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PLANT

ADVANCING CANADIAN MANUFACTURING

Volume 74, No. 02 March 2015

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FLIGHT of the DRONES

Aeryon takes off
in export markets

NEW TECHNOLOGY SECTION

CIEN

CANADIAN INDUSTRIAL EQUIPMENT NEWS

HIGHLIGHTS

- Carbon fibre is fast tracking
- Green power for forklifts
- Get ready for the robots
- Canada's digital conundrum
- Managing shift work

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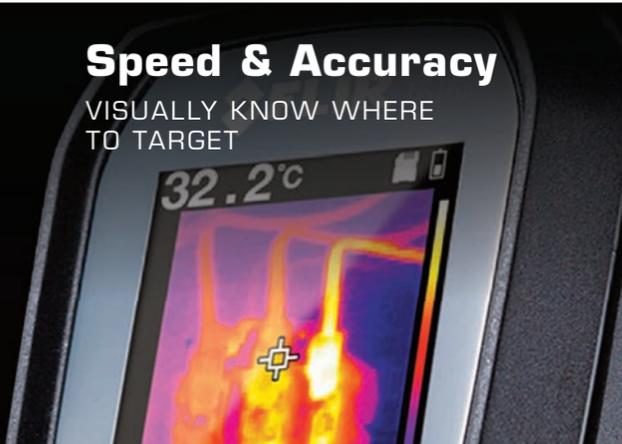
THE TG165 SHOWS WHAT'S HOT FOR INSTANT TROUBLESHOOTING.

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The World's Sixth Sense™



Prepare a cyber defence

Life was so much simpler when computers were subject to malware attacks from worms that infiltrated e-mail systems, stole Outlook contacts and allowed anonymous felons to plague friends, family and business associates.

Computer systems and the data they manage are now subject to much greater risks thanks to state- or otherwise privately supported interlopers who have elevated hacking to a sixth-column of hybrid warfare between states and/or business interests looking to either disrupt operations or steal intellectual property, trade secrets and other sensitive business information.

As governments scramble to get ahead of the geniuses that are relentlessly poking and prodding sophisticated barriers looking for a way in, manufacturers need to be aware of the threat to their businesses and place cyber security high on the action list. The need to address this issue is especially pressing for companies that in addition to protecting IT systems, also adopt smart technologies to access sensitive business and plant information that resides on the ground or somewhere in the "Cloud" using tablets, laptops, cellphones and other devices anywhere, any time, in real time.

Last year's incursion into the National Research Council's system by what Canadian authorities are identifying as China-sponsored hackers served as a flashing red alert for manufacturers. The intruders were lurking in NRC's client information, shopping for innovations and competitive information. The IT system had to be shut down and isolated, and now the Harper government is looking for \$32.5 million to finance a new NRC telecommunications and IT strategy.

A Fraser Institute report (*Cybersecurity Challenges for Canada and the United States*, www.fraserinstitute.org) provides a comprehensive look at the issue and it advocates greater cooperation and sharing between the two trade partners.

There is certainly common cause and the cost to business is astronomical.

The think tank references a 2014 study by the Center for Strategic and International Studies (CSIS) on behalf of McAfee, the security software firm, which estimates the global cost of cyber incursions at between \$375 billion and \$575 billion. Other studies place the damage much higher (in the trillion-dollar range).

CSIS says the cost to Canada appears to be much lower than the cost to the US (0.17% vs. 0.64% of GDP), but suggests the gap may be exaggerated by a lack of systematic data and under reporting.

Another McAfee study involving IT pros pegs the average cost of a breach and loss of intellectual property at \$600,000.

Verizon's 2014 Data Breach Investigations Report (www.verizonenterprise.com) – based on 63,000 incidents in 95 countries – offers a helpful list of the most common attacks. Manufacturers should be especially aware of the following and what to do:

- **Crimeware** (use of malware). Patch anti-virus and browsers. Disable Java in the browser. Use two-factor authentication. Implement configuration change monitoring.
- **Web app attacks** (on content management systems or e-commerce platforms). Use two-factor authentication. Consider switching to a static CMS. Enforce lockout policies. Monitor outbound connections.
- **Cyber espionage** (state-affiliated, targeting intellectual property). Ensure that servers are patched promptly and only give access to people that need it. Segregate key servers. Test your anti-DoS service. Key operations teams need to know how to react if there is an attack.

Be vigilant. Think of cyber security as a shifting target. Continually assess your level of risk, evolve your security measures with developments on the battlefield and don't let your guard down. Cyber malefactors are like super bacteria: they're relentless and won't be put down for long.

Joe Terrett, Editor

Comments? E-mail jterrett@plant.ca.



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» Bulletins

SPOC Automation Inc., an Alabama-based oil and gas industry engineering, software, and automation equipment manufacturer, has completed its acquisition of **KJ Controls Canada** in Spruce Grove, Alta. KJ Controls supplies variable frequency drives and electrical automation solutions for oil and gas and industrial clients across Western Canada.

Essar Steel Algoma Inc. is returning to profitability, reporting a net income of \$26.8 million for the quarter that ended Dec. 3. A year earlier the Sault Ste. Marie, Ont. manufacturer of hot and cold rolled steel products reported a loss of \$38.6 million. The company attributed the gain to higher shipments, higher selling prices and lower costs.

DIRTT Environmental Solutions has entered into a strategic collaboration with **Corning Inc.** It adds the materials science company's **Corning Willow Glass** to DIRTT's interior construction systems. DIRTT, a Calgary-based manufacturer of prefabricated interiors, described the 200 micrometer Corning product as 30 times thinner and lighter than standard 6-mm soda lime glass, chemically durable, scratch resistant, bendable and easy to clean.

Uniboard Canada Inc. is investing \$53 million at its Val-d'Or particleboard and thermally fused laminate facility to increase productivity and modernize key production areas. The company said the investment will also strengthen its facilities in Sayabec and Mont-Laurier, Que. The Val d'Or facility has 186 employees.

Canfor Corp. sold its Taylor, BC pulp mill to its Canfor Pulp Products Inc. subsidiary. The Vancouver-based forest products company said the \$15 million transaction will impact the management reporting structure at **Taylor Pulp** within Canfor Corp. Taylor Pulp employs 106 people and has an annual production capacity of 220,000 tonnes of bleached chemi-thermo-mechanical pulp.

FPIinnovations, Canada's national, industry-led forest research organization, is getting an investment of \$20.6 million from the federal government to develop and commercialize innovative new forest products and technologies.

Ford adds 400 jobs at Oakville plant

Automaker equips for production of the Edge crossover SUV

OAKVILLE, Ont. — Ford Motor Co. says it will add 400 new jobs at its assembly plant in Oakville, Ont. where the new Ford Edge crossover SUV will be built for Canada, the US and more than 100 other countries.

The new jobs are on top of 1,000 positions the automaker announced in October as the plant geared up to build the redesigned Edge with a \$700 million investment.

Ford says the new Edge will go on sale this spring in Canada and the US, and export to Western Europe for the first time.

The company says global demand for utility vehicles is up 88% since 2008 and they now account for 19% of the automotive market. In Europe, the utility vehicle segment grew from 9% market share in 2008 to 21% in 2014. In the US, the vehicle has been the best-selling crossover utility for seven of eight years since its launch.

The Oakville facility has added technology, robotics and



Joe Hinrichs, Ford's president of the Americas, joins Oakville Assembly employees to launch production of the 2015 Ford Edge. PHOTO: FORD

processes. More than 250 robots were added, including new software and vision systems.

Another 1,000 robots have been upgraded.

The new robots will apply urethane to glass, and install panels, doors and hoods to reduce variability. Laser brazing will provide cleaner lines and higher strength seaming of the roof. A "Vehicle on Wheels"

vision system ensures the flushness of doors and latches, while 3D dirt detection technology and robotic automation in the paint shop will employ a more durable application.

The Oakville assembly plant has 4,500 employees who produce the Ford Flex and the Lincoln MKT.

Ford will begin production of the 2016 Lincoln MKX this year.

Magna opens chassis plant in Mexico

130,000 square-foot facility will produce welded structural assemblies

AURORA, Ont. — Magna International Inc. has opened a 130,000 square-foot greenfield facility in Emiliano Zapata, Morelos, Mexico, where it will produce automotive chassis products.

The facility will produce structural welded assemblies for automakers, including Nissan, and is expected to employ up to 300 workers at full production.

Magna established its first facility in Mexico in 1991 with the opening of Autotek Puebla. With Autotek Morelos, it now has 31 facilities and more than 24,000 employees in the country.

The Aurora, Ont.-based auto parts manufacturer has 313 manufacturing operations and 84 product development, engineering and sales centres in 28 countries.

It employs 131,000 people worldwide.



Autotek Morelos brings the number of Magna plants in Mexico to 31. PHOTO: MAGNA

PLANT Off-Site photo feature RETURNS!

Travel with PLANT Magazine to an exotic locale and win \$75

PLANT is reviving its popular Off-Site photo feature.

When you go on a business trip or vacation, be sure to take a copy of PLANT with you. If you have a photo taken while reading your favourite manufacturing publication in a remote, interesting or exotic location and we use it, you'll get \$75.

PLANT has travelled all over the world, visiting such exotic locales as China's Great Wall, and Rome's Coliseum, it has been underwater and was taken on safari. Get snapping and become a PLANT celebrity!

Send photos with name, title, company, address and phone number to Off-Site, PLANT, jterrett@plant.ca. Digital photos should be at least 5x7 inches and 300 dpi.



PLANT reader catches up on what's going on in Canadian manufacturing during a long drop.

Tenneco, USW ink labour contract

CAMBRIDGE, Ont. — The United Steelworkers union (USW) have ratified a three-year collective agreement with automotive parts supplier Tenneco Automotive in Cambridge, Ont.

The new contract runs until February 2018. The company has 430 employees at the Cambridge plant, which makes vehicle exhaust systems and emission control products.

