MANUFACTURING AUTOMATION

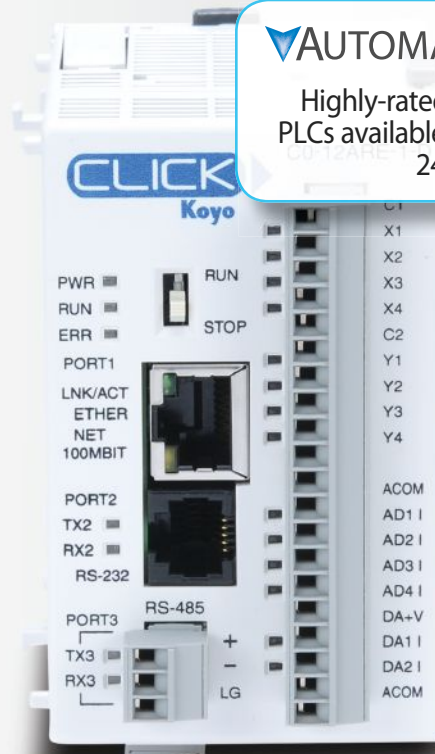*Your resource for Canada's industrial automation news*

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TAKING
CONTROL

Building a new business during a pandemic isn't easy, but the team at Black Controls Company is already seeing success. p. 18

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ON THE COVER: THE BLACK CONTROLS CO. TEAM. (L TO R) MIKE
LAKE, MATTHEW HEISZ, JON FERRIER, RICK BLACK & WADE CONRAD

Charting a new course for investments

Reflecting on this year is an overwhelming exercise, to say the least. Unless you'd previously spent a lot of time reading about pandemics or public health, 2020 was a year that the vast majority of us didn't see coming.

We were ill prepared, and maybe we should have known better – though I'm not sure what could have possibly equipped us ahead of time to comprehend the loss of life, the upending of our economy, the slashing of jobs, or the blow to the way we conduct business.

Now, a pivotal U.S. election is about to unfold that, no matter the outcome, will further affect trade and international relations both here in Canada and abroad.

Through it all this year, we did what humans do. We adapted, and we learned how to live with COVID-19 in our midst. Although 2020 has been sobering, companies are busy recalibrating for 2021. According to a recent study by BDC, 39 per cent of Canada's small and mid-sized enterprises (SMEs) are getting their finances in order by cutting down on operating costs, managing their cash flow and developing contingency plans.

The study, called *The Response: How Entrepreneurs are Adapting to the Pandemic*, identifies several other priorities of SMEs heading into the next year, including investing in technology to stay competitive (27 per cent), continuing to permit teleworking to enable social distancing (25 per cent), selling and promoting goods and services online (24 per cent), and diversifying clientele (23 per cent).

The two top priorities – managing cash flow and investing in new technologies – may seem out of sync with one another, but they've been constant refrains among economists and industry leaders over the past several months. Financial injections – whether via government stimulus or a business reinvesting in itself – are crucial to surviving a crisis. Investments drive new growth.

The industrial automation market in Ontario, for example, will soon see gains after a September announcement that Ford of Canada and Unifor, the union representing automotive workers in Canada, had inked a three-year, $1.8-billion deal to retool the auto manufacturer's plant in Oakville for electric vehicle and battery production.

The investment, which includes nearly $600 million in federal and provincial government funding, was sorely needed – previous production contracts were wrapping up, and the new deal is expected to retain 3,000 of the plant's 3,400 jobs. The investment also aligns with the federal government's goal to finance clean technologies in pursuit of net-zero carbon emissions by 2050.

At *MA*'s recent roundtable on industrial control systems, industry experts stressed this idea that investments should reflect on larger goals. The key to a successful controls implementation, said Sanjith Singh, vice-president of industrial automation at Schneider Electric Canada, is to thoroughly understand what you want to achieve from the top down.

Considering corporate goals such as sustainability, quality management or energy reduction will pinpoint what results you need to achieve and, consequently, what you need out of new technology. Ultimately, this helps decision makers ensure a better, longer-lasting investment. For more on investments and controls project planning from Singh and our other roundtable panelists, turn to p. 14.

Days after this magazine is printed, the results of the election south of the border will chart a whole new course for company investment across North America, and it will be time to prepare for how the outcome will affect operations in 2021.

Businesses may not have been ready for the pandemic, but they do know that political winds change every four years. And, as ever, they adapt. | **MA**

COVID-19 PRODUCTION

Feds approve ventilator for production

StarFish Medical has received authorization from Health Canada for its Winnipeg Ventilator 2.0 to be classified as a COVID-19 medical device.

The device was approved under an interim order, which allows the Minister of Health to permit the exceptional importation and sale of drugs, medical devices (including ventilators), and foods for special dietary purposes that do not fully comply with Canadian requirements, but are manufactured according to comparable standards.

StarFish Medical's Winnipeg Ventilator 2.0.

The approval allows Canadian Emergency Ventilators Inc. (CEV), as the manufacturer of record, to ship units to the Public Health Authority of Canada (PHAC), starting immediately.

PHAC is working with the company to review the devices that come into the National Emergency Strategic Stockpile (NESS) so they are ready to be shipped across the country if and when they are needed.

"Our goal with the Winnipeg Ventilator 2.0 is to deliver a fully featured ICU ventilator that could save patients' lives, be manufactured in Canada in the shortest time possible, and not disrupt the supply chain for

existing ventilators," says Scott Phillips, StarFish Medical CEO and founder.

"To do that, we started with proven technology (the original Winnipeg Ventilator designed by Dr. Magdy Younes), updated the design to incorporate technical advances and use non-medical supplier components, all while drawing upon a network of companies we have worked with

for over 20 years. The pioneering work of Dr. Younes, and the support of Cerebra Health with clinical input and upcoming clinical trials, is invaluable."

StarFish presented the ventilator design to expert review panels convened by NGen and ISED to positive and encouraging feedback.

John Walmsley, StarFish Medical EVP strategic relationships,

says teamwork was important in the project's rapid progress.

"Our supply chain moved quickly and diligently to discover what supplies and services were available, while our engineers worked with available components to create and build the design," he says.

"We used 106 StarFish employees on the project and over 100 people at key vendors including

Dometic, Advanced Test Automation, Yorkville, Dorigo Systems, Powersonic Industries and EM Dynamics. Having designed the product, we were very happy to have Celestica on board to coordinate with our supply chain and begin to bring on board their vendor network for manufacture."

AUTOMOTIVE

Ford, union reach deal worth nearly $2B for vehicle production

Ford of Canada and Unifor, the union representing many of the company's workers, have reached a deal that will bring new work to two Canadian plants.

A total of $1.95 billion will be invested in the automotive giant's Canadian plants, including $1.8 billion to produce five electric vehicles at the Oakville, Ont. plant. An engine contract slated for Ford's Windsor, Ont. plant rounds out the rest of the investment.

The Ontario government is matching a $295 million investment with the federal government to retool the Oakville complex into a global hub for battery electric vehicle production.

"[This] announcement is a testament to Canada's attractiveness as a destination for clean technology, talent and infrastructure in the automotive industry," says Prime Minister Justin Trudeau.

Ford's Oakville plant directly employs over 3,000 people and will be modernized with a flexible manufacturing system able to accommodate multiple battery electric vehicle (BEV) models.

It will also include the installation of a battery-pack assembly line. The Oakville Assembly Complex will become one of Ford's highest volume BEV plants in North America, with the first electric vehicles expected to roll off the production line in 2025.

"Any region seeking a long-term future in auto manufacturing must be adding value at every stage of the supply chain, particularly in the two technologies shaping the next generation of vehicles: zero-emissions and connected and autonomous," says Vic Fedeli, Ontario's minister of economic development, job creation and trade.

The Ontario auto parts industry employs about 63,000 workers for vehicles assembled in the province and abroad.

INVESTMENTS

Lion Electric to manufacture trucks for Amazon

Quebec-based manufacturer The Lion Electric Company has a contract to deliver 10 battery electric trucks to Amazon.

The first two will be delivered this year. Amazon plans to use Lion's trucks in its middle-mile trucking operations, which transports items within the company's network.

Lion Electric says the addition of the battery electric trucks to Amazon's fleet will help the retailer deliver on its goal of decarbonizing its transportation operations in support of The Climate Pledge.

As part of the delivery, Lion will provide a one-time training to Amazon and the drivers who will operate the trucks upon delivery of the vehicles. They will also establish a maintenance program for the trucks, as part of Lion's expanding network of Experience Centers.

The trucks will be manufactured at Lion's facility in Quebec, which has a current capacity to produce 2,500 electric trucks per year. Lion is also planning to open a larger manufacturing facility in the U.S. to accommodate the growing demand for its electric vehicles in the U.S.

Lion's trucks are purpose-built for electric propulsion, provide for modularity in energy capacity, are agnostic on charging technology, are vehicle-to-grid enabled, and have a range of up to 250 miles.

Auto parts manufacturers receive over $175K

Two auto parts manufacturers in Scarborough, Ont. are receiving more than $175,000 from the provincial government to help improve efficiency, productivity and build capacity.

The funding is part of the Ontario Automotive Modernization Program (O-AMP) and will be matched 1:1 by the recipient companies, Innotech Precision Inc. and Kobay Enstel Ltd.

Innotech Precision Inc. provides tooling, engineering and injection-molded components for the auto industry. The company is receiving $98,582 towards real-time automated monitoring systems, which includes vision and production data analytics.

Lion Electric Co. will manufacture battery electric trucks for Amazon.
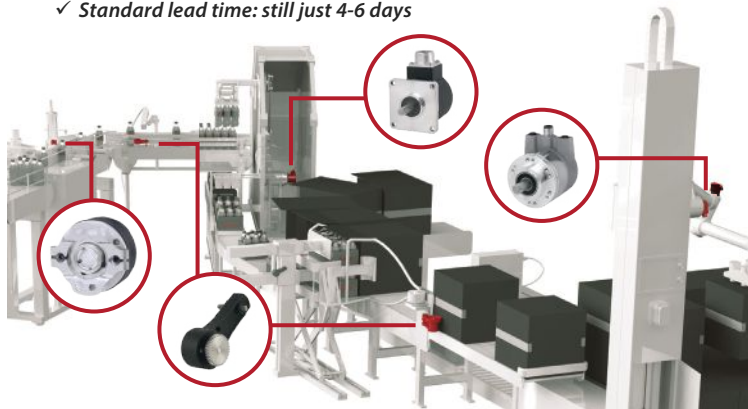
The investment will improve manufacturing efficiency and support sales growth. The project is expected to lead to the creation of six new jobs while helping to retain 53 jobs at the company.

Kobay Enstel Ltd. specializes in complex stampings, welded seating assemblies and tube fabrication. The company is receiving $78,410 towards custom computer software and hardware that will support real-time data gathering and analysis of the stamping press. Kobay Enstel says the investment will improve productivity and enhance competitiveness, leading to additional jobs at the company.

O-AMP is part of the government's Driving Prosperity auto plan, which partners with small and medium-sized automotive parts suppliers to invest in projects that support technology adoption. These projects improve processes and/or support training.

ABB to open new logistics facility

ABB's Motion business area is making some changes in Western Canada.

In response to growing consumer demand, ABB will consolidate its regional call centres and warehouses in Edmonton into a new, larger logistics operation to house Baldor-Reliance industrial electric motors and Dodge mechanical power transmission products.

Distribution and order handling activities will be transferred in November.

"The move will provide our customers with a greater variety of inventory and a larger operations support team that will have the means to deliver a wider breadth of services to our customers, in a timely manner with the quality of service they've grown accustomed to," the company says in a statement.

ABB's sales and commercial office will remain in the Vancouver area.

Manufacturer fined $40K for worker injury

A manufacturer and supplier of heavy machinery and rough terrain equipment has been fined $40,000 in Ontario provincial court after a worker suffered critical injuries at its industrial facility.

