigenous youngsters, to consider a career in skilled trades and technologies. CEO Ian Howcroft says the skills shortage has been a shared concern among industrial and manufacturing sectors for decades.

"We want to forge partnerships that will allow us to leverage resources to create an environment that promotes and values skilled workers. Things have improved and people are supporting our goal, but much more needs to be done."

That includes preparing the future workforce for jobs that don't yet exist. Steven Murphy, president and vice-chancellor of the University of Ontario's Institute of Technology in Oshawa, Ont., warns artificial intelligence, robotics and other emerging technologies will dramatically alter established tasks performed by humans.

Digital transformation

A recent report by McKinsey & Co. states about 60% of all occupations – including maintenance technicians – handle at least 30% of the activities that can be automated. The report predicts automation could affect 50% of the world economy.

The good news is this digital transformation will also add new jobs to the economy. The Royal Bank of Canada's (RBC's) year-long research project to better understand Canada's skills economy used a set of algorithms to examine more than 2 million job postings across 300 occupations. The study makes it clear global thinking will be in demand, and Canadians must be capable of moving between occupations, as old jobs give way to the new.

A new type of engineer is needed to deal with the challenges of a rapidly changing industrial world. Educational institutions and industry must quickly adapt training to meet this demand, says Philippe Tanguy, the CEO of Polytechnique in Montreal. Future engineers will have to be more innovative, and teaching methods must shift in the next decade to include entrepreneurship to ensure a relevant, professional education.

Employers also need to allocate more resources and strategic thinking to talent issues and demand more flexibility from colleges and universities to help with life-long learning, adds John Stackhouse, RBC's senior vice-president, office of the CEO.

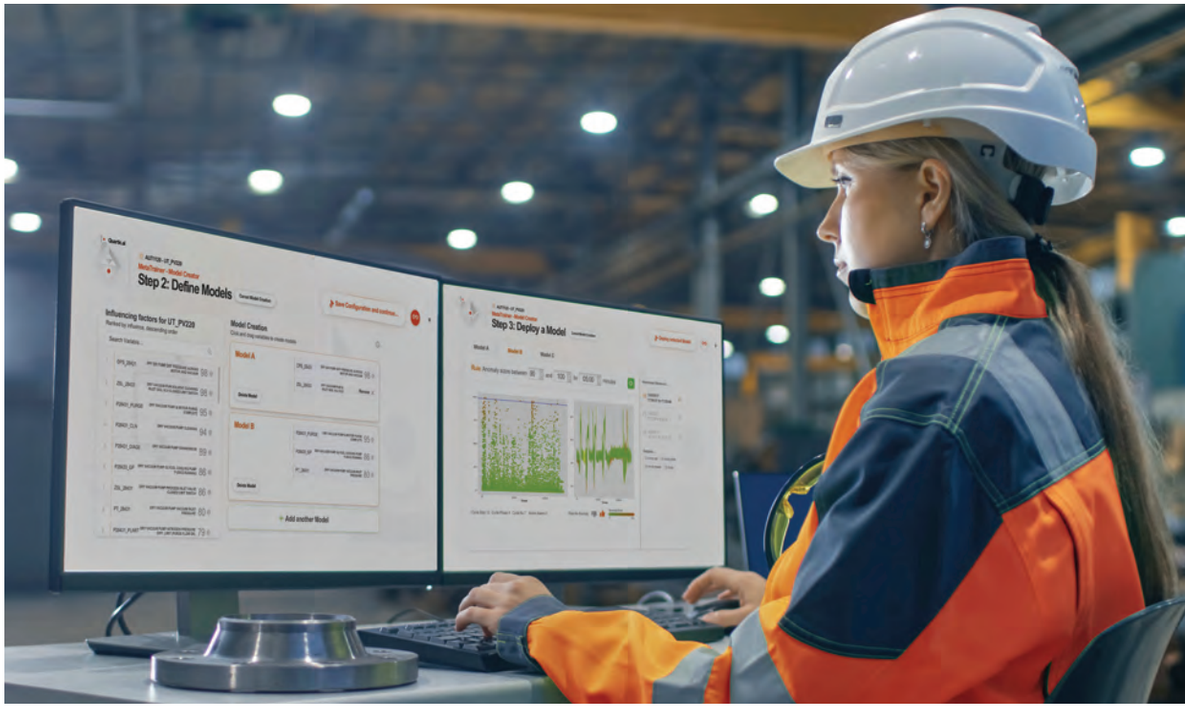
Much has been written about the future of work and its risks. The tasks are daunting, but there are also tremendous opportunities. Companies in Germany and Switzerland take a much bigger share of responsibility for apprenticeship training. We can learn from their successful approach.

Steve Gahbauer is an engineer, a Toronto-based business writer and a regular contributing editor. E-mail gahbauer55@gmail.com.

Comments?
E-mail jterrett@plant.ca.

Think about how to use technology and what's holding you back.

BY TREENA HEIN



A Quartic.ai platform user. PHOTO: QUARTIC.AI

Making IIoT easy to ADOPT

QUARTIC.AI HELPS LEVERAGE RAW DATA INTO INSIGHTS

Canadian manufacturers are not particularly engaged with the Industrial Internet of Things (IIoT). The **PLANT** Manufacturers' Outlook 2019 study asked senior manufacturing executives several questions that relate to the IIoT – and the answers may surprise you.

IIoT refers to the collection, analysis and use of data gathered by sensors and the operation of things (such as assets in a plant) by software integrated with the internet and cloud computing power. Only 7% currently apply IIoT capabilities and 10% are planning to deploy this year, but 32% are not familiar with it and 31% say it's not applicable. Respondents identify the top obstacles to deploying IIoT as uncertainty over how to start, what it's all about and how to use it effectively, as well as cost.

The good news is there are platforms that remove barriers to adoption and companies like Quartic.ai are making it painless for manufacturers to adopt the technology. The company, based in Oakville, Ont., leverages its partnership with Microsoft Cloud and IoT Solutions to turn raw data from assets (in many cases data already being generated) into insights that enable technicians and plant managers to make much better decisions. The firm, founded by Ash Bhardwaj and CEO Rajiv Anand in 2015, has almost 30 employees and is growing its list of clients in Canada and the US.