USW Local 2894 President Tony Koski says the deal provides wage and pension increases in each year of the contract, as well as improvements in benefits and contract language.

The union rebuffed the employer's proposal to create a two-tier pension system that would have excluded workers from its current defined benefit pension.

Heroux-Devtek opens \$54.2M Cambridge plant

CAMBRIDGE, Ont.—Héroux-Devtek Inc. has inaugurated a new \$54.2 million manufacturing facility in Cambridge, Ont. It's part of the company's capital investment plan aimed at carrying out a long-term contract to supply The Boeing Co. with complete landing gear systems for the B-777 and B-777X aircraft.

Deliveries are to begin in 2017.

The 108,000 square-foot facility in Cambridge's Boxwood Business Campus will primarily manufacture large-scale, complex landing gear components. It's currently in the pre-production phase and is to be operational by June, creating 40 jobs.

The Ontario government has kicked in \$7 million.

"This new facility will play a pivotal role in executing the most important landing gear contract in Héroux-Devtek's history and its high level of automation will allow us to provide superior quality products to Boeing at a very competitive cost," said Gilles Labbé, the company's president and CEO.

The Longueuil, Qué.-based manufacturer of aerospace components can expand by up to 100,000 square-feet if required and will grow its workforce in Ontario to 250 employees.

Héroux-Devtek UK has also entered into a strategic alliance with C&L Aviation Group (based in Bangor, Me.) to provide MRO services for the Saab 340 30-seat aircraft.

Walter launches national internship search

Program aims to bridge gap between millennials, upper management.

TORONTO — Walter Surface Technologies has launched Next to Succeed, a nationwide search for two of Canada's brightest students that will help to close the leadership gap among millennials and upper management.

Following the company's launch of Objectif: Relève, the Quebec-based internship program last year, Next to Succeed will foster the development of future leaders through a paid internship for business and engineering students to advance their careers at the multi-national company's Montreal-based offices.

"It is our goal to develop Canada's leaders of tomorrow and encourage other Canadian organizations to create strong leadership succession plans by investing in millennials," says Pierre Somers, chairman and CEO of Walter Surface Technologies.

As many senior and second-level execu-



Walter Surface Technologies' CEO, Pierre Somers, and 2014 internship recipient, Ryan Boyd, launch Next to Succeed. PHOTO: WALTER

tives retire or approach retirement, Canadian organizations face a serious leadership succession challenge. According to Statistics Canada 2013 Trends and Forecasts,

companies that transition to the next generation without a succession plan experience a drop in business.

"The Canadian population is aging and there is a critical need to fast-track efforts to train the next generation of young leaders," says Alain Gosselin, a professor in the Department of Human Resources Management at HEC Montreal.

The internship program provides access to training and development involving key projects in R&D, finance, operations and marketing.

Students can apply for the internship on the company's website (walter.com/NexttoSucceed).

Two interns will be selected on May 8 to complete the program, which will run from June to August.

Walter Surface Technologies is a provider of surface technologies.

» Careers



Michael Blundell

Michael Blundell, president of KSB's Canadian subsidiary in Mississauga, Ont., has been appointed president of KSB Group's USA operation, headquartered in Richmond, Va. Blundell will work to align management and strategy in the two countries. The KSB Group, an international manufacturer of pumps, valves and related systems, is headquartered in Frankenthal, Germany.



Isabelle Faucher

Carton Council of Canada has appointed **Isabelle Faucher** managing director. She comes from Reclay StewardEdge in Toronto, a consulting firm that specializes in sustainability issues. Carton Council includes a number of Canadian carton manufacturers.

Ryan Deska has joined the Canadian Renewable Fuels Association (CRFA) public affairs team. In addition to liaising with the media, he'll work closely with partners and organizations to advance Canada's biofuels industry and emerging bioeconomy.

KOM International Inc., a global supply chain consultant based in Montreal, has appointed **Keith Swiednicki** president and CEO. He has been with the company for 30 years, and president for the past eight years.

Michel Gueguin, a career researcher at the Technology Center RIO TINTO Iron & Titanium (RTIT) in Sorel-Tracy, Que. has joined the board at Canadian Metals Inc., which is developing a high-purity silica deposit in Quebec.

CRS Electronics Inc., a manufacturer of LED lighting products based in Toronto, has appointed **Michael Lam** CFO, replacing **Matthew Groen**. He was self-employed as a consultant, but previously assumed the CFO role from October 2012 to May 2013.

Hiram Walker adds \$8M line

Expands Windsor production by 230,000 cases



Wiser's whisky on the line at a Hiram Walker's Windsor, Ont. plant. PHOTO: HIRAM WALKER

WINDSOR, Ont. — Hiram Walker & Sons Ltd. has added a new \$8 million production line to its Windsor, Ont. facility.

The new line and facility upgrades have expanded bottling capabilities for an additional 13 new bottle formats, including McGuinness and Meaghers liqueurs, and will boost production by 230,000 cases per year.

Hiram Walker, a subsidiary of global spirits and wine make

Pernod Ricard S.A., says the changes allow the plant to efficiently produce small production volumes and build greater flexibility for new product innovation.

The investment includes a \$1 million investment from the Ontario government's Rural Economic Development Program.

Hiram Walker, in Windsor for the past 150 years, says it has invested \$80 million in the site during the last 10 years.

ATCO lands \$127M deal for LNG project

CALGARY — ATCO Structures & Logistics Pty. Ltd. will design, manufacture and install 435 modular buildings under its current agreement with Bechtel on the Chevron-operated Wheatstone project in Western Australia.

The additional work is valued at an estimated \$127.4 million and will start in March 2015 with completion in late 2015.

This is the fourth major contract supporting liquefied natural gas projects in Australia.

ATCO undertakes off-site construction and on-site installation simultaneously, using a coordinated just-in-time methodology. In 2013, it opened the world's largest customized modular manufacturing facility in Australia with capacity to produce more than 250 modules per month.

ATCO Structures & Logistics is part of the ATCO Group of Companies, a Calgary-based global company with more than 9,000 employees.

CME partners with CPEIA

OTTAWA — The Canadian Printable Electronics Industry Association (CPEIA) and Canadian Manufacturers & Exporters (CME) have partnered to explore and develop manufacturing applications for printable and organic electronics.

"Printable and organic electronics is an emerging manufacturing platform for high-volume, low-cost and automated production of a variety of electronic components," said Peter Kallai, executive director of the CPEIA. "It has far-reaching applications to power the connected world and the Internet of Things, by making objects smart and connected."

CPEIA said its new connection with CME will better educate Canadian manufacturers and product companies about new business opportunities. It will also connect technology innovators with end users in industry verticals including automotive components, smart textiles,

medical devices and intelligent packaging.

Printable and organic electronics will help reduce production costs, but key challenges remain to apply new materials, microcircuits, manufacturing equipment and processes, and information systems for specific applications and bring them to market.

The memorandum of understanding is a non-financial commitment to collaborate on a number of initiatives until 2017, including educational events such as webinars, working groups that will develop white papers and assistance to help members secure funding from external sources for development and commercialization activities.

CPEIA was established in 2014 to bring together Canadian and international players in industry, academia and government to develop the printable and organic electronics technology sector in Canada.

NRCan installs \$6M rolling mill at Hamilton lab

HAMILTON, Ont. — A new pilot scale rolling mill is now in service at a Natural Resources Canada (NRCan) facility in Hamilton.

According to NRCan, the \$5.96-million mill, installed at its CanmetMATERIALS facility, "will serve both the pipeline and automotive industries."

The mill will also help develop high-strength and thick-pipe steel alloys to enhance Canada's pipeline safety system. It will be accessible to industry players interested in research and development work on a cost-recovery basis.

Relocated from Ottawa to Hamilton in 2010 (to better support Canada's manufacturing sector), CanmetMATERIALS is the largest research centre in Canada dedicated to metals and materials research.

Parmalat Canada consolidates cheese operations

MARIEVILLE, Que. — Parmalat Canada will consolidate its cheese production and transfer operations from its Marieville plant to its facility in Victoriaville, Que., a move the company says will retain 410 positions and add 15 jobs.

A new production line for mozzarella will be installed in Victoriaville, which will become Parmalat's sole cheese production facility in Quebec.

There are 92 employees at the Marieville cheese facility. The new jobs will be offered to those willing to relocate.

Siemens partners with Ontario colleges

Training programs will expand technology curriculums

TORONTO — Global manufacturing giant Siemens has partnered with Seneca College and Sheridan College to improve programs for students in science, technology, engineering and math disciplines.

At Seneca, Siemens says it plans to establish a certification training program, in areas such as Mechatronics and/or Smart systems; contribute to the curriculum of current programs and design potential programs; and expand internships, apprenticeships, co-operative programs, and international assignments.

Siemens and Sheridan College have also formalized a partnership to collabo-

rate on curriculum development, training programs and applied research related to Canada's manufacturing industry at the college's Centre for Advanced Manufacturing and Design Technologies in Brampton, Ont.

Sheridan's Davis Campus houses a working industrial research and development space manned by faculty and staff, where local businesses carry out research and development.

Siemens will lend technology, resources and expertise to aid students and faculty in developing innovation and



Seneca's David Agnew (L), and Siemens Canada CEO Robert Hardt sign an MOU at the college's Newnham campus.

PHOTO: SIEMENS

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» Events

ISA Convention

ISA

April 25-28, Cleveland

The International Society of Automation (ISA) annual conference is for distributors, manufacturers/suppliers, industrial manufacturer representatives and service providers in MROP. Visit www.isapartners.org/events/annual-convention.

Partners in Prevention 2015

WSPS

April 28-29, Mississauga, Ont.

Workplace Safety & Prevention Services (WSPS) presents its annual health and safety conference and trade show with more than 60 sessions and 400 exhibits. Keynotes include Chris Hadfield, first Canadian commander of the International Space Station. Visit <http://wsps.ca/Partners-In-Prevention/Conference/Home>.