Following a guilty plea in provincial offences court in Windsor, Sellick Equipment Ltd. was fined for the accident at its Harrow, Ontario plant.

The court also imposed a 25-per-cent victim fine surcharge as required by the Provincial Offences Act. The surcharge is credited to a special provincial government fund to assist victims of crime.

According to an investigation by the Ministry of Labour, Training & Skills Development, on November 23, 2018, a worker employed at the industrial plant's fabrication department was operating an overheard crane attached to a chain hoist and a Mag-Mate lift magnet. The magnet is high-powered magnetic device used to lift metal objects.

The worker was using the magnet to transport a chrome-plated steel bar, which weighed 233 pounds. The worker was transferring the chrome bar into a drawer to be stored.

While the bar was suspended by the magnet, the worker reached underneath the chrome bar in

order to move metal bars within the storage drawer. While doing so, the chrome bar dislodged and fell, striking the worker and causing critical injuries.

The investigation determined that the surface of the magnet was not kept clear of debris. The ministry's inspector observed fragments of steel burrs and metal shavings on the bottom of the magnet.

Although the worker had received on-the-job training, the worker had not received formal overhead crane training, nor had the worker received or reviewed the operating manual for the magnet. The manual specifically required the surface of the magnet to be kept clean from debris.

The Occupational Health and Safety Act (OHSA) requires an employer to ensure that the equipment, materials and protective devices provided by the employer are maintained in good condition.

ROBOTICS

IFR: Global industrial robot installations up

A new report by the International Federation of Robotics (IFR) indicates there is a record 2.7 million industrial robots operating in factories around the world – an increase of 12 per cent over 2019.

The World Robotics 2020 Industrial Robots report says that sales of new robots remain on a high level, with 373,000 units shipped globally in 2019. This is 12 per cent less compared to 2018, but still the third highest sales volume ever recorded.

"The stock of industrial robots operating in factories around the world today marks the highest level in history," says Milton Guerry, president of the International Federation of Robotics.

"Driven by the success story of smart production and automation, this is a worldwide increase of about 85 per cent within five years (2014-2019). The recent slowdown in sales by 12 per cent reflects the difficult times the two main customer industries,

Worldwide industrial robot installations are up 12 per cent over 2019.

automotive and electrical/electronics, have experienced.

"In addition to that, the consequences from the coronavirus pandemic for the global economy cannot be fully assessed yet."

Quebec startup raises $6.5M for industrial robot AI platform

Omnirobotic, a Quebec-based robotics automation startup, has closed a seed round of $6.5 million to further develop and commercialize its AI platform for factory robots.

This funding enables Omnirobotic, which was founded in 2016, to continue building autonomous robotic capabilities for high-mix production environments, allowing industrial robots to see, plan and execute high-value-added processes like painting, welding and machining with limited human oversight.

"Our AI platform shows potential for significant productivity gains, along with substantial energy and consumable savings per part produced that are meaningful to all kinds of industrial manufacturers," says Francois Simard, Omnirobotic co-founder and CEO.

"The technology itself is transformative because these manufacturers will finally be able to use industrial robots for value-added tasks on never-before-seen parts within

unstructured environments."

Fonds de solidarité FTQ and Export Development Canada (EDC) led the round with participation from Real Ventures and a joint venture including the company's current employees.

RECRUITMENT

CAF-FCA releases national strategy for women in trades

The Canadian Apprenticeship Forum (CAF-FCA) is releasing a first-ever National Strategy for Supporting Women in Trades (SWiT).

In 2019, CAF-FCA, a non-profit that connects Canada's apprenticeship community through membership, led a task force of more than 60 skilled trades stakeholders to inform a strategy that would create more women's

representation in skilled trades careers in Canada.

The industry-driven strategy has four measurable action items that are intended to generate awareness, trigger policy change, recognize best practices and create skilled trade workplace environments where women's representation increases.

According to the Statistics Canada Registered Apprenticeship Information System 2018 data, when apprentice registrations in the manufacturing, construction and transportation sectors were analyzed, women represented 4.5 per cent of apprentice registrations.

The SWiT task force established a national target to increase participation and retention of women in skilled trades careers to 15 per cent by 2030.

Another priority of the strategy was to identify tactics to create respectful workplaces.

The SwitCanada.ca web page provides links to tools to assist employers, unions, educators and tradeswomen in creating healthy, safe and inclusive workplaces.

DEAL MAKERS

Schneider Electric partners with REV

Schneider Electric has welcomed Calgary's REV Engineering to its partner program in Canada as a Critical Power EcoXpert specializing in power quality.

The partnership will bring IoT-enabled technology for
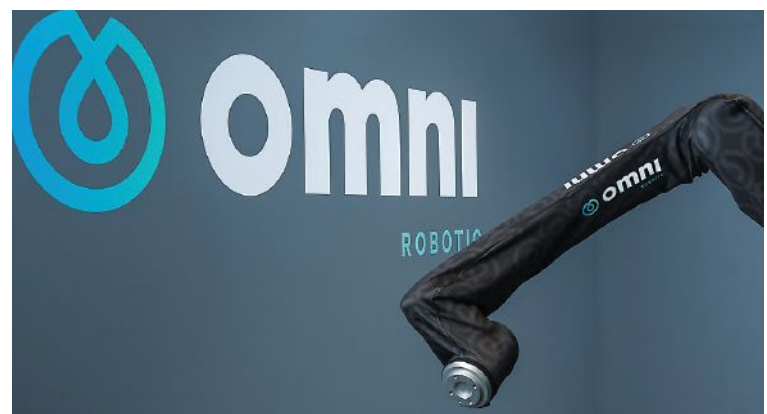
Omnirobotic, a Quebec-based startup, has raised $6.5 million for its AI technology that gives vision to industrial robots.

improved power availability, safety and operational efficiency to customers in Western Canada.

By joining as a partner, REV – a provider of high-voltage electrical engineering services, solutions and products for a wide range of diverse industries – will have access to Schneider Electric's power quality portfolio.

In early 2020, REV received the Medium Voltage EcoXpert Panel Builder certification from Schneider Electric, a demonstration of REV's expertise in power distribution and motor control.

With this certification, REV uses Schneider's technologies to design, manufacture, test and sell certified medium voltage (MV) switchboards.

Rockwell, Microsoft enter five-year deal

Rockwell Automation and Microsoft have announced a five-year partnership expansion to develop solutions that help industrial customers improve their digital capabilities through cloud technologies.

Microsoft and Rockwell are working to deliver edge-to-cloud-based solutions that connect information between development, operations and maintenance teams through a singular, trusted data environment.

This will allow development teams to digitally prototype, configure and collaborate without investing in physical equipment. This unified information environment also enables IT and OT teams to not only securely access and share data models across the organization, but with their ecosystem of partners as well.

Organizations can access Rockwell Automation solutions now via the Microsoft Azure Marketplace, with more solutions currently in development.

Cheryl Farrow

The Ontario Association of Certified Engineering Technicians and Technologists (**OACETT**) has appointed a new chief executive officer with an extensive track record of executive leadership and team building. **Cheryl Farrow** brings more than 20 years of experience in not-for-profit management to OACETT, including governance transformation, amalgamation and credentialing. Farrow's previous leadership roles include CEO of the Canadian Bar Association, president and CEO of the Supply Chain Management Association, executive director of the Canadian Grocery Human Resource Council and president of the Ontario Tourism Education Corporation.

Vecna Robotics has appointed **Jeff Huerta** to senior vice-president of sales. Huerta's responsibilities will focus on scaling Vecna Robotics' sales operations to meet the demand for its robotics platforms and orchestration software. Huerta brings more than 15 years of automation leadership experience to the company. Prior to joining Vecna Robotics, he was vice-president of North America sales at Balyo. Previously, he held sales and marketing positions with SICK, where he managed and developed the OEM packaging sales team for the North American market.

Jeff Huerta

INDUSTRY WATCH
BY PAUL HOGENDOORN

Paul Hogendoorn co-founded FreePoint Technologies with the goal of giving manufacturers the benefit of information technologies that inform, empower and motivate their most critical asset – their people. Contact Paul at paul.hogendoorn@getfreepoint.com.

The critical value of purposeful work

How do you end up building a motorcycle in your family room? (It's actually not too difficult to explain).

My wife and granddaughter have kept me plenty busy the last eight months. At first, I thought they were just creating projects to keep me sane, to keep me from going stir crazy, as I wasn't getting on airplanes, traveling to faraway places and doing what I love about work most – visiting plants and helping manufacturers make their companies stronger by connecting to their machines, and most importantly, with their people. In other words, by reconnecting meaning with work, and dignity with labour.

The first project was my granddaughter's idea. We have a run-down and dirty old pool shed that, in her mind's eye, would make a great "she-shed." It started simply, by cutting in two windows, squaring up the frame, and painting it all fresh, inside and out. Then came the furniture, fridge, microwave, 42-inch smart LCD TV and Nespresso coffee maker. To protect that investment, a new roof was required. And an air conditioner.

The second project was necessitated by the first; I no longer had a pool shed for the chemicals, equipment and odds and ends associated with the pool. So, a small garden shed between our house and the neighbour's had to be enlarged, but we quickly determined that it had to be replaced. To replace it meant leveling the slope between the houses, which meant building a retaining wall, on a proper footing, with drainage considerations. The net result is a beautiful 16-foot by six-foot secure storage area for everything that used to be in the pool shed (which is now the "she-shed").

Then came the upstairs bathroom. It too started simple, but grew. What was going to be a new single sink and a paint job became a new vanity with double sinks, which meant upgrading the plumbing that was embedded in the walls. After a great start to the project, I encountered the first of several "expected unexpected" problems. After cutting into the main, I discovered that the house, built in the late 1960s,

The author tackles a project.

There is a tactile and palpable sense of satisfaction that comes from completing tasks that have tangible and visible results, which most people have an inherent need for – especially those drawn to manufacturing careers.

was plumbed using 1-1/4 inch ABS, not 1-1/2 inch as has been the standard for a few decades – and my local Big Box had virtually nothing to couple into the now separated drain, with the family Thanksgiving dinner only a day away. With classic "just-in-time" execution, we managed to get the project done and avert a bottleneck at a critical family location.

In between those three projects was one that I have been picking away at for years – something I refer to as "wrench therapy." I've been deconstructing and reconstructing an early '80s motorcycle, more for the pleasure of wrenching than riding. It was a garage project until the reconstructed garden shed no longer had room for the snowblower and lawn mower, due to the pool equipment and furniture moving in. Relocating the lawn and snow equipment into the garage forced me to move my motorcycle project, and the only place available was the family room. (Pretty rational explanation, right?)

But through it all, I learned a couple of very valuable lessons that are applicable to all manufacturers in these disruptive COVID-19 times. The first lesson is that work has inherent human purpose, far more than just a means to earn a living. There is a tactile and palpable sense of satisfaction that comes from completing tasks that

have tangible and visible results, which most people have an inherent need for – especially people who are drawn to manufacturing careers.

Many workers lost their connection with this source of daily satisfaction, either temporarily because of short-term shutdowns, or permanently because of job loss. The cost of this kind of loss is catastrophic and immeasurable financially.

The second lesson I learned is that periods such as these offer us all a chance to get things done that we would otherwise not have had a chance to do. I have encountered many companies that have taken intentional steps to make themselves better by adopting new technologies; executing and completing projects they initiated in previous years that were often delayed; reskilling their workforce; reigniting the energy in their workforce by inviting suggestions and input; or by creative out-of-the-box thinking and planning. This was a time to do all of those things, but not everybody did them. Some chose to sit by, try to ride it out, and look forward for everything to return to normal.

The good news is, it's not too late to initiate – and complete – a few interesting and purposeful work projects. It's good for you, your company and your people. So, what's still on your project list? | **MA**

PHOTO: COURTESY PAUL HOGENDOORN

MACHINE SAFETY
BY WSPS

Eight ways for employers to 'take every reasonable precaution' during a pandemic

Occupational health and safety legislation says that employers and supervisors should "take every precaution reasonable in the circumstances for the protection of a worker."