"We are focussed on serving process manufacturers," Anand explains. "One of their main concerns is how to forecast the quality of their end product, and if the quality forecast is less than ideal, they want to know the causes in real-time and make proactive adjustments that prevent a lower quality product and waste."

Batch quality is affected by variability of raw materials, but so is machine performance due to degraded component health or operator-induced errors (shift to shift). "Food and beverage plants, for example, have a lot of operator involvement in choosing different set points for automation," Anand says. "Consistency, or what we call 'production certainty,' can be an issue."

Maintaining the reliability of critical machines – preventing breakdowns before an order is processed – is also top of mind for process manufacturers. IIoT platforms can equip plant managers with an accurate view of the current health of a machine and a health forecast. Through machine learning, Quartic.ai's software analyzes which components might break down and why (what is causing the component to move in the direction of the failure). For example, pressure is not what it should be and this is due to a valve malfunction.

"Motor current (electrical signature) is another example of data that can be analyzed to determine an asset's current and projected performance," Anand says. "This data is so often ignored, but proper analysis of it lets you know, a long time before vibration or oil analysis can, whether unusual wear and tear is present. And whether this is likely related to a faulty component or improper operation."

Critical assets

Anand confirms many smaller manufacturers are not sure, as indicated in the **PLANT** Outlook survey, about how to put IIoT in place or use it effectively, along with cost.

"A lot of them think it's going to be about adding more sensors and getting more data, but it's quite easy to get started with an asset/project where you are already generating data," he says. "Especially in industries where margins are low, a half a per cent point improvement in OEE (overall equipment effectiveness) is huge. You pick the right machine, and there can really be a big impact."

In addition to focussing on an

IIoT APPLICATION

Only 7% of manufacturers who responded to the **PLANT** Manufacturers' Outlook 2019 survey are applying Industrial Internet of Things capabilities. Here are the top five targets:

18%	Improving efficiency/productivity
14%	Tracking materials, shop floor assets
11%	Improving maintenance functions
11%	Providing more visibility into production processes
9%	Analytics functionality

asset that's already generating data, Anand says manufacturers should also focus on a critical asset where unscheduled downtime will cost a lot of money. Because these assets are key, there are usually long annual scheduled overhauls with the replacement of many components. But he has seen that with IIoT, his clients cut overhaul times by replacing only the components that need to be replaced.

There are other barriers to engagement. Anand and his team meet with company leaders who think an IIoT system will mean hiring a lot of new talent. Not true, he says; usually no new staff is needed. "We also encounter the old thinking of, 'I don't want to be the first.' But at this point, many companies have already stepped in the pool and are reaping the benefits."

Quartic.ai recommends a bottom-up approach with one machine at one plant showing the operators and technicians how having the technology in place will allow them to know it much better.

Quartic.ai's eXponence live feed. PHOTO: QUARTIC.AI

"It also means a higher level of satisfaction and meaning in their jobs, which is an important factor in employee retention. It feeds their interests in moving to the next level of asset performance management, instead of being stuck fighting fires all the time," Anand says.

Looking ahead, Erich Barnstedt, head of Azure Industrial IoT for Microsoft, believes that across all industries, leadership at virtually every company is realizing it's absolutely imperative to embrace digital transformation.

"They are looking for new solutions and approaches to existing problems or opportunities to grow and develop their business. Microsoft has been significantly invested in IoT and especially IIoT, long before the term was even coined," he says. "Our goal is to simplify the IoT journey."

Anand agrees. Those who embrace IIoT will prosper.

"Canadian manufacturers can compete with any manufacturer overseas," he asserts. "IIoT allows them to leapfrog ahead and stay competitive."

Treena Hein is a freelance business writer based in Pembroke, Ont. E-mail treenahein@outlook.com

Comments?
E-mail jterrett@oplant.ca.

Learn, apply, audit. PHOTO: ADOBE STOCK

Sit on your HANDS

IT'S ABOUT EXPERIENCING THE LEARNING

Slow down, guide and coach as the trainee performs the methodology.

BY RICHARD KUNST

There's no cookie cutter solution for the application of lean methodologies. The speed of learning can be hampered by plant culture. Live by the philosophy, "learn, apply, audit" when deploying training. And sit on your hands.

Here's why.

After university, I got a great job working as a field system engineer for a dairy farm equipment provider. One of my duties involved assisting and training dealers with the installation of milking equipment.

A farm in California was installing a sophisticated milking parlor, and ran into an electrical issue. The problem was simple to fix. It required the installation of a jumper in the electrical junction box. I asked the dealer rep if he understood what I did.

"Yes," he said.

My boss, who was present during this operation, offered me some valuable advice. "Richard, you are going to have to learn to sit on your hands." He noted that with me at six and a half feet, and the electrical box at the same height, there was no way the dealer rep saw what I did. "If you had instructed the dealer rep to conduct the procedure, he would have learned and understood the process."

I had an opportunity to be reminded of this lesson later.

My son was taking a high school math course and needed to create a pivot table in Excel. He asked me how to do it. But I was tired so I made the pivot table and asked him if he understood what I had done.

"Yes," he said.

When he needed to make another pivot table, and asked for my help, I sat on my hands. I provided instruction as he did it himself. It took longer but at least he understood how to do it. The learning process occurs through three channels: visual, touch and orator, and you develop training that covers at least two of these attributes.

In some cases show the learner how to do it; let the leaner do it, or hand over the manual.

This quote illustrates just how important it is to provide ongoing training to your employees.

Question: What happens if we train our employees and they leave? ***Answer:*** What happens if we don't train them and they stay?

Employees are responsible for gaining new insights (say 80 hours worth a year) but employers must provide the right kind of training. Those who don't train are on the path to obsolescence.

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?
E-mail jterrett@plant.ca.

CCOHS SAFETY TIPS

Repetitive trauma damages blood vessels in the fingers.

Hypothenar hammer syndrome involves damage certain blood vessels of the hand. PHOTO: ADOBE STOCK

In the palm of your HAND

PREVENT HYPOTHENAR HAMMER SYNDROME

People will use the heel of their hand as a tool to push, grind or hammer something solid. This repetitive trauma can lead to a serious condition called hypothenar hammer syndrome, which reduces blood flow to the fingers.