STLE 70th Annual Meeting & Exhibition

May 17-21, Dallas

Omni Hotel

The Society of Tribologists and Lubrication Engineers (STLE) conference showcases more than 400 technical papers, application-based case studies and best practice reports, and discussion panels on technical or market trends. Visit www.stle.org.

WMTS

SME

June 15-17, Edmonton

The Western Manufacturing Technology Show (WMTS) features state-of-the-art machinery and equipment for manufacturers in Western Canada, plus educational sessions, industry keynotes, an interactive town hall panel and networking opportunities. Visit www.wmts.ca or call (888) 322-7333, ext. 4435.

BSA 2015

BSA

May 2-5, Amelia Island, Fla

The Bearing Specialists Association's (BSA's) annual convention is themed "Relationships Matter." The business program will examine how relationships are the core to successful long-term partnerships and consider some new technologies. Visit www.bsaconventions.org.

The Truth About Compressed Air!

If you think compressed air is too expensive and noisy - read this. The facts will surprise you!

Compare these Blowoffs

There are a variety of ways to blow the water from the bottles shown in the photo below, but which method is best? To decide, we ran a comparison test on the same application using four different blowoff methods: drilled pipe, flat air nozzles, Super Air Knife (each using compressed air as a power source), and a blower supplied air knife (using an electric motor as a power source). Each system consisted of two twelve inch long air knives. The following comparison proves that the EXAIR Super Air Knife is the best choice for your blowoff, cooling or drying application.

The goal for each of the blowoff choices was to use the least amount of air possible to get the job done (lowest energy and noise level). The compressed air pressure required was 60 PSIG which provided adequate velocity to blow the water off. The blower used had a ten horsepower motor and was a centrifugal type blower at 18,000 RPM. The table at the bottom of the page summarizes the overall performance. Since your actual part may have an odd configuration, holes or sharp edges, we took sound level measurements in free air (no impinging surface).



Drilled Pipe

This common blowoff is very inexpensive and easy to make. For this test, we used (2) drilled pipes, each with (25) 1/16" diameter holes on 1/2" centers. As shown in the test results below, the drilled pipe performed poorly. The initial cost of the drilled pipe is overshadowed by its high energy use. The holes are easily blocked and the noise level is excessive - both of which violate OSHA requirements. Velocity across the entire length was very inconsistent with spikes of air and numerous dead spots.



Blower Air Knife

The blower proved to be an expensive, noisy option. As noted below, the purchase price is high. Operating cost was considerably lower than the drilled pipe and flat air nozzle, but was comparable to EXAIR's Super Air Knife. The large blower with its two 3" (8cm) diameter hoses requires significant mounting space compared to the others. Noise level was high at 90 dBA. There was no option for cycling it on and off to conserve energy like the other blowoffs. Costly bearing and filter maintenance along with downtime were also negative factors.



Flat Air Nozzles

As shown below, this inexpensive air nozzle was the worst performer. It is available in plastic, aluminum and stainless steel from several manufacturers. The flat air nozzle provides some entrainment, but suffers from many of the same problems as the drilled pipe. Operating cost and noise level are both high. Some manufacturers offer flat air nozzles where the holes can be blocked - an OSHA violation. Velocity was inconsistent with spikes of air.



EXAIR Super Air Knife

The Super Air Knife did an exceptional job of removing the moisture on one pass due to the uniformity of the laminar airflow. The sound level was extremely low. For this application, energy use was slightly higher than the blower but can be less than the blower if cycling on and off is possible. Safe operation is not an issue since the Super Air Knife can not be dead-ended. Maintenance costs are low since there are no moving parts to wear out.

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

Facts about Blowers

Energy conscious plants might think a blower to be a better choice due to its slightly lower electrical consumption compared to a compressor. In reality, a blower is an expensive capital expenditure that requires frequent downtime and costly maintenance of filters, belts and bearings. Here are some important facts:

Filters must be replaced every one to three months.

Belts must be replaced every three to six months.

Typical bearing replacement is at least once a year at a cost near \$1000.

- Blower bearings wear out quickly due to the high speeds (17-20,000 RPM) required to generate effective airflows.
- Poorly designed seals that allow dirt and moisture infiltration and environments above 125°F decrease the one year bearing life.
- Many bearings can not be replaced in the field, resulting in downtime to send the assembly back to the manufacturer.

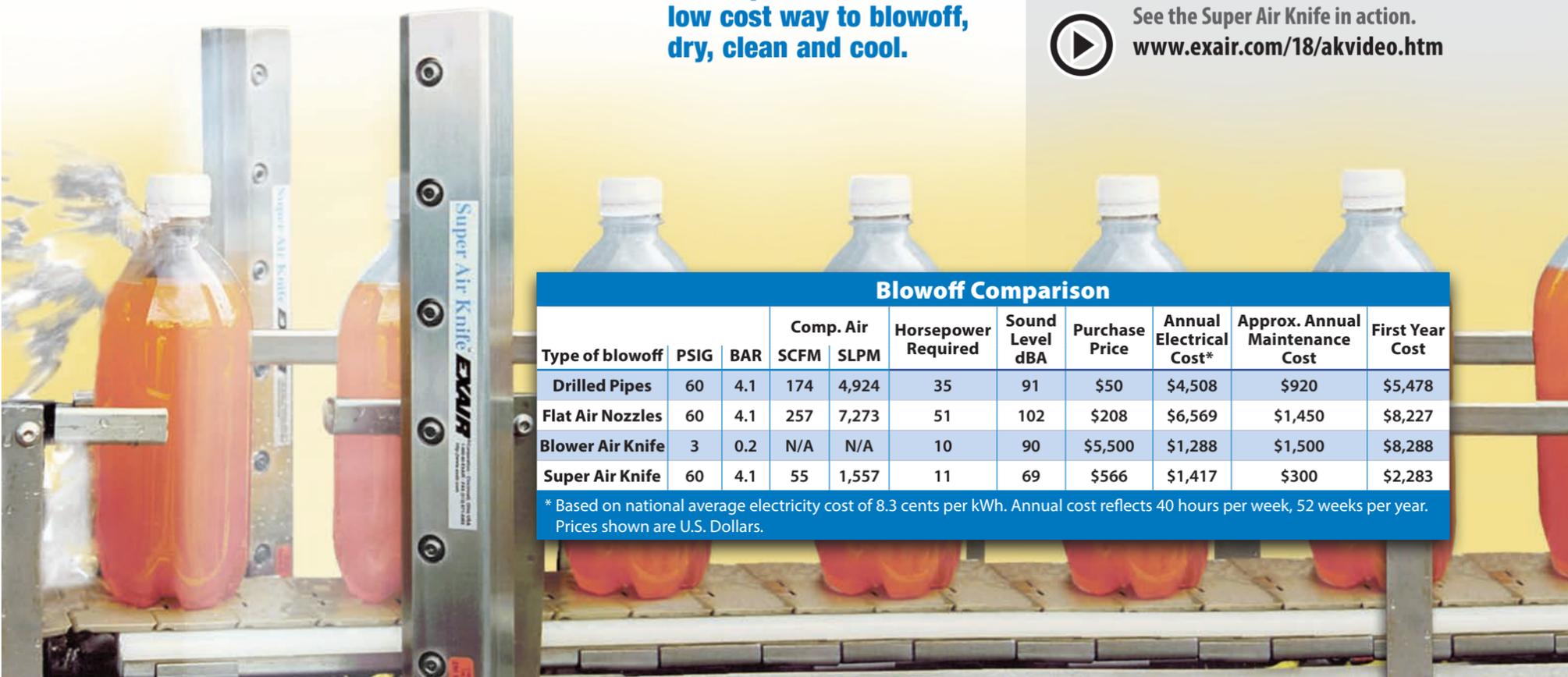
Blowers take up a lot of space and often produce sound levels that exceed OSHA noise level exposure requirements. Air volume and velocity are often difficult to control since mechanical adjustments are required.

To discuss an application, contact:

EXAIR Corporation
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Cincinnati, Ohio 45249-1621
(800) 903-9247
Fax: (513) 671-3363
email: techhelp@exair.com
www.exair.com/18/423.htm



See the Super Air Knife in action.
www.exair.com/18/akvideo.htm



Blowoff Comparison

Type of blowoff	PSIG		Comp. Air		Horsepower Required	Sound Level dBA	Purchase Price	Annual Electrical Cost*	Approx. Annual Maintenance Cost	First Year Cost
	BAR	SCFM	SLPM							
Drilled Pipes	60	4.1	174	4,924	35	91	\$50	\$4,508	\$920	\$5,478
Flat Air Nozzles	60	4.1	257	7,273	51	102	\$208	\$6,569	\$1,450	\$8,227
Blower Air Knife	3	0.2	N/A	N/A	10	90	\$5,500	\$1,288	\$1,500	\$8,288
Super Air Knife	60	4.1	55	1,557	11	69	\$566	\$1,417	\$300	\$2,283

* Based on national average electricity cost of 8.3 cents per kWh. Annual cost reflects 40 hours per week, 52 weeks per year. Prices shown are U.S. Dollars.



Bring balance back to the economy

BY HASSAN YUSSUFF

As the slide in oil prices impacts the economy and the repercussions for planned investment and employment become clearer, it's an opportunity to reflect on Canada's out-of-balance economic growth.

Manufacturing has been put through the wringer during the last 15 years. An over-valued dollar, intense competition in US and global markets, and the 2008-09 recession took a heavy toll on businesses and workers. Fifteen years ago, manu-

“A renewed strategy for advancing manufacturing should be linked to responsible resource use...”

facturing accounted for almost 16% of Canada's GDP, but it represents less than 11% today. Employment in the sector fell by more than 25% from its 2002 high, and today remains at the low levels reached when the economy bottomed out in 2009.

Between 2002 and 2012, about a quarter of Canada's manufacturing businesses closed shop. With so much scrapped machinery and equipment, it will be some time before capacity recovers.