This is known as the general duty clause, but what it means in this uncertain period is a question many employers have been asking Workplace Safety & Prevention Services (WSPS).

WSPS Regional Community Coordinator Lori Shepherd cuts through any uncertainty with this simple approach: "It means applying the same risk management strategies to this hazard as we would to any other hazard."

To help workplaces put this into practice during wave two of the coronavirus, Lori offers the following eight suggestions.

1. **Identify and assess COVID-related hazards that may be present in your workplace.** "We know the risk of contracting COVID-19 through close, prolonged personal contact can be very high," says Shepherd. "What processes, procedures and tasks could put employees at risk? How many people could be exposed to the virus, and how likely are they to become infected? Have any COVID-related changes implemented by your workplace introduced new hazards?"

2. **Determine how best to control the hazards.** Once you know the nature and extent of risk, it's possible to explore control options. Apply the hierarchy of controls, starting with elimination. For instance, replace in-person meetings and conversations with virtual meetings and phone calls. For hazards that can't be eliminated, determine how to control them. For instance:
   - Install transparent barriers between workstations
   - Change the alignment of workstations so that workers are at least two metres (six feet) apart in all directions and ideally don't face each another
   - Encourage workers to maintain clean workstations, tools and equipment; clean and disinfect tools and other equipment between shifts
   - Employ signage and markings to promote physical distancing. (Find examples at wsps.ca/Information-Resources/Articles/Using-signage-to-improve-physical-distancing.aspx)
   - Increase ventilation

- Stagger shifts and breaks
- Screen employees and visitors before they enter the workplace
- If masks or other personal protective equipment (PPE) are called for, ensure they also protect against COVID-19
- Clean or dispose of used PPE safely and in an environmentally friendly way

To help workplaces control hazards, WSPS, Ontario's Ministry of Labour, Training, and Skills Development, and other prevention system partners have collaborated on over 100 sector-specific guidance documents. Each document includes a number of control options.

Find them at: covid19.wsps.ca/resources/sector-specific-health-safety-guidance

3. **Develop a COVID-19 safety plan.** Compile all of the steps necessary to protect workers from exposure to the coronavirus, as well as the procedures necessary to monitor worker exposure and their health. Include steps to take in response to a suspected case of COVID-19 at work. Involve your joint health and safety committee or health and safety representative early on, and complement internal expertise with external expertise where needed. Once you have drafted a plan, discuss and share it with everyone at work.

4. **Integrate local public health requirements for workplaces into your safety plan.** Examples include wearing a mask or face covering, physically distancing at least two metres (six feet) apart, using proper hand hygiene, self-assessing for COVID-19 symptoms before entering the workplace, and staying home when feeling ill.

5. **Document everything you do.** This includes hazard assessments, controls, training, inspections, investigations, logs, checklists – so that if the need arises, you can demonstrate due diligence – that you have taken every precaution reasonable in the circumstances to protect your workers from COVID-19.

6. **Review and update your COVID-19 hazard assessment and controls.** A number of factors may prompt the need for a review:
   - Significant changes or improvements to processes or tasks
   - Challenges introduced by these changes
   - Evolving information on COVID-19 and related hazards
   - Changes to public health and other government requirements

7. **Reinforce everyone's role under the Internal Responsibility System**. This is another staple of occupational health and safety legislation. Under the system, everyone in the workplace – employers, supervisors and workers – is responsible for their own safety and the safety of co-workers, and has specific roles and responsibilities.

8. **If in doubt, err on the side of caution.** Focus on controlling hazards, not just on compliance. Legislation and regulations set minimum performance requirements, which cannot guarantee a safe workplace. If you focus on compliance as a minimum, and not on taking every precaution reasonable, you may not be managing hazards effectively.

Helpful resources

In addition to the over 100 sector-specific guidance documents mentioned above, WSPS offers two more tools on its website. The Hazard Assessment Template was originally created for small businesses, and can help any size workplace identify and assess hazards and recommend controls. The Post-Pandemic Business Playbook provides information and tools to help businesses adapt to the new operating environment. Sector-specific versions are also available. | **MA**

MICHELLE CHRÉTIEN, director of the Centre for Advanced Manufacturing and Design Technologies at Sheridan College, recently appeared on our podcast, Machine Language, to discuss innovation in automation and how partnerships can help

Manufacturing AUTOMATION: Tell us about the Centre for Advanced Manufacturing and Design Technologies and the research areas that you have available to industry.

Michelle Chrétien: It's a bit of a mouthful, so we usually refer to it as CAMDT. [CAMDT is] one of the applied research centres at Sheridan College. We're a technology hub where students and researchers, faculty and industry can come together to learn, explore, collaborate and innovate. We have a number of different areas across the broad spectrum of advanced manufacturing that we have expertise in, including digital fabrication, which includes additive manufacturing. We also have expertise and advanced equipment in robotics and automation. And our last core area of specialization that really goes underneath all of those other areas is in design. We're always learning and growing and expanding as the industry changes, [so] we're also starting new projects in cybersecurity for industrial control systems.

MA: Sheridan College and CAMDT are members of the Southern Ontario Network for Advanced Manufacturing Innovation (SONAMI). How does SONAMI work with industry?

MC: SONAMI is a network of colleges and one university institute that work with SMEs on applied research projects. The goal of SONAMI is to increase the capacity of the advanced manufacturing research and innovation ecosystem in southern Ontario. Our network is funded by FedDev Ontario, and provides a really excellent value to SMEs who are looking to stretch their innovation dollar. SONAMI partners work with companies to explore new products and processes, and to

de-risk technology adoption. Of course CAMDT has the expertise [but] across the whole network, there's a much broader array of expertise that you can tap into. By forming this network, we were trying to create kind of a one-stop shop for SMEs looking for partners in innovation, and for also access to funding.

MA: Why is it beneficial for industry to partner with these types of incubators and the larger academic world to ideate manufacturing concepts?

MC: I feel really passionately the value of partnership – and that one plus one usually equals more than two. I have a couple of reasons [why] I think it's a great idea. One is, I talk to manufacturers every day. And one of the things I hear most in terms of discussing what their barriers are to growth is access to talent. One of the top reasons to partner with an academic institution is access to a pipeline of highly trained, work-ready potential employees. Making connections with programs and students while

they're in school means they're more likely to choose you as a company after they graduate.

Building relationships with schools can also help to address another one of my favourite topics, which is diversity in fields like manufacturing. Partnering with an academic institution and building relationships with students and faculty at what might seem like an early point can really help to address the underrepresentation of certain populations in manufacturing and broaden the talent pool.

The other reason [is] access to cutting-edge equipment and expertise with zero capital investment. Across Canada, there are millions of feet of research space and hundreds of millions of dollars of specialized equipment and facilities that are there. If you're not reaching out in partnership to take advantage of that, you're really missing out

The final thing is [that] it really is a way to multiply your innovation spend. It's a low-risk, low-cost way to explore new technologies, kick

around new product ideas and really give yourself a little bit of a playground to think about how to make your business grow or be more efficient, increase productivity, etc.

MA: On a broader scale, how does innovation impact business objectives for manufacturers?

MC: I have a whole bunch of answers to that, but I think the one that that resonates most for the times that we're living in is that I like to think of innovation as a bit of insulation. A company with an innovative mindset, whose strategy includes ongoing innovation, is always better positioned to weather storms. I know in manufacturing especially, it can feel difficult to justify an investment. To this I would say, number one, find a partner. There are myriad ways to multiply your dollar – I don't know that we do a great job in Canada of making those connections, but those opportunities are out there and I think it's worth seeking them out.

The other thing I would say is, think about the cost of not investing. The return on your innovation investment isn't a simple calculation. You probably wouldn't go to your accountant for that answer. But I do think that [the] return on investment is there and it is tangible.

It's worth it to reach out. Find partners – you can multiply your investment and, frankly, everything we need is really here. It's in Canada. That is something that I think we are very fortunate to be discovering in a time where we're all sticking a little bit closer to home.

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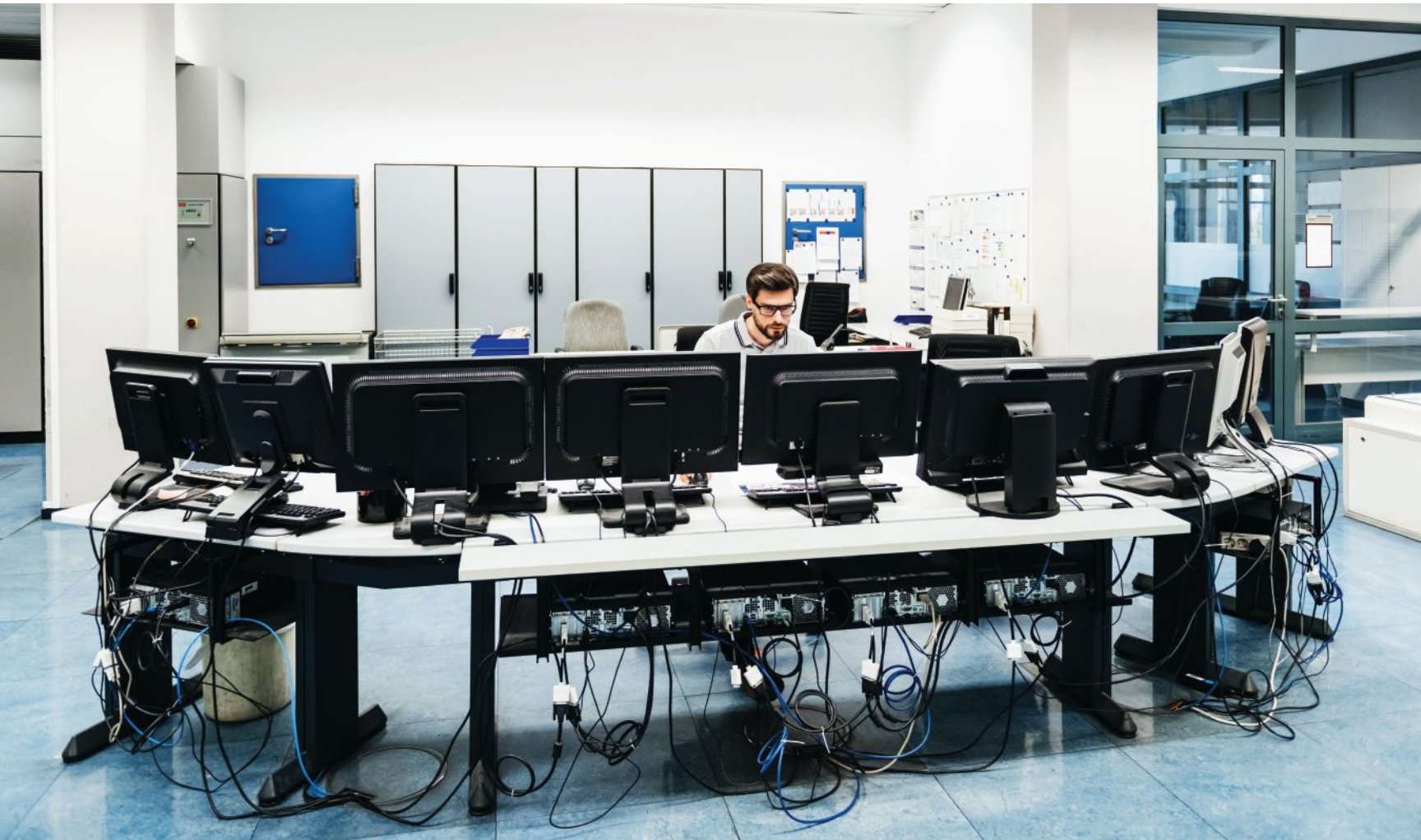
THE STATE OF
INDUSTRIAL CONTROL

Senior-level leaders join our roundtable on industrial control systems to sound off on legacy equipment, device lifespan and controls project planning

BY KRISTINA URQUHART

Upgrades to industrial control systems (ICS) are one of the biggest investments a company can make. Industry 4.0 offers many new capabilities for ICS, but how can a manufacturer convert their control systems while maintaining uptime, ensuring security and minding cost?