Hypothenar refers to the group of muscles that control the movement of the little finger. Some of these muscles make up the fleshy edge of the palm (hypothenar eminence). Using the palm as a hammer can damage blood vessels, especially the ulnar artery. This artery goes through the fleshy area of the palm and supplies blood to the fingers. Sometimes a single significant episode causes the syndrome.

The most susceptible workers are 40-year-old men. Those most at risk include metal workers, lathe operators, machinists and workers who use vibrating tools.

Symptoms include a pain at the hypothenar eminence and ring finger, pins and needles (paresthesia), loss of feeling, and difficulty holding heavy objects in the affected hand.

The fingers may also become sensitive to cold and change colour.

Diagnosis is based on symptoms, medical history and job history, then confirmed with tests showing the obstruction of the blood vessels.

Preventive steps

Treatments include smoking cessation (it negatively affects blood circulation), using padded protective gloves, and avoiding the cold. Certain drugs will help to restore blood flow. For some cases surgery may be necessary.

Preventive steps include:

- Improving work practices.
- Not using the palm as a hammer to pump, push or twist.
- Not gripping tools such as impact wrenches too tightly.
- Switching tasks regularly or resting hands.
- Using padded protective gloves to avoid the excessive trauma to the heel of the hand while working.

Other activities cause this syndrome, including sports that involve hands and gripping, mountain biking, breakdancing, drumming and weight lifting. Because this syndrome is relatively uncommon and unrecognized, diagnosis is often missed or delayed. Bring it up with the safety committee to ensure all employees recognize the causes and symptoms, and take preventive measures, at work and at home.

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

Comments?
E-mail jterrett@plant.ca.

HAZARDS

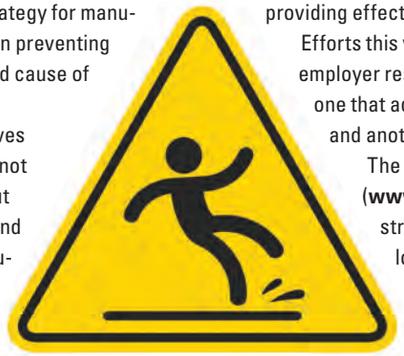
Safety risk strategy

WorkSafeBC adds slips, trips and falls

WorkSafeBC's 2019 high-risk strategy for manufacturing will include a focus on preventing slips, trips and falls, all a widespread cause of injuries.

The conditions that lend themselves to these kinds of mishaps are often not perceived as significant hazards, but they easily lead to severe injuries; and about a fifth of such injuries in manufacturing are defined as serious.

"Contributing factors to injuries are often seasonal – such as slippery surfaces after rain or snow – or are indirectly related to the manufacturing process," said Dan Strand, director of prevention field services with WorkSafeBC, the provincial agency that promotes safe and healthy workplaces. "We're tackling complacency around these avoidable incidents by educating employers and workers through inspections, and providing effective resources."



Significant hazard. PHOTO: ADOBE STOCK

Efforts this year will include the development of an employer resource and two marketing campaigns, one that addresses slips, trips and falls generally, and another that highlights winter-related risks.

The Manufacturing High Risk Strategy (**www.worksafebc.com**) addresses seven strategic focus areas: safeguarding and lockout; powered tools; hand tools (knives); material handling (falling objects); falls from elevation; falls on the same level; and mobile equipment.

CASE HISTORY

High-performance software covers a range of machine tool applications.

CAM system improves PRODUCTIVITY

ESPRIT COVERS IT ALL AT HI-QUALITY CARBIDE TOOLING

(L-R) Ian Kottelenberg (shop foreman) and Tim Middlehurst, Hi-Quality president.

PHOTOS: HI-QUALITY

Hi-Quality Carbide Tooling Inc., a manufacturer of carbide precision parts and dies, makes one-of-a-kind carbide tooling, including extrusion dies, spring forming tooling and stamping dies. They're used in machines to make mass-produced parts for the automotive, aerospace and medical industries.

For the past six years, the 15-employee company has used ESPRIT CAM software for its wire EDM work, but because of the specialized products it produces, the shop team wanted to use one software across plant. ESPRIT CAM got the nod.

"One of our dies will make two or three million bolts or ball joints for a car," says Tim Middlehurst, who co-owns the small manufacturing outfit in Orangeville, Ont. with Wendy Middlehurst. "We do lots of bearing work for the oil and gas industry and a lot of aerospace fasteners. We also specialize in spring tools that form shaped wire springs – not just your standard round wire springs."

The facility, which consists of 1,200 square-feet of office space and an 8,000 square-foot plant, has more than 30 machines on the job, including CNC, ID and manual grinders, wire and sinker EDM, and high-speed milling machines.

Hi-Quality typically deals with small-quantity orders ranging from a single piece to more than 20 pieces. "Everything we do is very specialized," Tim says. "What makes Hi-Quality's capabilities unique are the hardness and refractory nature of the carbide used in most of the company's parts. Carbide is very difficult to work with."

Now the shop uses ESPRIT, the flagship product supplied by computer-aided manufacturing software developer DT Technology, for milling and turning.

Simplified programming

The Carmarillo, Calif. company developed the software through extensive partnerships with machine tool manufacturers. It's customizable and supports CNC programming across a plant's full range of machine tools, including 2-5 axis milling, 2-22 axis turning, 2-5 axis wire EDM, multitasking mill-turn machining, and B-axis machines.

Using a single interface for all machines simplifies the programming process, increasing productivity.

"It's too confusing switching back and forth between programs," Middlehurst says. "For wire EDM, it's really easy to walk through the programming process, and it's easy to modify existing programs."

For example, the toolpath for a part can be modified with just a few mouse clicks. ESPRIT then automatically propagates the change through adjacent sub-elements to seamlessly create a new toolpath.

The software's simulation feature visualizes the complete machining operation on screen; in

SUPPLY LINES

SUPPLIER OF THE YEAR

Samuel, Son & Co. Ltd., a metals products manufacturer in Burlington, Ont., has been named Supplier of the Year, Raw Materials, by KIRCHHOFF Automotive's North American operations.