Uncontrolled resource extraction has been a major driver of the profound restructuring in manufacturing. High oil prices fuelled high profits in petroleum and related industries, sparking a sharp increase in foreign direct investment and speculative inflows. This led to a rising exchange rate and a dramatically overvalued dollar relative to the fair value of the currency. While the US dollar was falling against world currencies at the same

time, the Bank of Canada attributed about half of the loonie's overvaluation to oil prices and currency speculation.

The dramatic expansion of oil and gas extraction, coinciding with the decline of central Canadian manufacturing, had a profound impact on the economy. By the mid-1990s, it became less diversified, resilient and productive. In the early 2000s, the share of raw and semi-processed materials in Canadian exports rose, and economic activity shifted away from tradeable sectors.

As these imbalances unwind, the importance of a revitalized manufacturing sector is clear. High productivity levels and relative high rates of its growth are critical to our economy and standard of living, and to create well-paid, high-quality employment. Manufactured products are vital for a successful trade strategy, avoiding ongoing balance of payments problems, and strong growth in external demand is an important driver of productivity growth.

Invest in R&D

Manufacturing accounts for a higher share of GDP allocated to R&D, which strengthens innovation through the economy via links to services and other industries. Investing in the sector will be necessary if we want to lift business spending on R&D (0.88% of GDP in 2012), which is down from 2002 levels, and well below the OECD average of 1.63%.

Canada also needs a new approach to resource extraction. Building on our resources fosters wider, long-term economic opportunities in manufacturing and other industries.

This would require deliberate steps to promote refining, processing and the secondary manufacturing of raw materials in Canada. Measures are also needed to ensure the machinery, equipment and services – as inputs to the resource industry – contain a growing level of Canadian content.

Canada's trade deficit in industrial machinery and equipment doubled between 2001 and 2012. A sectoral strategy to manufacture industrial machinery could aim at reducing carbon emissions in resource extraction while seeking new domestic and international markets connected to green economies over the longer-term.

A sovereign wealth fund to capture a greater share of petroleum revenues would also help stabilize the economy, finance investment in manufacturing and cushion against future swings in oil prices.

Something to think about before the next “gold rush” in the oil and gas sector gets underway.

Hassan Yussuff is the president of the Canadian Labour Congress, which represents 3.3 million workers across the country in every sector of the economy. Visit www.canadianlabour.ca.

Comments? E-mail jterrett@plant.ca.



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Where Discoveries Begin

Just one new idea can spark change

KEYNOTE SPEAKERS



CHRIS HADFIELD
First Canadian Commander of the International Space Station (2013)
The Sky is Not the Limit



DR. JOE MACINNIS
Renowned Explorer | Leadership & Teamwork Expert
Leadership Lessons from the 7-Mile Dive into the Marianas Trench



MICHAEL LANDSBERG
Host of TSN's Off the Record
Darkness & Hope: Depression, Sports, & Me

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PLANT PULSE

ECONOMIC DEVELOPMENTS AND TRENDS

ECONOMIC ENGINE

Is Ontario capable of leading?

With Canada's oil producing provinces no longer the big drivers of growth, Ontario is being touted as the economic engine that will move the nation forward.

Analysts note the stars are in alignment, thanks to economic expansion in the US, a lower value loonie and lower energy prices.

But will Ontario be up to the job?

Douglas Porter, BMO's chief economist, offers a qualified yes in a Feb. 20 *BMO Focus* report, but he outlines four factors that will hold the province back.

China and Mexico are two significant new competitors. China accounts for almost 20% of all US imports as Canada's share has rolled back to 15%, while Mexico has been out producing Canada in the auto sector "for the first time."

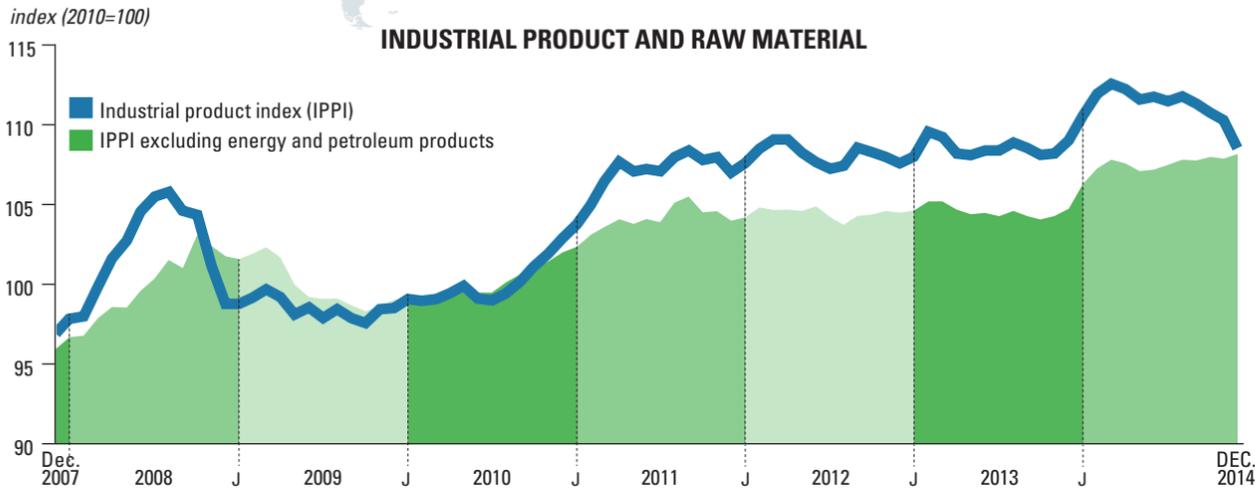
Ontario was also hobbled by the loss of many plants during the recession. Utilization rates are at pre-recession levels, but manufacturers will have a hard time keeping up with stronger US demand. Porter notes transportation is at 95.6%, the highest level since 1987. With no new plants or expansions on the horizon and an uncertain future for some assembly plants, he says there's little room for expansion to accommodate an increase in domestic/US sales. And the Bank of Canada has found 40% of firms already would have at least some difficulty meeting an unexpected pick-up in demand.

Fiscal challenges are another limiter. Ontario's projected \$12.5 billion budget deficit represents 1.7% of GDP. The gap was larger in the early 1990s, but the debt overhang is nearly 40% of GDP versus closer to 30% in the mid-1990s, with weaker medium-term growth prospects than in prior decades. He says the combination of spending restraint and tax increases will restrain medium-term provincial GDP.

Population growth in the 15-64 age group is now just 0.4% year-over-year – nearly a full point below the 35-year trend. He says this factor alone constrains Ontario's growth outlook compared with past cycles, even as migration to Alberta slows.

Other irritants include high electricity costs, increases in corporate and personal income taxes and some estimates suggest up to 20% of manufacturing activity will be hit by the steep drop in capital spending in the energy sector. But BMO believes a 10% year-over-year drop in the loonie and much lower energy prices will offset these "drags".

Bottom line, prospects are promising but he cautions against expecting miracles.



PRICES FOR INDUSTRIAL GOODS DECREASE

Thank the drop in energy and petroleum product prices for a 1.6% decline in December's Industrial Product Price Index. Lower prices for chemicals and chemical products (-1.4%) also contributed to the decrease, again thanks to fossilly volatiles such as hydrocarbon gases (-13.8%), plus liquified refinery and acyclic hydrocarbons otherwise not classified (-10.5%).

Source: Statistics Canada



\$1.4 BILLION

The value of more than 7.5 million cubic metres of lumber shipped to China last year. In 2013, 7.9 million cubic metres were sold for \$1.39 billion.

Source: BC government

The percentage of Canadians (based on a survey) who now use a tablet to organize their business and private lives.

43%

Source: BMO



3.4%

This is the increase in the Machinery and Equipment Price Index from Q3 to Q4 last year, due in large part to the loonie depreciating against the US buck by 4.1%.

Source: Statistics Canada

\$591 MILLION

Sales generated by R&D in the manufacturing sector (2013). Companies that make things accounted for half of Canada's business R&D.

Source: Statistics Canada



GROWTH SLIDES WITH OIL PRICES

Canada's economy will grow at a much slower rate than expected this year because of the drop in oil prices, and the toll this will take on business investment and corporate profits, according to the Conference Board's winter outlook.

Projected growth has been rolled back to 1.9% from a 2.4% forecast in November.

The Ottawa-based research firm says business investment will be the weakest part of the economy, with spending on energy structures and exploration dropping 23%.

Trade (concentrated in Ontario and Quebec) will be the bright spot because of a strong US economy and a lower dollar.

The Conference Board says the drop in oil prices should boost consumer spending because of lower gas prices, which should save the average household almost \$1,000 this year. However, growth in consumer spending is expected to slow.

Interest rates are projected to stay put until 2016.

Cha-ching! But not in a good way. If you live in Ontario, the Fraser Institute says this is how much you owe (in a virtual sense) based on the province's net debt (\$287 billion by the end of fiscal 2014/15, which represents 40% of the economy). The debt has grown \$117 billion since the recession, and not because of investment in infrastructure. Blame it on government borrowing to fund day-to-day expenses.

\$21,000

DEBT



Release the SWARM!

AERYON'S DRONES TAKE FLIGHT IN WORLD MARKETS

The Ontario Exporter of the Year is launching the small flying machines into new markets to serve a range of non-military applications.

BY MATT POWELL, ASSOCIATE EDITOR

Dave Kroetsh can't stop smiling. His company, Aeryon Labs, has just won the second of its two awards at the 2014 Ontario Export Awards, an exclusive November luncheon, and Kroetsh, outfitted in a bright turquoise shirt and snappy matching stripped tie, shakes hands as he makes his way onstage to collect the award for Exporter of the Year.

Despite a biting wind on that cold and grey day at the International Centre in Toronto, there are plenty of warm feelings for the Waterloo, Ont.-based manufacturer of small unmanned aerial systems (sUASs), more commonly known as "drones."

Aeryon is taking two trophies, having also won the top prize in the Consumer Products category at the awards event presented by Canadian Manufacturers & Exporters, CanadianManufacturing.com and PLANT.