Last month, we asked several industry experts to share their insight and advice on making a change to control systems and devices such as SCADA, HMI, PLCs and MES at our online Industrial Control Systems Roundtable. (You can watch the recording via automationmag.com/industrial-control).

The advantage of modern control systems is they can connect to automated machines and store reams of data that can be sent to edge or cloud services for analysis, noted Vic Briccardi, president of RTS Consulting – Automation. Using artificial intelligence and machine learning, that data is then used to optimize operations and drive value.

"In the past, systems were very much set it and forget it," said John Krajewski, senior director of product management, monitoring and control at AVEVA. "Now, control systems are living and breathing – we're constantly commissioning new things and decommissioning old things."

Over the course of about two hours, our roundtable participants discussed how COVID-19 has impacted that

The Industrial Control Systems Roundtable panelists, from left: Christian Perrier, PCI Automation; Sanjith Singh, Schneider Electric Canada; Vic Briccardi, RTS Consulting – Automation; and John Krajewski, AVEVA.

value, and how profitability, data optimization and security factor in to any new controls project. Here's just some of what they had to say.

"Don't get caught in the trap of getting a fancy new control system but using the old legacy control philosophy."

Using the ICS for crisis management

The COVID-19 crisis has put more stress on legacy ICS – particularly those that were not yet connected to the internet or equipped with the capabilities to enable remote access. As workers moved from their usual places of work early in the pandemic, there were restrictions on what they were able to access, said Krajewski.

In addition, support for hardware, software and service has been challenging throughout the pandemic, with people working from home, off sick or reluctant to travel, said Briccardi. Without connectivity, "users of existing and legacy control really lacked or had limited visibility and control of production operations," he said. "Total access to operations, anywhere at any-time, is paramount to supporting the operation."

Sanjith Singh, vice-president, industrial automation at Schneider Electric Canada, said that automation was a "godsend" for plants that didn't have enough workers onsite to maintain and run equipment. Plants that had upgraded their PLC, HMI and SCADA systems were better equipped to pivot for production of critical medical devices and supplies needed in the fight against COVID-19.

The bottlenecking in supply chains caused by the pandemic has highlighted a bigger need for networked systems, said Singh.

"As we see the demands of consumers becoming greater, there's a greater need for traceability throughout the supply chain," he said. "You don't just track and trace the finished product [anymore], you now need to trace the supply chain – so the suppliers' suppliers – almost to the point [of] the component level right up until to the produced level."

With supply chain, production and logistics requiring traceability to gain full visibility, the industry is moving from a "smart factory" idea toward a more holistic "smart manufacturing" approach.

"From that perspective, control systems are really helping to connect those dots, and connect the supplier to the raw material," said Singh. "It's almost a farm-to-fork mentality using the control system."

Considering cost vs. value

When is right time to upgrade? It comes down to several factors, Singh said, and greatly depends on a manufacturer's desire to embrace new technologies as well as the funding they have available – though there are a variety of solutions available now to fit most budgets.

But the maturity of the equipment should be of concern, as should access to parts. "As control systems age, there is a risk of failure and fatigue at the component level, which results in downtime," said Singh.

Manufacturers are hesitant to invest in new technology because they do not fully understand the risk if they don't, said Christian Perrier, president of PCI Automation. He finds leaders reluctant to move data outside of their current setup. But prolonged maintenance

ICS

For this roundtable, we defined industrial control systems (ICS) as the devices, instrumentation, software and networks used to operate industrial processes, particularly when it comes to manufacturing.

of control systems can only go so far until repairs get too complex and too costly to do. "It raises the risk of longer downtime," he said.

The availability of systems also prevents manufacturers from moving on upgrades, shared Krajewski. For example, some of his clients can only afford one to two hours of scheduled downtime per year, and don't want to have to run two systems at once in order to do an ICS changeout.

"So very often you see these guys trying to change the engines on the airplane while the thing is still in flight," Krajewski said. "The monolithic nature of a lot of the old systems actually led to this – to touch anything, I had to bring everything down. We're starting to see things become more segregated."

This means that while one part of a control system is down, another part can still be running – or the cloud can be used to upgrade certain components on the fly. This approach is enabling more manufacturers to move to a hybrid model, whereby they can bring systems that are not mission-critical fully into Industry 4.0 and leave critical processes alone, tacking on additional connectivity solutions as needed.

"Extending the reasonable life of assets has become a huge thread," said Krajewski. Artificial intelligence and machine learning can help operators learn the value of an asset "so that you can understand – do I need to replace it, or do I need to maintain it? Can I just continue to let it do its job?

"Very often you see these guys trying to change the engines on the airplane while the thing is still in flight," Krajewski says.

Ultimately, the capital expenditure that can be preserved is gold. There [may be] no reason to have to buy it again or rebuild it."

Briccardi pointed to a recent example when his company worked on a 1960s injection molding machine. Because it was not connected to the internet, it had no metrics or KPIs to indicate its health. The client did not want to move data to the cloud, but was willing to have analysis on site. With a $600 PLC attached to the machine, Briccardi's team was "able to strategically pick points to be monitored so that we had visibility into things like cycle time and idle time and mold changeover time," he said. The company was able to "get definitive numbers on how well the machine was performing compared to the latest and greatest technology, which then allowed them to make some strategic capex decisions on new machines."

Planning a new controls project

As they're considering an upgrade, some of the common things senior decision makers want to know include the availability of hardware, if there are resources to support the team during downtime, if data will be able to be shared and integrated with other parts of a plant, and if the ICS will be able to communicate with other controllers in the plant, said Briccardi. A key part of planning for an upgrade is creating a strategy or roadmap for the future, even if it won't be used for several years.

"Sometimes, direct cost-benefits are not enough to make a project go," said Perrier. "Initially, your project may not be profitable in itself, but if you consider integrating it into your full picture, it takes on a lot more value."

To ensure the success of a new controls project, Briccardi advised beginning with a business goal such as improved financial performance or increased productivity, as well as an expected outcome. Identify

$600

Using an inexpensive PLC that cost $600, Vic Briccardi at RTS Consulting was able to bring a 1960s machine online so that decisions could be made about the equipment's health and longevity.

high-priority initiatives that bring maximum value, then conduct a gap analysis to ensure those goals can be achieved.

Once an upgrade is underway, steer clear of old ways of thinking, said Singh. "Don't get caught in the trap of getting a fancy new control system but using the old legacy control philosophy," he said. "You become less efficient, because you've spent a lot of money and your return on investment has been pushed out."

He suggested looking beyond the project's goals to the company's goals. If sustainability is a corporate goal, then energy consumption should be a key indicator on a new ICS. Once you've mapped out what you want to achieve from a macro level, you will know what hardware makes the most sense for your application.

Optimizing performance using data

A key feature of modern industrial control systems is the streamlining of data collection so that the data can be contextualized and used to improve performance, Singh said.

In the past, manufacturers had their devices hardwired throughout a plant – and this system is still in place at most plants today. But with wireless networks or connected devices, data can be collected more easily, and used in exciting new ways that move beyond simple graphic representations and into preventative and predictive analysis.

"One of the biggest limitations we have is our imagination," said Krajewski. For example, a PLC might not be the best place to obtain information for a certain application. "If an operator sees falling output pressure on a pump and knows the seal needs to be replaced – when was the last time that information was maintained? That information is not in the PLCs. Do we have any spares in the inventory? That information is not in the PLC."

Indeed, PLCs are powerful tools that now incorporate office-centric communications protocols like SQL,

MQTT and others, which helps with their integration into reporting software, Perrier said. But they're not the only control device from which data can be gathered.

The latest tools for data analysis, which include modelling, correlation analysis and statistical process control, can provide ways to optimize production in real time, said Briccardi. In order to facilitate that analysis, control systems can move the data from machines to a database for computation. Ideal performance targets are then fed back to the edge.

That real-time data feedback is paramount to modern-day ICS, said Singh. "Clients are looking for speed. How quickly can I get data?" he said. "From a manufacturer perspective, or from an analyst perspective, if there's a component failure, you want to know the second of the minute of the day that it happened. So you need real-time data transmissions."

Speed will be further enhanced by 5G wireless networks, which are forthcoming to the industrial sector over the next few years. With lower latency and increased network capacity, Briccardi noted that 5G will allow manufacturers to reliably connect devices inside plants on segmented networks, allowing for private transfer of information.

Securing industrial control systems

Cyber attacks are an increasing problem in manufacturing – and industrial control systems are a major target for criminals. The roundtable panelists unanimously agreed that their clients don't take cybersecurity seriously enough.

For manufacturers without a cybersecurity plan, "once you get locked out of your production facility, you could go days or weeks before you open it up," said Singh. "Instead of paying for protection, you have to pay after the fact and then spend possibly millions of dollars because your production line is down.

"We really need to start thinking about what [this means] for our plant. If I were to get locked out of my plant today, what would it cost me? And is that cost greater or less than what it would be for me to actually invest in having a good cybersecurity plan?"

Singh advises against maintaining the status quo on a legacy ICS, even if connected systems bring higher risk.

With many cybersecurity incidents kept under wraps to protect the reputation of the affected company, awareness isn't as strong as it should be, Perrier said. "It causes other customers to have a distorted picture of the situation and the potential threat," he said. "One [attack] I heard about stopped production for three days on six job sites. Another caused a company to stop functioning for maybe two to three weeks, everything from customer service to production floor."

He stressed that losses are the biggest consequence of a cyber attack – not only in terms of production, finances and intellectual property, but also potentially human life. If an attack on a connected machine results in it operating in a different or unsafe manner than its original use intended, a worker could be injured – or worse.

"[Companies] say, 'I don't know that I can balance that risk against availability' – until it hits them. And then they realize how important it was," said Krajewski. "Be honest with yourself – make sure you have a clear and documented topology of your system so that you understand what the attack vectors are."

There are various areas of entry for a cyber attacker to compromise an ICS, and thus varying levels of risk, said Singh. He suggested contracting a company experienced in cybersecurity to provide an objective assessment of hardware, software and systems. He also advised against maintaining status quo on a legacy ICS, even if moving to connected systems brings higher risk.

"If we don't do something because we are worried about the risk of typically what could happen, then we're never going to move forward," Singh said. "Mitigate your risk. Because we know there is risk. Do the right things, put the cybersecurity measures in place."

That includes ensuring secure access to industrial control systems through encryption, authentication and restrictions on user activity, said Briccardi. Remote access works for some employees, but it can also introduce errors in programming if operators and engineers are accessing control systems without being present in the physical environment.

Perrier pointed out that there's an additional, rarely considered element that can help to ensure security – if employees are well compensated, they will care more about the health and security of the company.

Another way to minimize risk is to work with vendors that are specifically certified to make components or provide services. This is especially important at a time when everyone is experimenting with IIoT solutions that can provide additional access points for cyber criminals.

"Startups may not have that maturity," Krajewski said. "If you're working with a startup, they may have some brand-new fancy technology, but very often they haven't gone through the level of maturity where they've established the security practices to ensure they are ready for primetime."

Singh agreed. "Cheap is not always better," he said. "Sometimes, there is a reason why something is cheaper."

Thanks to our sponsor, Schneider Electric Canada, for their assistance in putting together the roundtable. Watch the roundtable recordings and see more videos from our panelists at automationmag.com/industrial-control. | **MA**

What's new in industrial control?

Roundtable participants shared the control trends that excite them moving into next year.