Samuel supplies KIRCHHOFF Automotive from its facilities in Canada, Mexico and the US.

The company was recognized for outstanding service and its commitment to quality. Samuel's automotive division supplies leading North American automotive brands and all levels of the automotive supply chain.

CLOUD PERFORMANCE

WESCO International, a global distribution and supply chain solutions company, is using the cloud-based Descartes Route Planner On-demand solution for delivery services and enhanced supply chain performance.

WESCO, its Canadian distribution arm based in Markham, Ont., is a provider of MRO and OEM products, as well as construction materials, and advanced supply chain management and logistic services.

Descartes Systems Group, based in Waterloo, Ont., provides software-as-a-service solutions.

70 YEARS IN CANADA

Atlas Copco, the Swedish manufacturer of industrial tools and equipment, is celebrating its 70th anniversary in Canada.

George Blomdal, a Norwegian engineer, was dispatched to Canada in 1949 to test the mining market's reaction to a new type of Swedish-designed rock drill that could be operated by one person instead of two.

Canadian Copco Ltd. was headquartered in Kirkland Lake making Canada the first country in the Americas to open an Atlas Copco office, and the eighth international office established after Norway.

a virtual environment programmers view the part, observe the movements of the tool, anticipate possible interferences, and make necessary adjustments to improve part quality and avoid tool damage.

Not having to write and troubleshoot custom post-processors offers another advantage. A universal post processor creates high-quality "post and go" G-code and is equipped with a complete library of pre-defined post processors. Additional factory-certified posts are available for many of the leading machine tool brands.

"The post processors that are available for our Sodick and AgieCharmilles machines are extremely accurate; they don't require any editing," Middlehurst says. "We have the confidence that once we post a job and plug it in, it's good – which means a lot."

When Hi-Quality first implemented ESPRIT for high-speed milling, the software presented a challenge.

"There was no consistent software available, that we knew of at the time, that could do 3D compensation for high-precision complex forms on our 3D mill," says Ian Kottelenberg, the shop's foreman. (3D compensation refers to the dimensions of the cutting tool remaining tangential to the part geometry.) "That created a very lengthy re-programming process if we wanted to change the size of the part. We worked closely with ESPRIT, with a lot of testing."

Hi-Quality's ESPRIT programmer also worked with an expert from Heidenhain (precision measurement and motion control solutions) to come up with the proper math for accomplishing the offset. After re-working and testing the solution many times to ensure success, ESPRIT finally delivered Hi-Quality a solution that worked.

"The software is now able to communicate consistently with our machine. Success!" Wendy adds.

This is an edited version of an article contributed by DP Technology Corp., a supplier of CAM software based in Camarillo, Calif. E-mail: esprit@dptechnology.com, or visit www.espritcam.com.

Comments?
E-mail jterrett@plant.ca.

LEADING EDGE

Innovative ideas for plants

REDUCE AIR-TOOL KICKBACK

Ergonomic snake arm for operators

Air-tool operators on production lines are subject to kickback forces that raise safety risks that include fatigue and injuries such as carpal tunnel syndrome. A Montreal-based robotics manufacturer has developed an ergonomic arm that handles tools and loads while guided by an operator.

Robotics Design's manual ANATERGOARM is comprised of linked U and H shaped modules that work in limited spaces, including those with obstacles. Modules are added or removed to customize the snake arm's reach and reconfigure for other tasks. The lifting arms remain at a horizontal position, negating the effect of gravity while making it easy to move payloads of up to 500 kg.

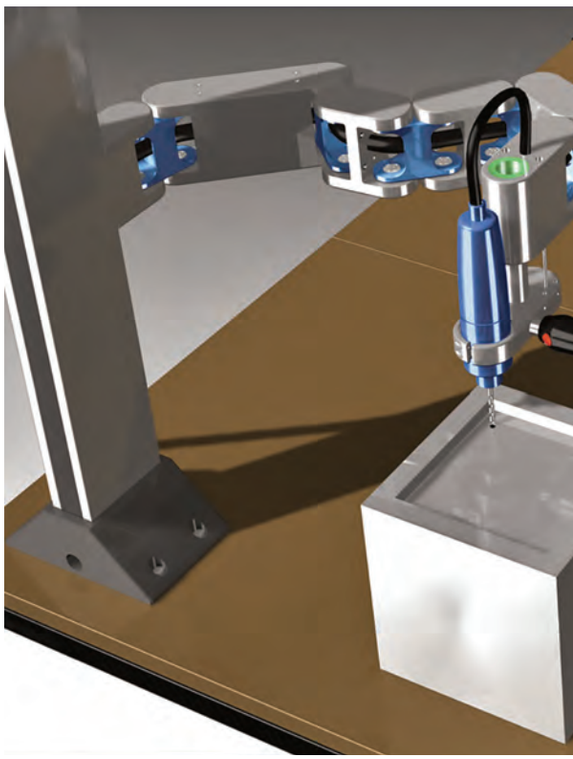
The University of Windsor is testing the arm to measure its effect on kickback. The first series of tests involved tightening hard and soft joints, using two different rundown strategies: a high velocity start with low velocity completion; and a 'Turbotight' strategy including only a high velocity stage.

A team of five unskilled operators compared three different scenarios: performing the task without a system; with a weight to counterbalance the tool; and using an ANATERGOARM to hold the torque gun.

The tests showed kickback peak force was reduced by 441% versus a no support scenario. Compared to a counterbalance system, peak force was reduced 387%. Observed variations in kickback peak forces were also reduced.

More tests will follow, including a simulation to give an accurate estimation of the modular arm durability in a mass production scenario.

http://roboticsdesign.qc.ca/index.html



Toolholder arm for manufacturing.

Basler's blaze 3D camera. PHOTO: BASLER

3D CAMERA BLAZES

Generates images in real-time

Basler's blaze, a second-generation 3D camera, brings Sony DepthSense Time-of-Flight technology to industrial measurement.

Equipped with vertical cavity surface emitting laser technology, the compact IP67 camera operates in the near-infrared spectrum (wavelength range 940 nm) and works well under daylight conditions.