After he collects the hardware, colleagues and peers launch a barrage of congratulations, back pats and hand shakes. Kroetsh is still smiling.

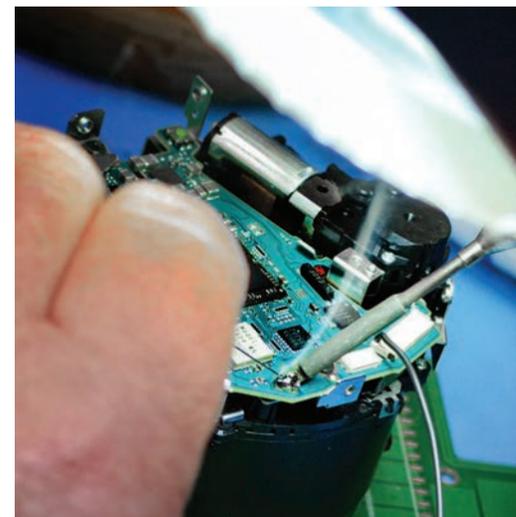
He needn't have been too surprised by the wins. The company he founded with two University of Waterloo pals has had enormous success during its short existence and is continually breaking away from the stereotype associated with drones.

Until recently, they were mostly used for covert military operations in conflict zones. Aeryon is leading an industry charge to introduce a new kind of drone that has applications in a number of commercial and industrial activities, as well as safety and humanitarian efforts. And it's having an impact in worldwide



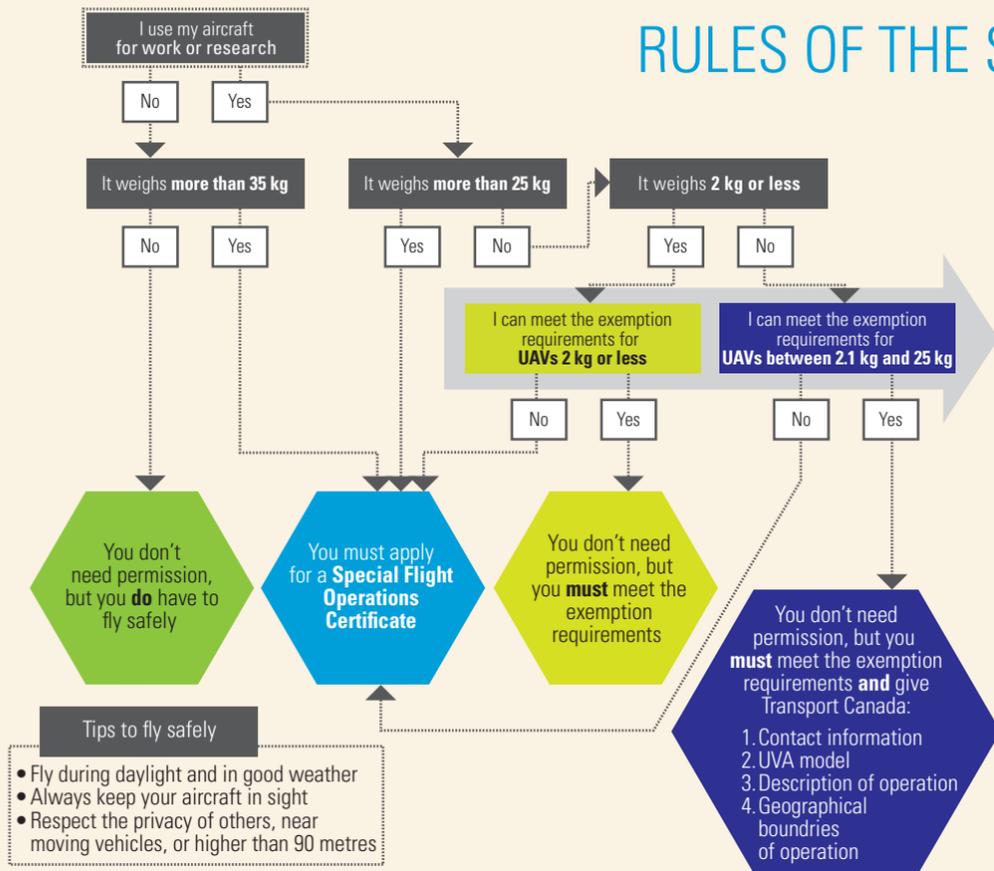
Aeryon president and CEO Dave Kroetsh shows off the company's Scout sUAV.

PHOTOS: STEPHEN UHRANEY



Aeryon sources most of its materials, including plastics and PCBs, from Ontario suppliers.

RULES OF THE SKY



Transport Canada released its updated rules for flying unmanned aerial vehicles (UAVs) in October, which include guidelines to avoid heavily populated areas and not flying them over military bases and prisons.

Operators must also keep UAVs in their field of vision at all times and only fly them during the day, in good weather. Failing to follow any of the rules can result in a fine of between \$3,000 to \$25,000. And you have to have a Special Flight Operations Certificate if you're using drones for work.

Not sure if you're permitted to fly a UAV? Use this graphic to get a better idea of what you need before you take off, and check out www.tc.gc.ca for the latest drone regulations.

Source: Transport Canada

system to set flight paths and manoeuvre multiple cameras outfitted on a three-axis gimballed mount, which capture 11 megapixel images and 1,080P 3D HD video in a basic set up.

The controls and images are broadcast through a 256 bit AES-encrypted network that has a range of three kilometres beyond line of sight. A number of custom payload options are also available, including the popular GoPro HERO3 action video camera.

An updated "Map Edition" of both models includes Pix4Dmapper software for field and office image processing, including integrated tools for 3D output visualization and editing.

Transport Canada has recently updated rules related to flying the drones, which cost between \$65,000 to \$120,000, depending on the level of customization. Operators now require a special operating certificate when using them for work, especially in built-up areas (see infographic).

Jack of all trades

The Ontario Provincial Police is using the drones to clear traffic accident sites quicker, as it did for a crash on Highway 401 near Bowmanville, Ont. in December when a big rig tipped, tragically killing the driver and scattered a load of gravel. The drones helped emergency responders re-create the crash, then re-open the highway quickly.

In the Philippines, an Aeryon drone loaned to Toronto-based aid group Global Medic assisted in emergency relief efforts after the deadly Typhoon Hagupit hit the island nation in December, providing relief workers with a bird's eye view of where aid was needed most.

Meanwhile, a SkyRanger UAV was deployed near Nome, Alaska to help the US Coast Guard deliver emergency fuel to iced-in residents after the isolated town was pounded by a winter storm.

And in 2011, a private security firm purchased two Aeryon Scouts in a deal orchestrated by the Canadian government for deployment in Tripoli, Libya for besieged rebels fighting the Gadhafi regime.

"Our focus has always been to create products that can be used by professionals who work in situations that are often dangerous, dirty, and difficult-to-reach,

Continued on page 12

markets.

"Nobody knew what a drone was seven years ago," says Kroetsh, 35, Aeryon's president and CEO. "We've created a market for these vehicles, which changes how you sell them – that's been our biggest challenge – it's more of a customer education process."

Poised for growth

The privately-owned company was founded by Kroetsh with his U of W buddies Mike Peasgood and Steffen Lindner in 2007, all of whom have backgrounds in telecom and digital video systems.

They envisioned a system that would handle the flying, allowing the user to get the job done and Aeryon's accomplishments are part of a trend in the UAV industry – massive growth. A report by New York-based research and intelligence firm ABI Research predicts the global sUAS market will top \$8.4 billion by 2018. The commercial sector will dominate, with revenues exceeding \$5.1 billion, for a compound annual growth rate of 51%, which is roughly five times greater than the hobby market and two and a half times the military and civil market segments.

He won't disclose numbers, but Kroetsh says the company's revenues have grown 100% year-over-year in each of the last five years. Aeryon and its (now 70) employees have moved twice

between 2011 and 2013, each facility bigger than the last. The team is now settled into a 40,000 square-foot office and manufacturing headquarters in north Waterloo where it produces Scout and SkyRanger sUASs.

About 80% of production is exported to the US, Iraq, Ecuador and Indonesia. Fifty per cent are military customers and the other half represents an even split between commercial and public safety clients. They include police and fire services, oil and gas and power companies, and an unnamed company that uses the drones for road and bridge inspections.

These aren't your hobby shop, remote-controlled helicopters flown around neighbourhood parks by pretend pilots and their kids. Both models carry impressive technological payloads, and are customizable with different types of cameras and analytic devices.

But Kroetsh cites the drones' ease of use as a competitive advantage. There's also a significant cost advantage for commercial clients in applications where the drones replace pricey helicopter rentals.

"These people aren't pilots – it's about being able to use the product easily and get the job done," says Kroetsh.

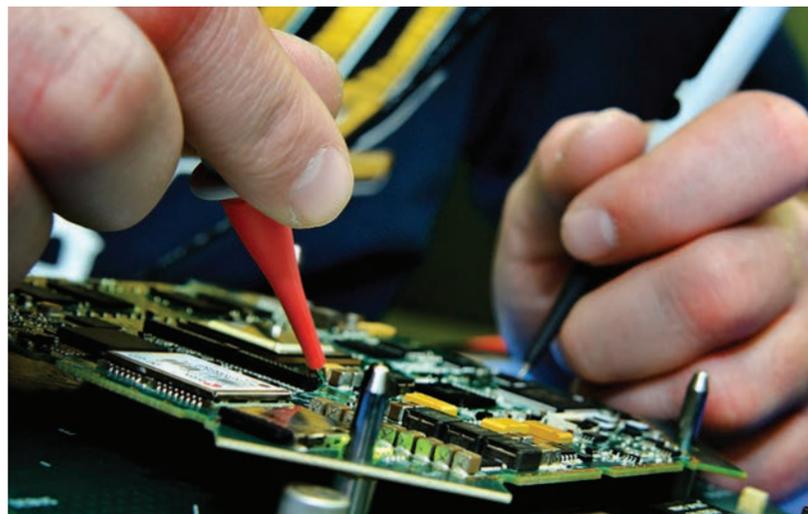
The Scout is a vertical take-off and landing (VTOL) sUAS. Aeryon describes it as best suited for public-safety, commercial and industry users. A simple point-

and-click navigation and camera control system makes training easy, so it suits applications that require survey-grade accuracy orthomosaics, DSMs and point clouds from aerial or oblique imagery. It integrates seamlessly with GIS, CAD and traditional photogrammetry software.