Vic Briccardi, president and founder, RTS Consulting - Automation
Briccardi said he is excited to see where AI goes, because it is a boon to productivity in the factory, and integral in ensuring maximum performance of assets with no waste. "I think we're heading toward a future where we'll have conscious factories driving the supply chain," he said.

John Krajewski, senior director, product management, monitoring and control, AVEVA
Client attitudes on change are shifting, Krajewski said, which makes conversations about upgrading easier. "I'm seeing a willingness to take that chance." Mission-critical legacy systems can co-exist with new AI, cloud, and machine learning solutions – and Krajewski said he's looking forward to seeing how that continues to evolve given the demands COVID-19 has put on the industry.

Christian Perrier, president, PCI Automation
"I like the way PLCs are now talking in languages once only seen in office software such as SQL, OPC and MQTT," Perrier said. "This really elevates the integration level." He also enjoys seeing how artificial intelligence is being used to enhance machine vision, as well as the automated logistics solutions that are now available for warehouses and distribution centres.

Sanjith Singh, vice-president, industrial automation, Schneider Electric Canada
"The trend I see is there's a shift away from buying products and turning to integrated solutions," Singh said. "People aren't looking at where they are today, they're looking at where [they're] going to be in three years or in five years. And I think that thought process is developing a trend of the connected world – and the connected product inside the industrial control system."

Jon Ferrier, an electrical designer at Black Controls Co., builds panels in the founder's garage.

TAKING CONTROL

Building a new business during a pandemic may not have been on this panel builder's vision board, but the team came through with a bigger order book

BY KRISTINA URQUHART

When programmer Rick Black decided to start his own industrial controls company last year, he did it for all the usual reasons: to get back to hands-on builds after working in management, to make more use of his technical knowledge, to fill a need in the industry, and to work for himself.

Black figured he would start small and then go from there. So in July 2019, he founded Black Controls Company out of his home in Barrie, Ontario and began designing controls systems. By September, he was building two custom control panels in his garage for his first client. Business steadily increased – a month later, he was able to hire an additional full-time staff member and part-time help, and, by the end of the year, the small team was working on a shutdown project with a local integrator at an automotive plant.

What Black didn't anticipate was that mere months later, his fledgling company would face a massive global pandemic, challenging his newly established customer base and supply chain. Luckily, Black says that while work for some industries such as automotive dried up during the early days of the crisis and it became harder to meet new customers, a strong pre-COVID relationship with a company that builds equipment for sterilizing medical devices helped to buoy his business.

Since exposure to the radiation used to sterilize the devices is unsafe for humans, the equipment builder uses palletizing robots and conveyor systems so its client can transfer the product into the sterilization bunker.

Black Controls Company developed and wired the conveyor's control system using PLCs, VFDs, servos and HMIs by Siemens, cabinets by Rittal, remote I/O and cabling by Murrelektronik, sensing by IFM, material handling robots by Fanuc, and field cabling by Lapp.

"The product [runs] in batches and its location is tracked through the system," says Black. "The conveyors are controlled by VFDs, and the sterilization treatment is done on a servo-driven conveyor. The servo allows very precise speed control. The speed in the treatment area is critical because it determines how much dose the product receives. Not enough dose and the product is not sterile, and too much dose will damage the product."

Since wiring and programming the handling systems and building six dual bay cabinets for that client, Black Controls Company has taken on a number of additional jobs, expanding in May 2020 to a 2,500-square-foot office and assembly space where Black now employs four full-time staff plus a part-time bookkeeper.

But back in March, as supply chains around the world were getting squeezed due to the pandemic, Black's client was concerned with acquiring enough raw material for upcoming projects. So he started stocking up on product and storing it in his house.

"We ended up ordering a bunch of VFDs and other hardware and they were all in my living room. The basement of my house was full of material and panels," Black says. "We weren't sure what was going to happen with COVID. So it was good to get the [new space] – and good to get my house back!"

Now, the team of five at Black Controls Company does design work and programming onsite at the new facility, as well as panel builds, testing and powering of components. They specialize in a wide range of projects including automated parts assembly and testing, logistical conveyance, robotic assembly, mold machine tending, custom control cabinet assembly and wiring, machine wiring and electrical installations.

The firm is vendor-neutral and works with any system based on specific customer applications, but has experience with products from a number of companies including Siemens, Allen-Bradley, Beckhoff, Omron, Mitsubishi, Fanuc, Yaskawa Motoman, Kuka, Keyence and Cognex.

Black got his start in the automation industry after completing a three-year electrical technologist program at Georgian College. He landed a co-op placement at Innovative Automation, a large Barrie-based automation solutions provider and systems integrator.

Black spent at total of 12 years at Innovative wiring, programming and developing machines, and eventually led the programming group. It was there he noted an eternal need for outside contractors to help execute projects. "I saw what [contractors'] responsibilities were from a customer standpoint, and I decided that it was something I wanted to pursue," Black says. His new team members at Black Controls are all former colleagues.

As they look to 2021, the team plans to concentrate on the material handling, packaging and automotive sectors. "We are also excited about the recent investments made in automotive battery manufacturing here in Ontario and are optimistic this will lead to some opportunities for us," says Black.

"Our growth so far is in part a reflection of the tremendous talent that we have on our team." | MA

NEW TOOLS
FOR TRAINING

With technology frequently in flux, today's workforce requires ongoing digital learning that prioritizes a proactive versus reactive approach

BY WILLIAM VALEDIS

High-impact events, such as accidents or major breakdowns, temporarily elevate training and information management needs – but reacting to these events through one-time training is not ideal.

The long-term cost when we do not address the root cause of issues impacts every business. Think of current training philosophies like an iceberg: we react quickly to what we see on the surface and don't evaluate what lies beneath in terms of business impact.

There are serious questions to be answered when determining whether the return on our investment has had any impact or not. Was the training content developed in concert with a current employee skills matrix? Did the training meet the needs of our employees? How was the training balanced to our needs in terms of lecture/practical? Did the training result in measurable improvements in operation or maintenance efficiencies? Have MTTR and DT decreased? Does the training require follow-up?

Proactively planning for employee training and critical information management has heretofore been a simple exercise of picking items from a menu of readily available training offerings or products.

10

A machine's typical lifecycle may be 10 years, but operators are often provided a week or less of one-time training, with no guidance as the machine becomes more complex to repair.

The current training approach is usually misaligned with specific employee and organizational needs and values, and typically results in employee frustration and higher operational costs. Implementing any training as a one-time event also diminishes the life cycle value of the investment, since knowledge fades away or disappears after the project is complete, or due to employee turnover.

New employees often don't have access to a formal onboarding processes, leading to a lack of accurate information about specific areas concerning employee health and safety, as well as company policies and procedures. Some organizations have adopted ISO standards on how certain procedures are to be followed, but little is done in the areas of maintenance troubleshooting, operator functions and safety, which would benefit from push notifications on critical information.

Training materials in manufacturing facilities range from being loosely organized and outdated to inaccurate or totally unavailable despite being deemed critical to the operation. Perhaps there is fear, misunderstanding or miscalculations about costs over benefits of training. It is time to rethink how critical information is distributed and adapt to the new reality – that the workforce must be continually updated and trained in our new world. To do so, we must move from instructor-led training to blended, digitized ongoing learning.

Training myths

Myth: One week of training is adequate

Reality: One week of training to last a machine's lifecycle – typically 10 years – is inadequate, since we know every organization experiences employee turnover. Repeating OEM training is also costly since many OEMs are focused on selling their products and training is one of those "optional" items the customer may or may not buy.

Myth: Available training will meet our needs

Reality: Without understanding current employee skill levels, it would be guessing at best to try to hit the training needs target. In many organizations, skills matrixes do not even exist, so

Steps to control costs

1. Working from a skills level list helps to identify the current skill level. This first step is crucial in establishing a baseline.

2. Not everyone needs every training course or information type to carry out their job responsibilities. Electricians, for example, may need technology training that is relevant to the areas in which they are assigned. Putting all electricians through all the PLC courses that are installed in your plant may not be such a great idea. Putting all employees through safety policy training, on the other hand, is appropriate.

3. Packaging costs vary from paper production to mobile/online, with the latter resulting in higher development costs. The added benefit of mobile/online content packaging is that it provides valuable data as to where each employee stands in terms of learning their specific assigned material, difficulties in learning certain content and sharing feedback on important issues that impact productivity. Course reassignments, cross-training needs and more can be handled with data and reports.

4. Development of courseware or information packages must not be developed in isolation. Development must include key management stakeholders during development and reviews, to ensure the content meets the employee and organizations future objectives. One hour of mobile/online-ready learning/information content takes about 100 hours to produce. Mobile/online content development costs can range between $8,000-$16,000 per hour of content delivery – but keep in mind how much material can be delivered in one hour.

5. Paper-based content can be handled via presentations in a classroom and this involves instructor and facility costs, as well as the cost of the employee's time.
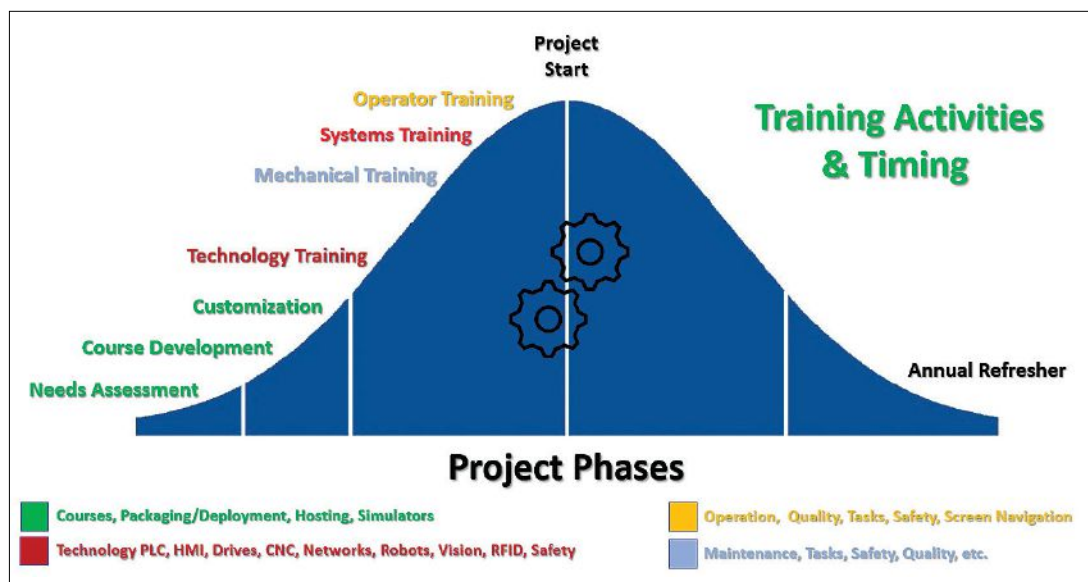
Digitized training should be front-loaded before a project begins, with annual sessions thereafter to provide refreshers or to update new content.

$8K-16K

Mobile/online content development costs can range between $8,000-$16,000 per hour of content delivery – but keep in mind how much material can be delivered in one hour.

evaluating needs is not possible.

Available training works in several scenarios. For example, organization XYZ just installed a new-generation PLC model 1000 and not a single technician has ever worked with this new model. An OEM class that introduces the model 1000 PLC would be a good choice here. But would this OEM model 1000 PLC course address all training needs? No.

Understanding the current skill level is important to set a baseline level of expertise. Knowing what is required after the project is complete helps us to measure the skills gap. OEM training or "off-the-shelf" training is primarily focused on product features, and not specific needs. Third-party training is designed to address the designer's objectives, which may or may not be your objectives.

For liability reasons, large OEMs will not customize training content to your needs unless a specific waiver of liability documents is signed, which is rare.