A multipart image consists of a distance, intensity and confidence map with a frame rate of 30 frames per second. 3D point clouds and 2D gray images are generated in real time within the camera, reducing the host system's processor load.

The Sony sensor enables a more precise and sensitive scanning of reflected light. The camera measures optical values almost to the millimetre over a range of up to 10 m, independent of light and contrast and with a resolution of 640 pixels x 480 pixels.

Basler, a German manufacturer of industrial cameras with North American offices in Exton, Pa., says it will begin production of the camera by the end of the year.

www.baslerweb.com

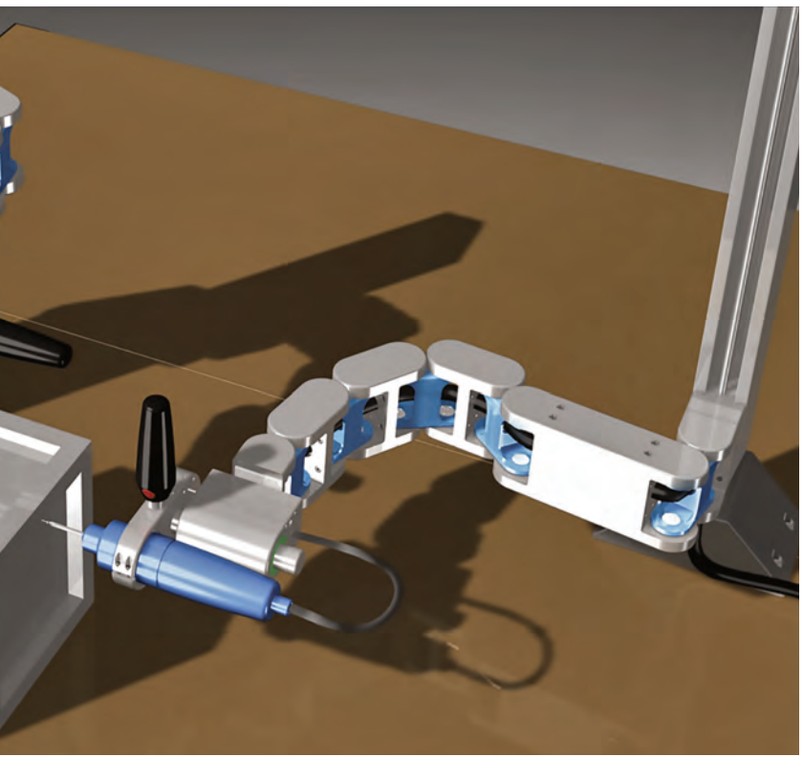


PHOTO: ROBOTICS DESIGN

HMI TOUCHSCREENS GET AN UPGRADE

For new and retrofit applications

IDEC Corp. has upgraded its human-machine interface (HMI) touchscreen models. The HG2G-V5 5.7-in., HG3G-V8 8.4-in., HG3G-VA 10.4-in. and HG4G-VC 12.1-in. are direct replacements for previous models fitting into the same panel cutouts. All HMI programming converts to the new models, so no new programming is required.

Brighter screens, better resolution. PHOTO: IDEC

TFT-LCD screens display a wide range of vivid colours, with the three larger-sized HMIs improving the resolution to 1,024 x 768 pixels, while the 5.7-in. model remains at 640 x 480 pixels. Brightness ranges from 600 to 800 cd/m2 to deliver greater visibility, even in high-glare locations such as direct sunlight. Best-in-class backlight life ratings are 100,000 hours minimum.

The HMIs support BACnet/IP, a widely used protocol in building automation and HVAC applications. Support is included for more than 100 other serial and networking industrial protocols. Up to four protocols can be used simultaneously.

The built-in web server creates web pages with a browser-based page editor. This functionality provides remote monitoring and control, and is accessed using any device capable of hosting a web browser including a smartphone, tablet or laptop. A remote user gets the same functionality as standing in front of the local screen. Troubleshooting and maintenance is possible any time and from anywhere.

IDEC Corp. is a provider of industrial automation and control products in Sunnyvale, Calif.

www.IDEC.com/usa

TECHNOLOGY INNOVATION OF THE YEAR

Award goes to Quebec's AGT Robotics

Major kudos for AGT Robotics, a Trois-Rivières, Que.-based robotics innovator.

It's BeamMaster robotic system for welding steel structures and Cortex software received the Technology Innovation of the Year Award from FANUC, the world's largest manufacturer of industrial robots.

It's an acknowledgment from the industry of the most innovative product or project of the year in the Americas and is awarded by a jury of peers, all robot system integrators, from among several hundred projects.

BeamMaster robotic system. PHOTO: AGT ROBOTICS

Cortex software bridges the gap between welding robots and steel structure designers by retrieving 3D information from an architectural drawing and automatically generating the weld seams without any human intervention. It generates all the program points necessary for the welding tool, automatically determines the correct procedure, defines all robot movements (without collisions), and plans the sequence of all the BeamMaster's operations.

https://agtrobotics.com

FIELD XPERT MANAGES ASSETS

Tablets cover all important protocols

Endress+Hauser's two universal, device configuration tablet PCs handle plant asset management in hazardous or non-hazardous environments.

The touch-enabled Field Xpert tablet PCs – model SMT77 (11.6-in. display) and SMT70 (10.1-in.) – allow maintenance staff to manage virtually all digitally communicating field instruments throughout their entire life cycle.

Field Xpert tablet SMT70.

PHOTO: ENDRESS+HAUSER

Extensive, pre-installed driver libraries stored in both tablets cover all important industrial protocols and access the Industrial Internet of Things, plus device information and documentation. The Field Xpert tablet automatically updates all DTMs and software regularly to ensure maintenance teams have ultimate connectivity when it counts.

Both models also support multiple communication technologies including HART, Profibus DP/PA, Foundation Fieldbus, Modbus and EtherNET/IP.

Device connectivity may be achieved point-to-point, over digital networks, or via marshalling cabinets, remote I/Os and gateways.