A drone outfitted with a thermal camera and programmed to fly over oil and gas sites would inspect flare stacks and pipelines for leaks or disturbances, or to monitor soil composition and vegetative health using a Normalized Difference Vegetation Index (NDVI). It's achieved by combining infrared images with the Scout's Photo3S-NIR payload with visible light images. In this case, the Scout would provide a major cost advantage because the drone would replace costly satellites or airplanes.

The SkyRanger is a VTOL quadcopter. Its arms and legs fold down for easy storage in a backpack for military and emergency applications such as tactical awareness and targeting, reconnaissance and surveillance, and convoy security. Ruggedized and weather sealed, it handles temperatures between -30 to 50 degrees C and winds up to 65 kilometres per hour.

Both of Aeryon's drones weigh between three to six pounds and are battery-powered for flights of up to 50 minutes. Operators use a tablet-like ground control



The company employs 5S, visual management and kanban systems to keep its manufacturing processes simple.



The drones carry a variety of technology payloads, including analytic devices and the popular GoPro HERO3 action video camera.

Super high-tech

Continued from page 11

and to provide a safer, more cost-effective alternative for people to do their jobs," says Kroetsh. "Keeping people safe is definitely something we value."

While the majority of Aeryon's products are shipped around the world, the drones are decidedly Canadian, each containing about 80% domestic content such as printed circuit boards (PCBs) and plastics, says Rob McMillan, Aeryon's vice-president of operations.

"We're on a hundred-mile diet with most of our materials, which is really helpful when you're in a market that's developing new products and having the ability to work with your suppliers in a timely manner. The volume and scale at which we operate is also suitable for North American manufacturing."

As a growing company, working quickly is also a competitive advantage.

"The speed at which we move is the exciting part. We're leading the market, and defining it. I've been here for nine months, but it feels like three years because we've achieved a lot in that time."

The company's new facility, which includes 13,000 square-foot of manufacturing space, with an additional 22,000 square feet at the ready, was a blank slate. Aeryon deployed visual management, 5S and kanban manufacturing processes to keep the production process as simple as possible to handle any number

of customization requests easily. It also has a number of kanban agreements with suppliers to keep in-house inventory low, but easily accessible.

McMillan says keeping all the products on a kanban or pull system makes custom requests easier to handle.

"If someone wants something different, we're able to handle that request without disrupting the flow of the line," he says.

Virtually everything onboard its drones is customizable, including the number of batteries to which each is outfitted, plus different camera and device mounts.



Aeryon is focusing its R&D on improving flight times and technology payloads.

Indeed, customization is a big part its business as customers seek new applications for the drones, making Aeryon's commitment to R&D key.

"R&D is not just a commodity, it's a huge element of what we do," says Kroetsh, adding that Aeryon has participated in both the Industrial Research Assistance Program (IRAP) and makes use of the Scientific Research and Experimental Development (SR&ED) tax credit.

R&D focused

It also received \$985,000 in funding from the Federal Economic Development Agency for Southern Ontario (FedDev

Ontario) in 2012 to manufacture and commercialize the Scout sUAV, and it's working with Canadian Manufacturers & Exporters' SMART program this year.

"As things have evolved, our challenge now is to show people how we're different from the other products that are available," says Kroetsh.

That includes new projects to extend flight time and expand technology payloads such as VTOL compatibility with different cameras.

McMillan, a UK-transplant who joined Aeryon in March of last year after spending 10 years leading NPI and manufacturing teams at Blackberry, says the high level of Canadian content helps with some of the company's export certifications. For instance, Aeryon has an advantage over manufacturers in the US where there's strict restrictions around exports that have defence capabilities.

It also helps that Aeryon is manufacturing a product that got worldwide applicability, says Kroetsh.

"We're not making steel containers or pipes, which aren't as well suited for the world wide market. We're making a product that's unique and provides a service that disrupts traditional applications."

As the drone market gains altitude, Aeryon's focus on R&D and breaking into new export markets will continue to demonstrate how smaller Canadian manufacturers can make a big impression.

Comments? Email mpowell@plant.ca.

» Nano Technology Rechargeable battery breakthrough

Could more than double lithium-ion battery capacity

Researchers from Singapore's Institute of Bioengineering and Nanotechnology (IBN) of A*STAR and Quebec's IREQ (Hydro-Québec's research institute) have achieved a breakthrough that could lead to longer-lasting rechargeable batteries for electric vehicles and other mobile devices.

The five-year research collaboration established in 2011 has synthesized silicate-based nanoboxes that could more than double the energy capacity of lithium-ion batteries (compared to conventional phosphate-based cathodes).

"IBN researchers have successfully achieved simultaneous control of the phase purity and nanostructure of Li₂MnSiO₄ for the first time," said Professor Jackie Ying, IBN's executive director. "This novel synthetic approach would allow us to move closer to attaining the ultrahigh theoretical capacity of silicate-based cathodes for battery applications."

Next step for the researchers is to further enhance the new cathode materials to create high-capacity lithium-ion batteries for commercialization.

IBN is the world's first bioengineering and nanotechnology research institute.

IREQ, conducts R&D in energy efficiency, energy storage and other energy-related fields. Hydro-Québec invests \$100 million in research annually.

» Automotive R&D What's driving boomers?

AUTO21 study tracks their road behaviour

BY KINGA ELIASZ AND BRENDA VRKLJAN

There's a seismic shift underway among the drivers of tomorrow. In 2011, baby boomers began turning 65, joining the ranks of seniors, the fastest growing group of drivers in Canada. In 2009, there were 3.25 million of them and by 2028 their numbers are expected to double.

With aging comes the onset of medical conditions and other health-related changes that affect the way people drive and use their automobiles.

Driving is critical to quality of life and independence, so it's imperative an effective screening measure is developed to correctly flag those who may be a medical risk. But there's also a need to support safe driving among older people for as long as possible.

Baby boomers represent a significant and influential segment of the car buying market. How they drive will influence vehicle design and innovations.

The Canadian Driving Research Initiative for Vehicular Safety in Elderly (Candrive) received funding from the Canadian Institutes of Health Research (CIHR) to track the health, driving patterns and crashes of 928 drivers aged 70 and older over five years. But the project didn't capture how they actually drive their automobiles. Now it does.

A partnership with the AUTO21 Network of Centres of Excellence provides funding to a team of researchers and graduate students from engineering, kinesiology and occupational therapy at McMaster, Ottawa and McGill universities. Their research, the first of its type in the world, uses video and GPS data to quantify changes in actual on-road driving behaviour within a sub-group of drivers from the Candrive study.

An in-car recording system developed with industrial partners



The system's three cameras provide a 180-degree view both inside (including the driver) and outside of the car. A fourth camera captures the participant's vehicle within the environment (bottom right quadrant).

PHOTO: AUTO21

Persentech and GoPro applies GPS-technology to capture driving patterns using three HD cameras that provide a 180-degree view inside and outside of the car. A fourth camera captures the vehicle within the environment.

The team tracks changes in performance across time and identifies key factors that influence the safety of older drivers, including their use of vehicle design features.

Driving is the most viable means of transportation within this age group. Understanding how boomers drive and use their vehicles provides an opportunity to develop effective strategies that will promote their safety and the safety of others using the road.

Watch AUTO21's award-winning video of the project, *Innovations that enhance the safety of older drivers* at <https://www.youtube.com/watch?v=lvnVIARyX94>.

Kinga Eliaz is a doctoral candidate at McMaster University in Hamilton. Brenda Vrkljan is an associate professor of Occupational Therapy with the School of Rehabilitation Science at the university and a project lead researcher with AUTO21 Network of Centres of Excellence. Visit auto21.ca.

Comments? Email jterrett@plant.ca



Cadillac's ATS-VR racing car is outfitted with a carbon fibre rear wing.

PHOTO: GENERAL MOTORS CO.

» Materials

CARBON FIBRE on the FAST TRACK

COSTS ARE COMING DOWN

Speedy technology development is driving widespread carbon fibre adoption for cars of the future.

BY PLANT STAFF

The faster than expected pace of technology development is driving the widespread adoption of carbon-fibre reinforced plastics (CFRPs) for automotive lightweighting by the mid 2020s, according to Boston-based research firm, Lux Research.

Advances in fibre, resin and composite part production will lead to a \$6 billion market for automotive CFRPs by 2020. The report says even that figure is dwarfed by the full potential for CFRPs in automotive if the material becomes affordable enough for use in mainstream vehicles.

"Companies throughout the value chain must position themselves to take advantage of the coming shifts," said Anthony Vicari, Lux Research associate and lead author of *Scaling Up Carbon Fibre: Roadmap to Automotive Adoption*.

The growing trend was obvious at Detroit's 2015 North American International Auto Show, where major industry players gave visitors a taste of the lightweight material, which included Cadillac's new ATS-VR racing car with its long carbon fibre wing stretching across the rear.

The car represents a prime example of how carbon fibre components have been restricted to high-end, low-volume production, but it's also a sign that automakers are changing their attitudes towards the material.

GM is already engaged in a research program with Japan's Teijin, which provides carbon fibre to Airbus Group NV's A380 superjumbo. The partnership is working towards developing new mixes of carbon fibre and plastics to make the manufacturing process simpler and more cost effective.

Meanwhile, Ford has started a research initiative with DowAksa, a joint venture involving the US's Dow Chemical and Turkey's Aksa. The Dearborn, Mich.-based automaker wants to cut between 250 and 750 pounds from its new cars and trucks by 2020, partly by using lighter material to wring out more miles per gallon and improve the range of its electric and hybrid vehicles.