Myth: Classroom training meets our needs
Reality: During the last decade, we have witnessed tremendous acceleration in areas of learning using technology, but not many organizations are using that technology. Traditional classroom training should be supplemented or replaced with an enduring learning approach. Today, people are accustomed to a social/collaborative and personalized learning environment that is available when/where it is needed. Relevant content about maintenance, operations and training

can easily be searched and used immediately.

Information management myths
Myth: We have a document library
Reality: The information in these libraries is often outdated. Paper information cannot be searched and stored information is not always available when/where it is needed. Updates are manual and time consuming.

Myth: Digitizing information is expensive
Reality: If we calculate the number of employees times the amount of time spent looking for required information over the project lifecycle, this exercise will be convincing enough that digitizing and automating the distribution of information is cost effective. I once witnessed an operator who was unable to locate a machine parameter backup file. A support engineer contacted the OEM only to find out the OEM had gone out of business. The parameter file then had to be re-created while the machine was out of production for two days.

Another time, a worker performed a task without the latest version of the task's safety procedure. The information never made it to the operations binder box, where all the safety procedures were kept. When the worker performed the task, they sustained what was thankfully a recoverable injury.

The cost of reacting to needs
Processing power, big data, cloud, AI, IoT, mobility, robotics, PLC, drives, CNC, vision – all of these technological advances and others will continue to put pressure on training and keeping the workforce informed with critical

It is time to rethink how critical information is distributed and adapt to the new reality – that the workforce must be continually updated and trained in our new world.

information in an automated process.

To compete in an interconnected global market, Canadian companies are looking to fill a huge void of skilled workers in many disciplines – and this is a huge problem when the talent pool is constantly draining due to retirement, not enough young people entering the industry, and loss of workers by way of emigration. Based on my working experience all over the world, technical training in Canada is not always taken seriously compared to other developed countries.

Today, organizations rely on a variety of technologies to handle sales, infrastructure, HR, procurement, manufacture, distribution and customer service. As technology dependence and the skills gap are increasing, our knowledge base – our greatest asset – is shrinking. But it is also unrealistic to expect workers to become competent in every technology we install in plants, particularly when it comes to maintenance.

Some time ago, I arrived at a paper mill that was down, losing production due to a PLC network problem. I was asked to see the plant manager before I investigated the problem, which was unusual. When I got to the plant manager's office, he asked me to report back the name of the "incompetent shift person that was not capable of fixing the problem."

After getting the plant up and running, I asked the electrical group how much training they had received on the PLC and installed network – and the answer was zero. The amount of time taken to fix the network problem is inversely proportional to the amount of time invested in training – so in this case with zero training, the time required to fix the problem is, in theory, infinite.

The front-line workers keeping the manufacturing processes and machines running must be literate in specific technologies. We must be selective as to what training and/or information is critical for each functional group. We need to understand that learning is ongoing, not a single event. The cost of training and information sharing can be initially a single event, but the tools used during the initial phase must be available throughout the intended lifecycle. | **MA**

William Valedis is director, support systems development, at KINITO Systems Inc. and a member of *Manufacturing AUTOMATION*'s editorial advisory board.

Creating training content

Here are some ideas to help plan training and critical information sharing.

Operational information
- Develop guides on how to operate machines, or how to perform tasks
- Provide information critical to operational procedures and safety
- Use a blended mobile/online method that survives the process, machine or project lifecycle
- Push updates immediately after changes

Maintenance information
- Upload application backups for PLC/DCS and other critical devices on secure server
- Develop guides on how to perform certain maintenance tasks
- Provide information critical to maintenance procedures and safety

Safety procedures
- Develop guides for how to perform tasks safely
- Deploy safety policy and procedures in a secure cloud space

Disaster recovery
- Create plans and backups for a catastrophic event to address loss of valuable software, critical recipe data, product parameter lists, drawings, etc.
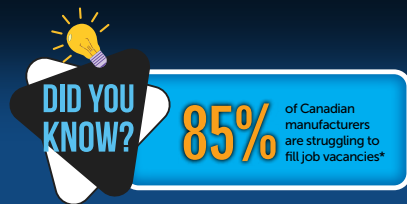
BRINGING PRODUCTION
BACK HOME

Pandemic shortages have amplified concerns about over-dependence on offshore providers, causing more manufacturers to consider bringing production back to North America. The trend is likely to drive more automation

BY JACOB STOLLER

Perhaps one of the most far-reaching consequences of the COVID-19 pandemic will be that it has accelerated the conversation about the viability of the supply chains we depend on. In May, a McKinsey Global Institute survey of supply chain executives found that a stunning 92 per cent plan to take steps to make their supply chains more resilient.

"We estimate that 16 to 26 per cent of exports, worth $2.9 trillion to $4.6 trillion in 2018, could be in play – whether that involves reverting to domestic production, nearshoring, or new rounds of offshoring to new locations," conclude the authors.

Offshoring, once seen as a panacea for North American manufacturers, is rapidly losing its lustre. "Compared with six months or a year ago, many more people have realized that supply chains are too long, too complicated, and too unreliable," says Harry Moser, founder and president of the U.S.-based not for profit Reshoring Initiative.

"COVID-19 has revealed vulnerabilities in today's supply chains that have required organizations to rethink their end-to-end processes to accelerate risk management and resiliency," says Takshay Aggarwal, IBM's global leader digital supply chain, citing a recent IBM survey of 3,500 C-suite executives.

Pandemic-related fears may be the tipping point amongst existing worries about tsunamis, hurricanes, political instability and potential trade wars. "Business schools endlessly tell organizations that leadership is about running contingencies on risk factors for the future," says Alan Middleton,

92%
A recent McKinsey study indicated 92 per cent of supply chain executives plan to make their supply chains more resilient.

executive director at the Schulich Education Centre, York University, "but we all get a bit lazy, and we don't do it unless we're forced to do it. So this is forcing us to go through all those risk factors."

Mitigating offshoring's inherent risks doesn't come cheap. For example, companies that depend on offshoring often face long lead times, requiring them to maintain and manage large amounts of "just-in-case" inventory. The associated costs of that – financing, storage, transport, management, shrinkage – add up to some significant numbers that many managers are unaware of.

Moser has done the math and exposed a significant gap between the purchased cost of an offshored product and the real cost, which he calls Total Cost of Ownership (TCO). "Procurement often ignores the impact of offshoring on inventory, stocking out, travel, late night phone calls, IP risk, warranty, etc," writes Moser on the website reshorenow.org. "Most companies make sourcing decisions based solely on price, oftentimes resulting in a 20 to 30 per cent miscalculation of actual offshoring costs."

The site includes a free online calculator for estimating the TCO of a given product. Users input information based on 30 factors, and the app computes a forecast of the TCO over five years. While Canadian statistics are not currently available, the

PHOTO: CHRISTOPHER BERNARD / GETTY IMAGES

"You can lose by not automating," Moser says. "But you can't win by automating alone, because everybody else is going to also automate as much as they need to."

numbers are useful for Canadian manufacturers, some of whom have worked with Moser. The site also includes, based on U.S. government data, a service to provide details on U.S. companies that are currently importing from overseas, and what they are spending. Canadian companies could benefit from the service to sell more product, Moser notes.

Large manufacturers are the least likely to bring back production now in their own factories offshore, Moser has found, particularly if they are also using that capacity to service local overseas markets.

"The enthusiasm also gets greater the further you go down the supply chain," says Moser. "It's the contract manufacturers – mold makers, foundries and machine shops – that will benefit the most from reshoring."

While such companies don't make headlines, they are a significant contributor to the economy. "The majority of employment is still with small, medium-sized companies," says Middleton. Many, however, have relied on a favourable currency exchange rate with the U.S., and have not been as innovative as they could be. "Canada has a great history of patents applied for, but not

a great history on commercial application," he says.

Meeting the technology challenges

Automation is likely to play a significant role in reshoring efforts. The most obvious reason is the existing labour shortage. According to a 2019 report released by Canadian Manufacturers & Exporters (CME), 85 per cent of manufacturers are having difficulty filling vacant positions.

"Labour and skill shortages in the manufacturing sector are alarming. They are holding back the entire sector and, by extension, Canada's economic growth," says Dennis Darby, president and CEO of CME in a press release about the report.

The other factor is that the economic advantage enjoyed by countries like China and India is no longer just about cheap labour. "At the moment, the Chinese, the South Koreans, and the Germans are automating a lot faster than we are," says Moser. "You can lose by not automating, but you can't win by automating alone, because everybody else is going to also automate as much as they need to."

Fortunately, many of the newer technologies have become

accessible for smaller companies due to significantly lower costs, scalability and user-friendly operating environments that no longer require specialized personnel such as robotics engineers.

"Today, we've got case after case where line operators and production coordinators are doing all the robot programming and setup," says Joe Campbell, senior manager of applications development for Universal Robots North America. "These smaller companies have never been able to deploy automation in any significant way in the past."

The other key is having the flexibility that smaller manufacturers need. Campbell says many of his customers deploy collaborative robots on carts and move them around to various processes where they might take on the repetitive tasks such as loading and unloading a machine tool. Because they operate side-by-side with workers, they can be quickly integrated into a new work process.

The manufacture of automotive electronic modules is one area where Campbell is seeing a lot of activity. "Quite a lot of what we do is load and unload testers," says Campbell. "We're not populating the board with

chips and components, but we're doing the material handling."

A typical business case for acquiring robots, Campbell says, is to charge a higher selling price based on quick delivery.

Looking ahead

According to Middleton, the reshoring question needs to be pursued with a long-term view. "It's not just now," says Middleton, "but it's getting people to really look at the path of technology. So you're not just looking at what's the labour factor now relative to what the technology factor is, but at the realistic impact on design, development and manufacture."

Canadian companies typically don't have the clout or access to capital of U.S. companies, Middleton says, but still have some significant strengths that can be leveraged.

"We have good talent and a number of good companies in areas such as IT, artificial intelligence and robotics," he says, "so where the story can be positive is on technology and material support to traditional areas such as mining and agriculture. They have technology needs and equipment needs as well, so why can't there be massive improvements in where they get their equipment from?" | **MA**
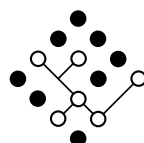
Jacob Stoller is a journalist and author who writes about Lean, information technology and finance.

AI AT
THE EDGE

Using artificial intelligence to process data on an edge device helps to create new value for OEMs

BY CHRIS CATTERTON

One of the key benefits of artificial intelligence (AI) is the valuable insight that it delivers to the broader Internet of Things (IoT) strategy. And in no industry is this actionable and insightful data more valuable than in manufacturing.

Without AI, manufacturers have limited visibility into the health and behaviour of their assets (i.e., equipment and devices), and that could have significant impact on performance, cost and security. For AI to reach its potential, each part of the asset value chain needs to be able to gain insight into device behaviour while connectivity costs are controlled.

Original equipment manufacturers (OEMs) face two key challenges with IoT deployments. First, they have

IoT

The Internet of Things (IoT) refers to physical devices that use sensors, hardware and an internet connection to collect and share data.

limited insight into the health and performance of their smart equipment/devices once they are deployed into the field, causing them to miss out on some critical information that could help not only avoid unexpected downtime and catastrophic failures, but also deliver better products to market. Second, when OEMs do gain visibility and access to the data their solutions are producing, the cost of sending that volume of data to the cloud for processing and storage can be exorbitant.

Driving intelligence to the device OEM

Regardless of whether AI-enabled IoT solutions are part of an industrial or consumer implementation, great benefit can be derived if they are added. When device manufacturers embed AI into their devices, they are able to

define the inputs and outputs more specifically. For example, for pipeline monitoring, pressure, volume, and flow rates may be important factors to measure. For industrial equipment, such as robotic arms in a manufacturing line, cycle rates and temperatures may be most significant. And in consumer goods, such as a dishwasher or washing machine, vibration and energy usage may be the key factors to measure. The device manager can take the AI-enabled platform and feed it into a machine learning engine and monitor the impact on outputs.