Endress+Hauser, with offices in Burlington, Ont., serves the industrial process engineering market.

www.ca.endress.com

ENCLOSURES

DURABLE OUTDOOR ENCLOSURE

Five sizes.

GEOS enclosures and accessories are designed for outdoor industrial applications.

This new line features high impact resistance (IK 09), high ingress protection (IP66/IP67), a temperature range of -35 to 60 degrees C, patented protection against water accumulation, and double insulation.

They come in five sizes, with solid or transparent cover, wide range of accessories and mounting systems

It's distributed by ITC Electrical Components based in Concord, Ont.

www.itcproducts.com

MATERIAL HANDLING

LIFT WITH A COMPACT FOOTPRINT

Heights of up to 56½ in.

CLT compact scissor lifts from Presto ECOA Lifts offer high travel in a compact footprint.

They have 2,000-, 3,000-, 4,000-, 5,000- and 6,000-lb. capacities for a variety of work positioning, assembly, repair and inspection applications.

A double scissor mechanism allows for a collapsed height of 8½ in. while providing raised heights of up to 56½ in.

Lifting control is via a hand pendant or foot switch that operate a ¾ hp motor running on 115 V single-phase of 208/230/460 V 3-phase power.

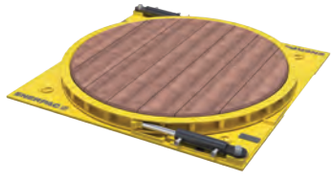
Standard platforms range from 24 x 36 in. up to 24 x 60 in., but larger platforms up to 48 x 84 in. are also available.

Features include cylinders with internal stops, lifetime self-lubricating, PTFE lined, composite bearings, retained base and platform rollers, and safety restraint maintenance bars.

Presto makes lifting devices in Norton, Ma.

www.prestolifts.com

TURNTABLES HANDLE HEAVY POSITIONING



Low profile.

Enerpac's new line of industrial turntables safely reposition heavy or oversize loads.

The ETT200 and ETT400 simplify handling, adjustment and precise orientation of loads up to 200- and 400-tons, thanks to a powerful and robust hydraulic cylinder technology.

Designed to complement Enerpac's SL Hydraulic Gantries and/or LH Low Height Skidding Systems, they handle heavy or oversized systems, devices and components such as industrial-scale transformers, generators, motors or engines.

With a low profile of just 5.91-in. (150-mm) that provides load stability, the system is driven by either a single, double-acting 25-ton capacity hydraulic cylinder (ETT200), or two cylinders in the ETT400 to achieve 400-ton handling capacity. Both models operate with standard Enerpac hydraulic pumps.

The 6 ft. (1,825 mm) diameter hardwood platform provides controlled zero-turn capabilities in an efficient footprint, 10,000 psi (700 bar) cylinders and 360-degree, bi-directional rotating capabilities made possible by a highly accessible cylinder ratcheting system.

The system is easily transportable by four integral lifting hooks, sets up quickly and weighs just 3,750 lb. (1,700 kg).

Enerpac, based in Milwaukee, is a global supplier of high-pressure hydraulic tools, controlled force products and innovative solutions for precise positioning of heavy loads.

www.enerpac.com

ANALYZERS

ICP-OES FOCUSES ON TRACE ELEMENTS

The SPECTROGREEN ICP-OES analyzer's new viewing technology achieves 2x sensitivity while delivering fast analysis.

Plasma optical emission spectrometry (ICP-OES) works with dual side-on (DSOI) interface technology, a new approach to plasma view design. It uses a vertical plasma torch, observed via a new direct radial-view technology. Two optical interfaces capture emitted light from both sides of the plasma, using only a single extra reflection, for added sensitivity to deliver twice the sensitivity of conventional radial systems.

Works with DSOI technology.

It's used to determine trace elements and handle samples with challenging matrices, including certain wastewaters, soils and sludges as well as samples containing industrial chemicals, high salts content, or metals.

The analyzer saves on consumables with a low-purge optic design (a UV-PLUS option offers no-purge) and requires no added cooling, thus eliminating the need for external chillers.

SPECTRO is a German manufacturer of elemental analyzers using optical emission spectroscopy and x-ray fluorescence spectrometry.

www.spectro.com

VISION

LASER-PRECISION INLINE PROFILING

The Z-TrakTM LP1 3D laser profiler from Teledyne DALSA delivers accurate and precise height measurements for in-line metrology, volumetric measurements, parts inspection and identification, as well as bin-picking applications for semiconductor, electronics, factory automation and logistics.

Ranges from 10 to 1,000 mm.

The ergonomically designed compact unit with a powerful FIR-peak detector is factory-calibrated and bundled with Sapera Processing 8 Runtime, or Sherlock 8 3D software for easy setup and deployment.

A GigE Vision interface supports the GenICam standard, and the LP1 is easy to interface with other off-the-shelf software. Z-Trak supports Power-over-Ethernet (PoE) with general-purpose inputs/outputs and flexible mounting options.

Key features include: a FIR-Peak detector algorithm for high accuracy and stable operations; imaging of objects with different surface reflectance; high accuracy with both red and blue lasers; an optimized optical path for consistent results across the entire measurement range; models with measurement ranges from 10 to 1,000 mm; and laser class 2M and 3R versions for wide operating conditions.

Teledyne DALSA, based in Montreal, is part of the Teledyne Imaging group, which manufactures digital imaging components for the machine vision market.

www.teledynedalsa.com/mv

3D SCANNING FOR FASTER PRODUCTION

The compact ECCO 95.020 sensor from SmartRay provides an ultra-high resolution 3D scanning of up to 20 million points per second that ensures faster production lines and throughput.

A 20-mm range.

Delivering speeds up to 10 kHz in full HD for up to 1,920 points per 3D profile, it

has a lateral resolution of 13 µm, vertical resolution of approximately 1.3 µm, and Z-repeatability of 0.2 µm with a 25-mm field of view at mid-field positions.

SmartRay is a German manufacturer of 3D sensors.

www.smartray.com

POWER TRANSMISSION

HIGH-VOLUME DRIVE FOR PLANTS

NORD's LogiDrive technology for high-volume warehousing, manufacturing and packaging systems combines flexibility with energy efficiency.