And automotive supplier Johnson Controls' prototype Camisma seat is manufactured with a carbon fibre frame that's 40% lighter than metal counterparts.

Window of opportunity

But Lux's report warns that CFRP developers will have to continue the pace of innovation to overcome the high costs that have limited the material to less price-sensitive markets, such as aerospace and sporting goods. It offers the following recommendations:

- **Growing partnerships hasten development.** The number of direct partnerships between carmakers or Tier-1 automotive suppliers and carbon fibre players has nearly doubled to 11 since 2012. Toray, a Japanese advanced materials manufacturer, has partnerships with Plasan Carbon Composites and Magna. It has formed the most new relationships and is a major hub.

- **Patent uptick suggests mid-2020 adoption.** There's a lag of about 18 years between uptick of patent activity and attainment of mainstream commercial adoption milestones. A major upturn in CFRP patent activity will drive large-scale automotive adoption by the mid-2020s.

- **Other manufacturing costs need to be cut.** Carbon fibre itself, at \$28 per kilogram, represents just 22% of the cost of a final CFRP part. Additional advances must reduce capital, labour, energy, resin and processing costs, which make up the remaining 78%.

The push to increase carbon fibre use will also be driven by changes in US EPA rules that will require carmakers to improve average fuel efficiency to 4.3 L/100 km (54.5 mpg) by 2025.

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» Batteries

Electrovaya's green tech will be field tested by Mondelez's distribution centre forklifts to reduce emissions and improve productivity.

BY PLANT STAFF

Electrovaya Inc. is putting a different spin on the lithium-ion batteries that typically go into the world's teched-out electric cars.

The Mississauga, Ont.-based battery manufacturer is working with Mondelez Canada Inc. to replace lead acid batteries in the snack maker's forklifts with Lithium Ion 2.0 technology. The switch is supposed to increase productivity, reduce emissions and cut power requirements by up to 35%.

"Three shift operations using conventional lead acid batteries suffer from reduced electrical efficiencies, lower productivity and higher maintenance costs," says Andy Ganapathy, Electrovaya's vice-president of sales.

He describes the Lithium 2.0 technology as essentially maintenance free and allows the operation to run continuously over three shifts.

Mondelez Canada is a division of



Lithium-ion batteries are becoming increasingly popular in automotive and transportation applications.

PHOTO:THINKSTOCK

energy storage and smart grid power, consumer and healthcare markets.

The company says its non-toxic manufacturing technology produces a higher performing cell compared to conventional lithium-ion battery plants that use the toxic solvent n-methyl-pyrrolidone (NMP), which has caused birth defects in lab animals.

The company has more than 150 patents relating to its SuperPolymer 2.0 battery technology and various system architectures. Its products have been used by NASA and in the Scribbler tablet computer.

It also partnered with Tata Motors and Miljø Grenland/Innovasjon to manufacture batteries and electric cars, and was a key player in the launch of the first all-electric US car sharing program in Baltimore, Md. that offered its Maya-300 micro-car for rent at the Maryland Science Center.

In January, Electrovaya delivered a Lithium-Ion 2.0 battery system for energy storage to Glencore's Raglan nickel mine in northern Quebec. The battery system accepts and stores energy from all sources including diesel generators, solar and wind, and can reduce diesel consumption by up to 50%.

Ganapathy is confident there will be much potential for the company's advanced battery systems in the forklift market. He predicts lithium-ion technology will replace both lead acid and hydrogen fuel cells for electric forklifts "similar to the way the electric automobile is essentially all powered by lithium-ion today."

Comments? E-mail jterrett@plant.ca

Green POWER for FORKLIFTS

LITHIUM ION TESTED TO REPLACE LEAD ACID

global snack maker Mondelez International Inc. (2013 revenue of US\$35 billion), which makes and sells brands such as Cadbury chocolates, Nabisco biscuits, Tang beverages and Trident gum.

It was established in 2012 after Kraft Foods Co. spun off its grocery portfolio. The company employs more than 3,000 Canadians between a head office in Mississauga, Ont. and manufacturing

facilities, sales offices and distribution centres across the country.

The battery packs going into the forklifts will be equipped with Electrovaya's intelligent battery management systems (iBMS) and are to be delivered to Mondelez's distribution centre in Toronto, where field trials will continue through the end of March.

iBMS is an integrated system that optimizes and protects the battery system at the cell, module and system levels. Distributed and system control intelligence works in different voltage configurations that can be scaled depending on the battery system.

Founded in 1996, Electrovaya manufactures proprietary lithium-ion super polymer batteries and battery systems for the clean electric transportation, utility-scale

» Green Buildings



PHOTO: CAPITA SUPER CORP.

CAPiTA launches its Mothership

Snowboard manufacturer builds an emission-free plant

CAPiTA Super Corp. is breaking ground on its very own "Mothership."

The Seattle, Wash.-based snowboard manufacturer is building a massive, CO2 emission-free, 53,000 square-foot plant powered by hydro and solar energy.

The Mothership, to be built on 2.8 hectares of land in Feistritz a.d. Gail, Austria, will house all tooling, milling, printing, pressing, grinding, finishing, packaging and logistics operations.

Its advanced research lab will have a groomed, 1.2 kilometre on-site testing slope, but more rigorous testing will be done nearby on Nassfeld resort's 30 lifts, two snowboard parks and slopes measuring 4,600 vertical feet.

A hydropower station built in cooperation with the local community will power the plant. Inside, its new production technology runs at a lower temperature, requiring less energy while specialized water pumps regulate climate control.

"Moving forward, our goal is to make the best snowboards in the world, utilizing socially responsible manufacturing for a dynamic and demanding marketplace," says CAPiTA president Blue Montgomery, who started the Seattle company in 2000 when he was just 26.

The company promotes sustainable initiatives, such as the development and use of reforestation-certified wood cores and material recycling. Healthier production techniques will also be used, such as water-based inks, plant-based resin and solventless finishing.

All current employees will be retained when the new facility opens in the fall.

CAPiTA is recognized throughout the industry for progressive products, innovative athletes and its snowboard production in Austria.

Files from CanadianManufacturing.com

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» Think Lean

Defining CYCLE times

...AND OTHER MANUFACTURING TERMS



Laundry is an operation and a good way to illustrate how manufacturing inputs lead to more valuable outputs.

PHOTO:THINKSTOCK

Operations are described using common terminology and mapping tools. Here are some definitions and simple examples.

BY RICHARD KUNST

The word 'operation' evokes the image of a large factory, but it's any process involving a set of inputs of one or more steps that result in a more valuable set of outputs. A car plant is certainly an operation, but so is a hospital, the claim-processing department of an insurance company, or a person doing the washing. Each of these operations can be described using specific terms. Using laundry as a metaphor, here's a breakdown of what the terms mean.

Cycle time. It's the average time it takes to complete a step or set of steps within an operation. The cycle time for the washer is 30 minutes while the cycle time for the dryer might be 45 minutes to an hour. In a 10-washer operation, the cycle time for a single load would be three minutes (30 minutes divided by 10 washers). If the dryer is large enough to run two loads the cycle time per washer-load will be half of the cycle time per dryer-load.

Dependent steps. They can only be done when a

previous step has been completed. The interaction of dependent steps creates much of the need for operations management.

Bottleneck. Within a set of dependent steps, this one defines the speed at which the entire operation runs. Generally, the step with the longest cycle time will be the bottleneck. Imagine there's lots of laundry. As soon as the first load is in the dryer, the second load starts in the washer, and so on. Once the line is full, the dryer will determine the speed of the operation because it will still be drying the first load when the washer finishes its cycle on the second load.

The bottleneck is often an important area of focus for improving the capacity of an operation. Increasing the bottleneck's capacity will increase overall capacity, but increasing the output of a non-bottleneck step may have no effect.

Manufacturing lead time. This is the average amount of time it will take a new set of inputs to move all the way through the operation, assuming no unusual measures are taken. A load of laundry would spend one cycle (45 minutes) in the washer, including idle time, another cycle in the dryer (90 minutes), and then two-thirds of a cycle being folded (120 minutes). From laundry bag to clean and folded will average two hours.

Because folding takes place after the bottleneck, the load doesn't have to stay there for a full cycle.

Idle time. Sometimes you only need to do one load of laundry, but because the steps in the process are dependent, two machines (including the folder) will be idle part of the time.

Since many operations are capable of completing their tasks faster than the bottleneck operation, it's not sensible to run them at full capacity. If you run the washer and dryer non-stop all day, you would accumulate extra loads of wet laundry waiting to be dried. Eventually the washer would have to stop running to let the dryer catch up.

Work in process (WIP). This refers to laundry still in the washer, the dryer or being folded. WIP is sometimes discussed in dollar terms, or whatever units are moving through the operation. Once the line is full, there would always be a load either in the washer or waiting to be put into the dryer and another load in the dryer. We would also have a load being folded, but since it doesn't have to wait for anything, that step will be empty some of the time. Ignoring the possibility that folding is delayed by loading, expect to have a load of laundry in-process at the folding step for 30 minutes out of every 45 minutes of cycle time for two 2/3 loads of WIP.

Buffer. Sometimes an operation will have storage space where WIP from one step accumulates before being worked at the next step. There are many reasons for having a buffer. Suppose we want to run the washer non-stop in the morning to get as many loads as possible finished before the afternoon, but we need space for them while the dryer catches up. In larger operations, a buffer ensures the bottleneck is never starved for inputs. Since the bottleneck sets the pace, loss of production there implies lost production for the entire operation.

These terms put together and properly executed ensure that won't happen; and if applied at home, they map out an efficient way to get the laundry done.

Richard Kunst is president and CEO of Cambridge, Ont.-based Kunst Solutions Corp., which publishes the "Lean Thoughts" e-newsletter and helps companies become more agile, develop evolutionary management and implement lean solutions. Visit www.kunstsolutions.com. E-mail rkunst@kunststartofsolutions.com.