This process not only brings visibility into the health of a specific device, but also allows the device OEM to gain insights that help health and performance of its entire portfolio. Take household appliances, for example. An OEM may want the data output to go to their

When OEMs do gain visibility and access to the data their solutions are producing, the cost of sending that volume of data to the cloud for processing and storage can be exorbitant.

IT systems to run further analysis on their machines. They can use this data to gain intelligence on how a single machine, all machines in a specific model number, or even machines in a geographic location are performing.

Being able to aggregate this data through AI-powered solutions allows OEMs to better understand why things go wrong and determine what factors led to the issue. For example, was the problem contained to a particular facility? Or to a particular line where parts were made? Are parts failing more frequently? What additional metrics should be measured? Furthermore, these OEMs can then bring a servitization model into play by offering a maintenance service for an asset that is showing signs of failure, prior to the asset failing.

Translate this to the automotive industry, where AI-powered edge solutions can predict vehicle health based on similar situations with other vehicles. The vehicle manufacturer can be proactive with service announcements, alerting customers that their part may fail and should be serviced to mitigate it.

This data could also be used to invoke warranties, for example, if instructions state that a device is for indoor use, but humidity and conductivity are registering at exceptionally high levels, that could indicate that the device may have been placed outside.

Many OEMs manufacture more than one type of product, and machine learning technology is emerging that allows this level of intelligence and insight to be trained, delivering value back to the OEM without reinventing the wheel. The OEM simply needs to select what data should be gathered as input and output.

This rapidly accelerates time to market to bring embedded AI to devices, because no new training model is needed for each device – it's just a matter of connecting to the platform. While different types of devices have different data inputs, the machine learning platform is agnostic to those data inputs. The device simply goes through the training phase to learn normal asset behaviour, and whenever that behaviour deviates from the norm, it triggers an action, such as an alert.

The outcomes of an OEM using edge AI-enabled IoT include increased hardware/asset reliability and productivity, and greater visibility into device performance, enabling product development to plan future improvements.

Controlling costs

One of the biggest expenses of using an IoT solution is the cost of connectivity to transport raw data to the cloud for processing. Most AI solutions don't take into account the impact on costs when data is sent to the cloud. Most of that data is reporting readings that are in normal range where no action is needed. Many IoT implementations use cellular or, in some cases, satellite networks for data transmission to the cloud, and there is cost associated with every byte of data transmitted.

When readings are in normal range, moving all data – good, bad and marginal – to the cloud is expensive, and in most instances not necessary. What businesses really want to be alerted to are unusual readings that indicate impending signs of failure, so they can take action before catastrophic operational downtime occurs.

Technology is emerging that lets all data to be trained, collected and processed at the network edge, with only out-of-range data being transmitted to the cloud. This helps create significant cost savings from both a data transmission standpoint as well as a storage one, as select data can now be parsed and stored for deeper analysis.

A side effect of transmitting all data to the cloud is power consumption. Most IoT devices work on batteries and whenever IoT devices connect to the network and transmit, battery consumption comes into play. By reducing the amount of time devices connect to the network because only select data is transmitted, overall battery life is improved.

Driving new efficiencies

AI-based IoT solutions are driving new efficiencies across a number of industries, and its value to manufacturing is being proven through a variety of use cases. Key to this is controlling costs, and emerging technologies can help analyze data at the network edge, avoiding high cloud transmission costs.

With new visibility provided by AI solutions, OEMs can access the data being collected by IoT devices, glean short-term insights, and also create an environment for longer-term analysis and overall value. | **MA**

Chris Catterton is the director of solution engineering at ONE Tech.

AUTOMATION SOFTWARE

Digitized workforce management solutions

Honeywell has released a modular software solution to help industrial companies enforce compliance with key health and safety requirements, including body temperature checks and automated entry management processes. The solution facilitates site monitoring compliance in accordance with social distancing policies and enables contact tracing and monitoring of worker safety. It also includes remote collaboration capabilities to empower company operations with a reduced workforce. As part of a broader plant and personnel safety portfolio, the Honeywell Digitized Workforce Management – Business Continuity and Response solution combines software and hardware technology to support return-to-work and transition to operations. The system can support Honeywell thermal cameras that can be used with systems compliant with NDAA 2019, Section 889 to check for elevated body temperatures and provide input to the access control system. This can enable operators to restrict entryway access if an elevated temperature is detected, helping to automate the preliminary screening process and reducing manual tasks.
honeywell.com
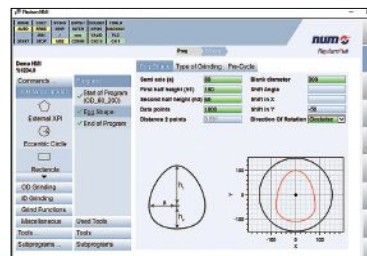
Software for non-circular capabilities in CNC grinding

New software from NUM provides manufacturers of CNC cylindrical grinding machines with a means of adding non-circular grinding capabilities to their products. Non-circular grinding is used in a wide variety of automated manufacturing applications, such as the production of camshafts, crankshafts, cams and eccentric shafts. NUM has now added non-circular grinding functionality to its NUMgrind cylindrical grinding software, which forms an application-specific element of the company's Flexium+ CNC platform. It is fully compatible with other Flexium software, from release 4.1.20.00 onwards. NUMgrind is specifically designed to simplify the creation of G code programs for CNC grinding machines through the use of a graphical human machine interface (HMI), conversational-style "fill-in-the-blanks" type dialogues or a combination of the two. Unlike conventional CAD/CAM workstation tools for generating CNC machine tool control programs, NUMgrind is intended for use in the production environment. Application-dependent projects, and the corresponding ISO part programs, can be created, tested with NUM's Flexium 3D simulation software and transferred to the targeted machine.
num.com

Control engineering software

Controls engineers can design machines and process applications faster using the latest release of the Studio 5000 Logix Designer software. Rockwell Automation has updated the software with productivity enhancements and new capabilities that can speed up projects for process applications specifically. Productivity enhancements in version 33 of the Studio 5000 Logix Designer software include: auto-generated diagnostics for supported devices that reduce programming time and give users access to detailed diagnostic information, preservation of online controller tag values when making offline changes

MATERIAL HANDLING

Lifting magnet for fast cycle times

Industrial Magnetics recently announced the availability of the FXE line of remote-controlled lifting magnets in North America. Combining the safety of a permanent magnet for load handling with the controlled-release capability of an electromagnet, the FXE uses virtually no energy and does not require a battery backup system. They're ideal for lifting applications that require fast cycle times, without the operator having to touch the load. The FXEs allow the operator to pick up ferrous metal sheets or parts and safely release them with the push of a button. Pickup and release functions can be performed by using the wireless remote control or direct activation from the magnet's on-board control buttons. All labels and controls are located on top of the magnet, which gives the operator easier access and visibility, allows the magnet to fit into tight spots, and limits the risk of damage to the controls. A built-in load sensor prevents the load from being released until it's at rest and the fail-safe permanent magnet design securely holds the load in the event power is lost. Nine different models with working load limits of 660 to 10,580 lbs are available.
magnetics.com
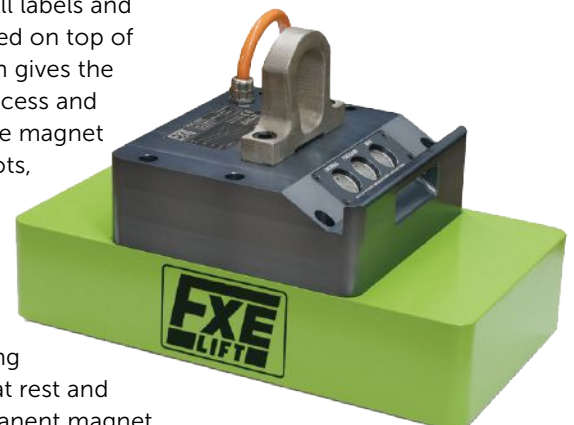
and conducting sequential downloads, and extended tag properties that allow engineers to leverage contextual data to create more descriptive and powerful HMI elements. When paired with the new Allen-Bradley ControlLogix and CompactLogix process controllers from Rockwell Automation, the latest version of Studio 5000 Logix Designer can also accelerate process projects in key ways: HART integration allows engineers to connect HART devices just like they do EtherNet/IP devices, and pre-built task models reduce the amount of time spent on project creation and layout and can improve consistency across projects.

rockwellautomation.com
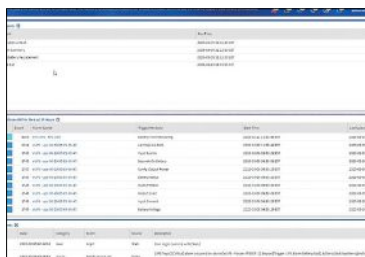
Remote power monitoring software

Eaton has launched the newest version of its Visual Power Manager (VPM) software, VPM Essential. The new offering delivers the comprehensive remote power monitoring capabilities IT and data centre professionals rely on in VPM, but in a self-installable, subscription-based license ideal for small to medium business applications. Supporting up to 1,000 monitored devices, VPM Essential provides a host of features, including a fully HTML5 web interface, auto discovery, mass firmware upgrade and node-settings configuration tools, monitoring of third-party devices and multi-tenant user access control. Among Eaton's two levels of VPM licenses, VPM Essential provides additional simplifications, including a modified home page, device dashboards and set-up wizard.

eaton.com

COMMUNICATIONS & NETWORKING

EtherCAT I/O series for incremental signal analysis

Beckhoff Automation has introduced new EL51xx EtherCAT terminals with built-in incremental signal analysis functionality. These four I/Os feature eXtreme Fast Control (XFC) technology and enable analysis of incremental signals in the controller. The new EtherCAT terminals acquire incremental signals with high frequencies up to five MHz and feature many parameterization options and integrated functions that enable optimum adaptation to control tasks. Each terminal offers an integrated sensor supply, which is parameterizable to five, 12 or 24 V. Users can connect encoders with differential RS422, 5 V TTL

or open collector interfaces. Based on internal pull-up resistors, no external wiring is required for open collector analysis. Additional 24 V digital inputs can save, lock and set the counter value. A wide range of additional integrated functions, such as rotary axis functionality, workpiece measurement and standstill monitoring enable data pre-processing directly in the I/O terminals. The measurement of period, frequency and speed with a resolution of 10 ns is also available.

beckhoff.com

Controllers with configurable Ethernet ports

WAGO has released the 750-8210 PLC, expanding its line of PFC200 Generation 2 controllers. The 750-8210 includes four configurable Ethernet ports, an SD card slot and is IIoT-ready. Each of the four 10/100 Ethernet ports can

be individually configured up to four IP addresses with a common MAC address or set up as group combinations. These ports support MODBUS TCP/UDP and Ethernet/IP as well as other protocols such as EtherCAT and Sparkplug with additional licenses. Other features of the 750-8210 controller include high-speed Cortex A8 1 GHz processor, 512 MB ram with 4 GB internal flash memory, and the SD card slot, which extends the memory up to 32 GB. The device is Linux-based and can run applications with Docker Containers and integrated firewall. This controller supports MQTT protocol and can be configured to connect to cloud services such as AWS, Azure, IBM Cloud and more. Programming and configuration can be done with either WAGO's e!Cockpit software or Codesys 2.3 based WAGO IO-Pro Software.


wago.com

MACHINE SAFETY

Safety door interlock switches

ITC Electrical is stocking SLC switches for the electro-mechanical locking of doors, covers, protection grilles, etc. The switches offer remote monitoring access status and offer optional emergency opening from inside or outside the enclosure. SLC switches feature a tough thermoplastic body and a metal head, designed to accept entry from four sides and the top (user-configurable) of the

corresponding key (actuator). It can be set power-to-lock or power-to-unlock. A tool-operated safety release is on the front of the switch enclosure, and inside the enclosure, an optional escape release enables immediate opening in case of emergency.