High efficiency gearboxes, IE4 permanent magnet synchronous motors and decentralized variable frequency drives (VFDs) support a range of speeds for stacker cranes, automated guided vehicles, chain conveyors and roller conveyors.

Supports a range of speeds.

VFDs operate with all common field bus networks, offer free PLC integration and provide simple commissioning with plug-in parameter boxes or NORD's programming software tool.

Distributed control AC vector drives and motor controllers operate near or directly mounted on motors and reduce load on the higher level control system.

Nord Gear Ltd. in Brampton, Ont. is the Canadian arm of the German manufacturer of drive technology.

www.nord.com

PUMPS

NO SEALS, NO LEAKING

Hydra-Cell T200 medium pressure pumps from Wanner Engineering Inc. are seal-less, eliminating related leaking and wear issues.

Flow rates are up to 95 gpm (359 l/min.; 3,258 bpd) with a maximum pressure rating of 3,500 psi (241 bar).

No leak path eliminates hazardous VOC emissions or the clean-up and disposal costs of packed-pump leakage. This also eliminates external lubrication and maintenance as well as plunger wear problems associated with packing.

The pumps can run dry without damage, operate with a closed or blocked suction line and pump hot abrasive fluids effectively.

Handles high-capacity applications.

Hydraulically-balanced, multiple diaphragms handle high pressures with low stress and process abrasive particulates up to 800 microns in size.

Wanner Engineering is a pump manufacturer in Minneapolis.

www.Hydra-Cell.com

Industrial Literature Review

CABINET COOLERS END COSTLY SHUTDOWNS

A manufacturer of enclosure cooling systems prevented the loss of future production and eliminated downtime. Could this type of cooling be suited to your environment? Learn more about how cooling systems can help your production stay up and running. Download EXAIR's latest white paper, "Cabinet Coolers End Costly Shutdowns."

www.exair.com/18/ccecs18lf.htm

EXAIR Corp.

EVENTS

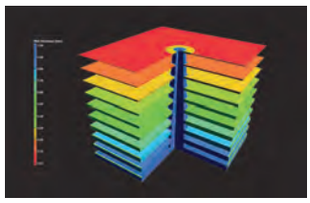
MainTrain 2019
PEMAC
Sept. 16-19, Edmonton
The Plant Engineering & Maintenance Association of Canada (PEMAC) conference. Professional development for asset management, maintenance and reliability professionals. Visit www.pemac.org.

Canadian Manufacturing Technology Show
SME
Sept. 30-Oct. 3, Mississauga, Ont.
Canadian Manufacturing Technology Show (CMTS) is Canada's national stage for manufacturing technologies, best practices and industry connections. Live technology, keynotes, panel discussions and technical sessions. Visit https://cmts.ca.

Pack Expo Las Vegas
PMMI
Sept. 23-25, Las Vegas
Presented by the Association for Packaging and Processing Technologies. Co-located with Healthcare Packaging EXPO. More than 2,000 exhibitors covering a 900,000 square-foot show floor featuring packaging machinery in action. Visit www.packexpolasvegas.com.

Advantage through Excellence – Future of Manufacturing
EMC
Oct. 9-10, Vaughan, Ont.
Excellence in Manufacturing Consortium (EMC) conference. Peer-to-peer networking and sharing of global best practices. Streams include: Advanced Manufacturing and Innovation; Export Development and Growth; Operational Excellence; Future State of Manufacturing; and Plant and Best Practice Tours. Visit www.futureofmfg.ca.

Plantware



Wall-thickness analysis.

PHOTO: VOLUME GRAPHICS

3D PART VOLUME

Computed tomography (CT) scanning has become an essential part of a non-destructive testing (NDT) toolkit. But by scanning after manufacturing, CT-image inspection without further analysis can lead to over- or under-estimating the significance of visible anomalies. This leads to high rejection rates, corrective measures, or adding weight to compensate.

Volume Graphics' latest generation of its non-destructive, industrial CT software recreates a three-dimensional volume of a part that contains detailed information about its surface and interior geometry.

Version 3.3 of VGSTUDIO MAX, VGSTUDIO, VGMETROLOGY and VGinLINE determine the surfaces of multi-material components; export measurement and analysis results to store them centrally in quality-management software; automate inspection processes based on text recognition; and translate real CT data into volume meshes for simulation.

Native support for data export is in the Q-DAS format for VGSTUDIO MAX and the VGMETROLOGY metrology solution, as well as the VGinLINE for automated CT inspection.

Companies that still work with traditional measurement systems can switch to this CT measurement technology without encountering software hurdles or foregoing established processes for further statistical evaluation.

Export of detailed, CT-based measurement and analysis results is now enabled in the common Q-DAS data exchange format.

Volume Graphics Inc. is a German developer of non-destructive testing software with US headquarters in Charlotte, NC.

www.volumegraphics.com

Factories of the future set standards for excellence

BY JAYSON MYERS

Changing customer expectations, rapidly evolving market conditions and new applications of technology are transforming manufacturing around the world. Standards for assessing capabilities are also changing. So how should excellence in advanced manufacturing be judged?

Let's start with the capabilities most likely to define the "Factory of the Future" – practices that set the benchmarks for performance over the next five to 10 years.

The adoption of state-of-the-art technologies is identified as the defining feature of advanced manufacturing. Digitally connected factories, multi-axis CNC machines, robots and automation, additive manufacturing and virtual engineering all feature prominently in depictions of Industry 4.0. Meanwhile, artificial intelligence (AI) and machine learning, cobots, 5G networks and smart materials are setting the stage for Industry 5.0. But what really counts is the adoption of the most appropriate techniques and technologies. Key to this is the ability of companies to manage their technologies in a productive and ultimately profitable way.

"THERE'S A CLEAR VISION OF HOW TECHNOLOGY AND DATA ARE TO BE USED FOR GAINING COMPETITIVE ADVANTAGE…"

What do factories of the future look like? They deploy agile business strategies that take changing conditions into account. The focus is on a unique value proposition for customers and how innovations in products, services, production and business processes contribute to enhancing solutions. There's a clear vision of how technology and data are to be used for gaining competitive advantage, which is incorporated in strategies and roadmaps with performance benchmarked regularly against industry best practices.

Employees are equipped with the skills required to manage the technologies they operate. And maintenance practices are based on real-time monitoring of critical components, with focused interventions that prevent productivity loss.

Digital technologies and data are used to transform products, systems or services. Employees are supported by integrated digital processes; shop floor systems are smart, interconnected and autonomously share information; and control of digital information enables virtual design and simulation of new systems prior to implementation. Data systems are secure and data accuracy is guaranteed with analytics incorporated into decision-making systems, supported by machine learning and AI.

End-to-end engineering maximizes customer value while managing risks and costs throughout product life cycles. Products and their related manufacturing processes, use, servicing and disposal requirements are designed and developed simultaneously by cross-functional project teams, customers, suppliers and other stakeholders. Meanwhile, data collected throughout product life cycles are fed back into the design and engineering process to improve performance, productivity and customer satisfaction.

Employees are enabled and engaged in product and process innovations, while investment supports their skills, expertise and competencies. Factories of the future stimulate life-long learning and individual growth paths based on open communications. Knowledge is shared and accumulated based on problem-solving experience. Project teams are agile. They work with authority managing processes and resolving operational problems.

Shop-floor processes are designed to exploit the full potential of user-friendly, automated, intelligent, efficient and flexible human-machine interactions. Self-managed quality and process control systems enable them to adapt quickly to changing orders and customer requests without jeopardizing quality levels. Knowledge of the relationship between manufacturing parameters and final product quality enables first-time-right, lot-size-one production and rapid changeovers.

Factories of the future are environmentally and socially responsible. Dependency on non-renewable energy resources, water and raw materials are systematically reduced. They identify, assess and mitigate operating risks, and they're considered leaders in shaping and complying with new rules, regulations and standards. They cooperate, collaborate in partnerships to accelerate innovation, manage risks and adapt rapidly to changing business conditions. While participating in international innovation networks and demand-driven value chains, internally they work as innovation networks. And operations are regularly informed by external knowledge of best practices, technology, industry and market trends.

Today, standards of manufacturing excellence need to be assessed in light of these capabilities. They provide a good roadmap for business success in a world of constant change.

Jayson Myers, the CEO of Next Generation Manufacturing Canada, is an award-winning business economist and advisor to private and public sector leaders. E-mail jayson.myers@ngmcanada.com. Visit www.ngmcanada.com.

Comments? E-mail jterrett@plant.ca.

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canada.syspro.com/future-proof

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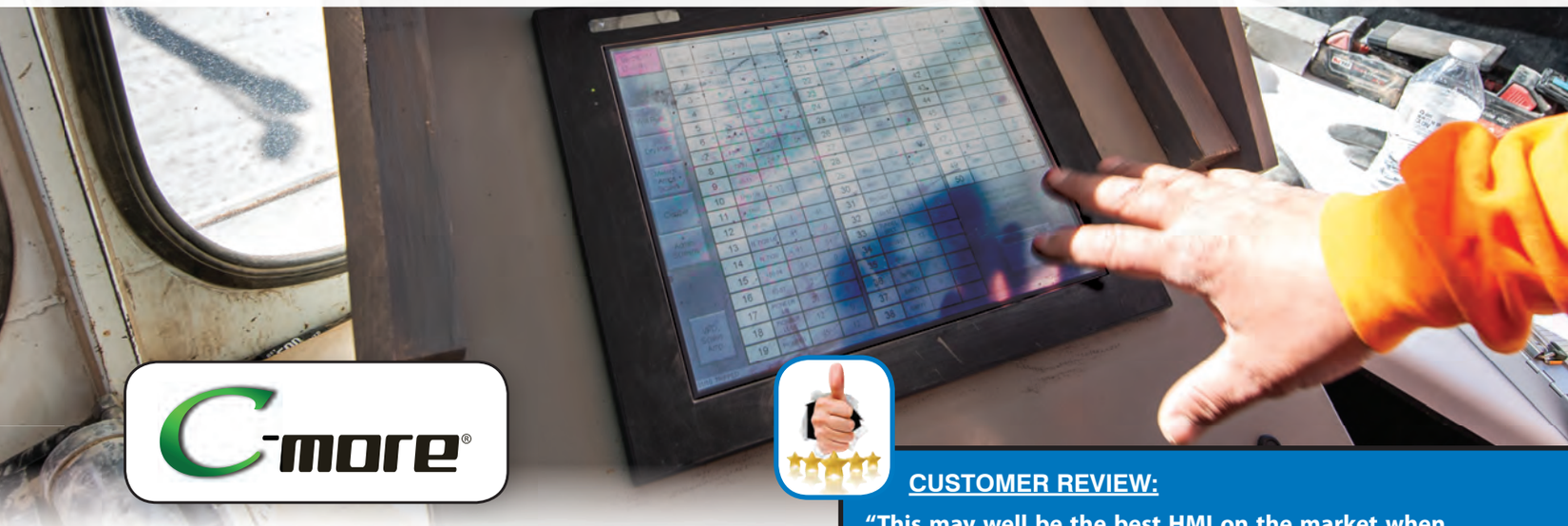
C-more HMIs are the go-to choice for low-cost system interfacing



C-more®

As with most industrial control projects, cost is king, but you don't have to sacrifice quality to keep your budget intact. C-more HMIs are built to last and provide many advanced capabilities, including object animations, logic and math operations, web server/mobile app access, and data logging, all for a surprisingly low price.

CUSTOMER REVIEW:

"This may well be the best HMI on the market when you consider functionality vs price...It is large and bright and the wide-screen appearance allows plenty of room for information and interaction...There are no better options available from any source."

Scott in DRAPER, UT

CUSTOMER REVIEW:

"In a nutshell, these panels (and indeed, the entire EA9 line) offer great value, usability, and ease of use for the price...The programming is very straightforward and the panels have quite a lot of functionality...If you compare these to the AB Panelviews, I'm not sure what that extra $3000 buys you, but it's nothing I need. As long as it's up to me, I'll save my employer that money, (and myself the frustration) of dealing with AB products..."

Brian in TACOMA, WA

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