itcproducts.com
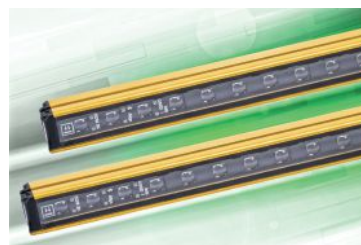
Slim-profile safety light curtains

AutomationDirect has added new Contrinex slim-profile safety light curtains to its safety products lineup. The curtains are to be used for human
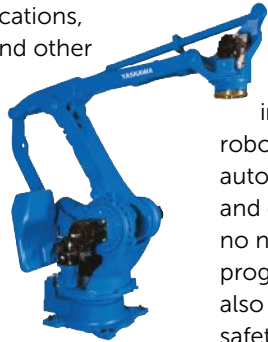
protection and product/machine safety. The new Contrinex 14-mm and 30-mm beam resolution extended-protection, slim-profile safety light curtains eliminate blind spots (the height of the light curtain is the height of the protected area). These new slim light curtains can also be wirelessly configured through Bluetooth. The 14-mm resolution light curtains provide finger-safe protection and 30-mm resolution curtains offer hand-safe protection. Protection heights are 170 mm to 1,290 mm (6.7 to 50.8 in) for the 14-mm resolution curtains and 170 to 1610 mm (6.7 to 63.4 in) for the 30-mm curtains. Operating ranges are 0.25 to 5 m (0.82 to 16.4 ft). All of the safety light curtains have Type 4 and Cat 4 PL e safety ratings and are IP65 rated.

automationdirect.com

ROBOTICS

High-payload palletizing robot

Yaskawa Motoman has released the 500-kg-payload PL500 robot, ideal for a variety of palletizing applications, unitized loads and other logistical tasks for end-of-line or distribution automation. The PL500 features extremely fast axis speeds and acceleration for maximum production throughput. It offers a large work envelope and a high payload to efficiently load/unload pallets, and handles full layers or a variety of product including boxes, bags, bottles and cases. The PL500 features a 3,159 mm horizontal reach, 3,024 mm vertical reach and ±0.5 mm repeatability. Its T-axis features a 60-mm pass-through to facilitate connections to the end-of-arm tool, as well as a high moment of inertia to ensure unbalanced loads are handled effectively. Parallel-link construction also provides strength, rigidity and stabilization of high moment and inertia loads, while heavy-duty bearings provide smooth arm rotation. A single cable is all that is needed to connect the manipulator to the controller. The PL500 robot can be floor-mounted, and brakes are included on all axes. The robot is controlled by the high-performance YRC1000 controller that is built to a global standard and does not require a transformer for input voltages ranging from 380AC to 480VAC. **motoman.com**

Robotic palletizing for lower throughput

Robotiq has introduced a new robotic palletizing solution for lower throughput applications that require frequent changes of task and box or pallet size. The new system is designed for applications of up to 13 boxes per minute. In addition, this application-focused technology comprises fully connected, plug-and-play hardware and software with pre-selected functions for rapid and simple deployment with UR10. The palletizing application can be set up in three steps on the visual robot control device, with automatic trajectory planning and collision detection, and no need for a PC or external programming. The solution is also compatible with third-party safety systems such as safety interlocks, light curtains and area scanners. **robotiq.com**

Platform for robot development

Qualcomm Technologies has unveiled a new robotics platform that uses 5G and artificial intelligence to help develop power-efficient robots and drones. The Qualcomm Robotics RB5 platform is comprised of an extensive set of hardware, software and development tools to create high-compute, low-power robots and drones for a variety of sectors, including industrial, enterprise and defense. More than 20 early adopters are in the process of evaluating the platform, and 30-plus ecosystem players are developing necessary hardware and software to enable various robotics applications, including ADLINK and Panasonic. The platform's Qualcomm QRB5165 processor, customized for robotics applications, offers a computing architecture coupled with the fifth-generation Qualcomm AI Engine delivering 15 Tera Operations Per Second (TOPS) of AI performance for running complex AI and deep learning workloads. The platform also includes support for 4G and 5G connectivity speeds via a companion module. **qualcomm.com**

MOTORS & DRIVES

Brushless DC motor with integrated driver

Portescap introduces the newest addition to its Ultra EC mini brushless DC motor platform – the 16 ECP brushless motor with a new integrated driver. These new 16-mm diameter motor versions are available in two lengths (36 mm and 52 mm). The integrated motor drive solutions are a good fit for applications such as respiratory and ventilation devices, miniature pumps, medical hand tools, clinical diagnostics, valve actuation as well as many others. Portescap brushless motors are an ideal choice for geared applications because of their minimal speed drop and low motor heating under load. Their low inertia makes them an exceptional option for applications requiring fast stopping, starting and acceleration. Upon request, Portescap can also provide options for customization including gearboxes, encoders, coil variations and mechanical interface modifications. Portescap is globally ISO 9001:2008 certified and its production site in India is also ISO 14001:2004 and OHSAS 18001:2007 certified. **portescap.com**

Servo motion control package

Emerson has released the PACMotion servo motion control portfolio to offer an integrated automation solution for high-performance industrial applications. The portfolio includes a new motion controller that connects directly into the PACSystems RX3i programmable logic controller backplane for high-speed, high-precision performance with synchronized motion for up to 40 coordinated axes, enabling end users to scale up their motion systems. The complete PACMotion portfolio includes motion controller, servo motors, servo drives and motion configuration software for applications in packaging, printing, material handling, semiconductors, food and beverage, and general manufacturing. Emerson's technology enables precise, jerk-free positioning, preventing material slippage and production losses and improving machine efficiency. On-the-fly electronic reconfiguration allows users to implement rapid changeovers without stopping production to deliver shorter production runs and increased machine utilization. **emerson.com**

Conveyor communications

ROEQ has launched GuardCom, a communication solution that enables Mobile Industrial Robots (MiR) equipped with ROEQ's top rollers to communicate directly with conveyor stations to initiate the transfer of goods between mobile robots and conveyors. The solution consists of two products: GuardCom installed on the stationary conveyor station, and GuardCom Connect, installed on the autonomous mobile robot. Multiple GuardCom Connects can work with the same GuardCom and vice versa. GuardCom is compatible with all stationary conveyor stations, replacing third-party wireless devices. Once the mobile robot has arrived at the conveyor, GuardCom signals to the station that the robot is in place and ready to receive or deliver the packages, and the same signal is sent to the robot letting it know that the stationary conveyor is ready. Once the transfer task is completed, both units receive a signal that it is safe for the robot to leave.
roeq.com

PROCESS CONTROL

Sanitary RTDs and transmitter probes

The AutomationDirect process control temperature sensor lineup now includes RTD versions of the M12 connection transmitters, transmitter versions of the RTDs without process connection, and sanitary 3-A versions of RTDs and transmitter probes. ProSense Pt100 RTD sensors and transmitters with sanitary connection probes offer a clean-in-place tri-clamp process connection ideal for applications where corrosion and product contamination are factors. Temperature measuring ranges for ProSense Pt100 type RTD probes with sanitary connections are available from –58 to 400 degrees F. ProSense XTP series temperature transmitters combine a precision Pt100 or Pt1000 RTD sensing element and transmitter electronics in a single stainless-steel body. Available in three preconfigured measuring ranges, XTP series transmitters are ready to use out-of-the-box or use the free XT-SOFT software to program transmitters with a custom measuring range. ProSense Pt100 RTD sensors

and transmitters with sanitary connection probes have a one-year warranty and are cURus, CE approved.
automationdirect.com

Pneumatic manifold for valve actuators

Cowan Dynamics has announced advancements to its C-PAC Module Pneumatic Manifold and the launch of the corresponding C-PAC online store. The C-PAC (Cowan's Pneumatic Actuator Control) is an out-of-the-box solution that the company says can save up to 90 per cent in assembly time and to automate valve actuators without using piping to connect various automation components. The C-PAC

Pneumatic Manifold has several capabilities for linear and 1/4 actuators, including speed control, safety pressure relief and fail-safe capabilities. The pre-assembled manifold configuration eliminates potential leak points and comes with an optional pre-installed ASCO solenoid valve. Actuator technicians can select any solenoid valve brand with the appropriate area classification for complete compatibility. The online store gives valve automation centres and technicians the ability to configure the C-PAC module with over 35 variations for their application. The C-PAC pneumatic manifold can be ordered in three sizes.
cowandynamics.com

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MANUFACTURING AUTOMATION

MA rounds up research reports and industrial automation applications to help manufacturers make smart decisions on the path to digital transformation

Protect programming languages from attacks

In a new research report, global cybersecurity firm Trend Micro highlights design flaws in legacy programming languages that could lead to vulnerable automation programs. Vulnerabilities can allow attackers to hijack industrial robots and automation machines to disrupt production lines or steal intellectual property.

"Once OT systems are network-connected, applying patches and updates is nearly impossible, which makes secure development upfront absolutely critical," says Bill Malik, vice-president of infrastructure strategies for Trend Micro, in a statement. "Today, the software backbone of industrial automation depends on legacy technologies that too often contain latent vulnerabilities, like Urgent/11 and Ripple20, or varieties of Y2K-like architectural defects."

Legacy proprietary programming languages such as RAPID, KRL, AS, PDL2, and PacScript were designed without an active attacker model in mind. Developed decades ago, they are now essential to critical automation tasks on the factory floor, but can't themselves be fixed easily.

Trend Micro Research has worked closely with the Robotic Operating System Industrial Consortium (ROS-Industrial) to establish recommendations to reduce the exploitability of the identified issues.

The task programs that rely on these languages and govern the automatic movements of industrial robots can be written in a more secure manner to mitigate Industry 4.0 risk. The essential checklist for writing secure task programs includes the following:

- Treat industrial machines as computers and task programs as powerful code
- Authenticate every communication
- Implement access control policies
- Always perform input validation
- Always perform output sanitization
- Implement proper error handling without exposing details
- Put proper configuration and deployment procedures in place

Source: Unveiling the Hidden Risks of Industrial Automation Programming, Trend Micro, 2020

COVID-19 impacts operations

According to a recent survey conducted between April and August 2020 by IBM's Institute for Business Value of over 3,800 C-suite executives across 20 countries and 22 industries, COVID-19 has prioritized operational capabilities over external growth. Among the top objectives were cost management **(87%)**, enterprise agility **(87%)**, cash flow and liquidity management **(86%)**, cybersecurity **(76%)** and IT resiliency **(75%)**. Other findings included:

59%
Fifty-nine per cent of respondents said that COVID-19 accelerated their digital transformation.

60%
Sixty per cent of organizations have accelerated their process automation plans as a result of the coronavirus crisis.

64%
Sixty-four per cent of organizations have shifted to more cloud-based business activities in response to the pandemic.

Source: COVID-19 and the Future of Business, IBM, 2020

The KINETIC Reflex is a discrete smart wearable worn on the belts or waistbands of industrial workers. It automatically detects unsafe work postures and provides users with real-time feedback to reduce injuries and create better work habits. The technology was recently updated with proximity alert features to enable workers to practice proper social distancing and to help keep them safe during this pandemic. With this feature, workers are notified of potential risk via a gentle vibration if they are too close to one another. KINETIC features a software analytics platform that enables management to conduct contact tracing and produce detailed reports on each interaction. If a worker tests positive for the virus, management export a list of everyone who could have potentially been exposed, as well as the duration of the contact.

Mobile robots make a move

Mobile for logistics (such as those from MiR, pictured), will grow ten-fold by 2024.

In a new market report, Interact Analysis predicts mobile robots will have a ten-fold investment increase in the logistics sector by 2024. The firm expects COVID-19 to be a significant driver in long-term mobile robot growth, and that sales of autonomous mobile robots (AMRs) will quickly overtake automated guided vehicle (AGV) revenues.

Have a research report or smart automation application to share? Send to **kurquhart@annexbusinessmedia.com** and you could be featured in *Manufacturing AUTOMATION*!

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