Comments? E-mail jterrett@plant.ca.

» Skills

Help for apprentices

Loan program offers up to \$4,000

If you'd like to hire apprentices but the money is a bit tight, check out the Canada Apprentice Loan. It will provide apprentices in Red Seal trades access to interest-free money of up to \$4,000 per period of technical training.

The program is expected to attract up to 26,000 apprentices annually who will apply for more than \$100 million in loans for Red Seal trades training that includes occupations such as construction, electricians, gasfitters, heavy equipment operators, ironworkers, machinists and sheet metal workers.

Red River College, where the loan program was announced in January, is set to break ground on the 100,000 square foot Skilled Trades and Technology Centre. Announced in 2012, the \$60 million facility will create a central hub for trades training at its Notre Dame Campus, apply new technology, provide collaborative work spaces, and expand capacity in high priority programs.

There are approximately 2.9 million skilled trade workers in Canada, which represent 17% of the workforce.

Visit www.esdc.gc.ca/en/support_apprentices/loans page for information about the Canada Apprenticeship Loan program.

LEAN ALERT



Gemba is a Japanese term that refers to "where the work is being done." When there's a business or operational problem, that's where you must go. Understand the situation clearly, engage with operating teams and leaders to understand their different perspectives. Make your own observations. When you experiment with potential solutions, observe the results first hand – not through a report or e-mail. Problems will only be solved if the current situation is clearly understood, and seen first-hand – not in the design or operations offices.

Source: Association of Manufacturing Excellence (AME), Canada. Visit <http://ame.org>.

» Inside Maintenance

KPIs need to be closely related to maintenance actions and what people can influence.

BY STEVE GAHBAUER

Key performance indicators (KPIs) are supposed to measure equipment and process performance, as well as costs. But do they? It depends on what, how and when you measure, and how you interpret the results.

Christer Idhammar, the founder of IDCON Inc., reliability and maintenance management consultants based in Raleigh, NC, says many organizations are blinded by the latest dashboards, graphics and information posted with too many KPIs. In most cases these don't mean much to the people who can impact those numbers. Driving or leading, KPIs need to be closely related to actions people can influence and to maintenance actions that are possible.

J.P. Pascoli, manager of engineering and maintenance at uranium provider Cameco Corp. in Port Hope, Ont., adds that maintenance performance management through KPIs is often not effective because indicators are not visible or understandable at the shop floor level. Many companies may not have the financial resources to invest in high-tech display monitors, and if they do, the content may not be sufficient for specific crew performance measurement and engagement.

Ben Stevens, founder of DataTrak Systems Inc., an asset management solutions provider based in Godfrey, Ont., offers a simple method of sorting out the ones that work from the ones that should be junked: first define the major objectives, then ask some penetrating questions about whether KPIs match these objectives:

- Do they focus attention on a critical status or trend; measure it effectively and promptly; quickly identify a key change in the trend or status to prompt a change in behaviour; and are they easily measured and easily understood?
- Does the measurement, analysis and reporting process properly reflect the performance of the equipment?
- Are the results quickly available?

How are your KPIs?

REVISITING HOW YOU MEASURE PERFORMANCE



Make KPIs closely relate to maintenance actions that are possible.

PHOTO: THINKSTOCK

- Is the measurement and analysis process easy and precise?
- Is it well understood by the maintenance team?
- Is the output message clearly understood by the maintenance team and by management? Do people read and use it?

Predicting failure

If you use mean time between failure (MTBF), know the mean of the failure times and the distribution of the failures around the mean. A sharply peaked distribution will give a more useful prediction because the probability of failure varying significantly away from the mean will be low. But this relies on a number of critical factors: data related specifically to the equipment being examined; consistent definitions of failure; consistent and accurate data collection and analysis; and understanding failure

modes, degradation rates, changes in operations and changes in maintenance.

Using MTBF to develop an equipment replacement policy can be very misleading. For example, if your MTBF is 1,000 hours, by definition, half of the equipment will have already failed by the time you schedule the replacement. If you aren't comfortable with a 50% failure rate, avoid using it.

Is MTBF a useful KPI? Stevens says the answer lies in a follow-up question: what will you do with the results of the KPI? Suppose you measure equipment MTBF = 1,000, and this compares with last year's number of 950 or 1,050. What action will follow? And if you take no action, why are you measuring it?

Which KPI should be used to measure the success of an EAMS and/or CMMS? Stevens says there are three types of KPIs for a CMMS that should be con-

sidered, depending on which stage has been reached in the completion of an EAMS implementation. First are KPIs that show the progress made toward the implementation of an EAMS/CMMS. Next are the KPIs that show how well your EAMS/CMMS is performing. Review the objectives established in the planning and justification of your project. In general, the relevant KPIs will be those that measure the maintenance and materials processes. Third are the KPIs that show the improvement in your maintenance and materials business effectiveness – for example the results of applying a CMMS to your operation.

Biggest improvements

Stevens recommends aiming for value-based KPIs – key performance indicators that measure the value of the maintenance function in terms of the overall value of the organization.

Each company's KPIs will be different; your selection of the best should be based on company objectives. Focus on where you want to make the biggest improvements. How many KPIs do you want to track? Too many is a waste of time and resources; too few does not give you enough insight. The value of the KPI lies in the actions that it prompts. If the KPI causes no call for action, question whether it's doing the job.

A chapter titled "Pros and cons of the role of KPIs" in the 2001 book *Maintenance Excellence*, edited by the late John Campbell and Dr. Andrew Jardine, states management uses performance measurement primarily for monitoring purposes and that many performance indicators have been developed to support operational decisions. They are, at best, descriptive signals that some maintenance action needs to be taken. The book classifies KPIs into three categories: measures of equipment performance; measures of cost performance; and measures of process performance. However, the underlying assumptions of these measures are often not considered when results are interpreted; thus, their value can be questionable.

You need a balanced results presentation to measure performance. The so-called balanced scorecard (BSC) proposed by R.S. Kaplan and D.P. Norton (*Harvard Business School Press, 1996*) offers a template for this. It translates a business unit's mission and strategy into objectives and quantifiable measures. BSC has been implemented in many companies. Experience indicates that the BCS's greatest impact is to drive the change process.

KPIs are a useful tool for improving maintenance – if they are chosen well, measure what you want tracked and measurements are interpreted correctly.

When KPIs are done right, the results speak for themselves.

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

Comments? E-mail jterrett@plant.ca.

» Energy

Let there be (LED) light!

Retrofit will cut energy use by 60%

Cott Corp.'s production plant in Mississauga, Ont. will soon be saving \$170,000 in energy costs annually thanks to a light-emitting diode (LED) lighting retrofit by Cambridge, Ont.-based Eco-Shift Power.

The energy management and lighting firm has signed a contract with the global beverage maker to upgrade fixtures throughout the 220,000 square-foot facility.

Eco-Shift, a Cambridge, Ont. manufacturer of LED lighting, will replace 972 HID metal halide, fluorescent and halogen PAR lamps with its NetZero LED fixtures to cut more than one million kilowatt hours (60%)

of energy use.

Its light management system will also be installed into all NetZero LED lights in warehouse and production areas, which will allow Cott to monitor and monetize energy savings through dimming and scheduling, and to diagnose fixture issues.

Cott, which has 60 manufacturing facilities in North America and the UK, is looking at a maximum 99.9% return with the project guaranteed to be cash flow positive in just 15 months.

The new lighting system will also keep 708 tonnes of carbon dioxide out of the atmosphere – the equivalent of annual greenhouse gas emissions from 149 passenger vehicles.



NetZero fixture.

PHOTO: ECO-SHIFT

» CCOHS Safety Tips

Getting a HANDLE on SHIFT work

HOW TO AVOID THE NEGATIVE EFFECTS

Shift work is a reality for about 25% of the North American working population and with more occupations and industries operating around the clock, this number is not likely to decrease.

Circadian rhythms are our body's biological clocks that manage various internal functions throughout a 24-hour day, using daylight and darkness as cues. Working during the night and sleeping during the day is contrary to our natural rhythm, which disrupts sleep and the body's recovery from physical and mental activity during these "opposite" hours.

Risks associated with shift work include: shorter sleeps and/or poorer sleep quality than regular day workers; a higher risk of breast cancer and an elevated risk of other types of cancer; an increased risk of heart disease; some studies indicate a higher risk of pre-term delivery, gastrointestinal disorders and mental health problems; a higher risk of workplace injury than morning or afternoon shift workers; and shifting schedules increase injury risk.

Here are some tips for employers that will reduce risks:

- Avoid permanent (fixed or non-rotating) night shifts.
- Keep consecutive night shifts to a minimum.
- Avoid quick shift changes.
- Free weekends are better than a single day off.
- Avoid several days of work followed by four- to seven-day "mini-vacations."
- Keep long work shifts and overtime to a minimum.
- Consider different lengths for shifts.
- Examine start-end times.
- Keep schedules regular and predictable.
- Conduct a risk assessment for every task to be performed during a specific shift.
- Night shifts should not be too long and should end as early as possible so workers get more undisturbed sleep.
- Make shift changes easily adaptable. 'Rotating forward' (morning – afternoon – night) are easier to adapt to than rotating backwards or having irregular shift changes.
- Morning shifts should not start too early.
- Consult workers when setting shift schedules.
- Avoid scheduling the same worker to more than one shift a day.

Taking steps to minimize risks will ensure workers are healthier and safe.

This article was provided by the Canadian Centre for Occupational Health and Safety (CCOHS). The not-for-profit federal corporation promotes the physi-

cal, psychosocial and mental health of Canadian workers by providing information, training, education and management systems. Visit www.ccohs.ca.

Comments? E-mail jterrett@plant.ca.



Working nights disrupts normal sleep patterns.

PHOTO: THINKSTOCK

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» Quality

Corporate leaders have to be more involved and committed to the objectives set out in management systems and plans to achieve them.

BY GARY ROBINSON

The much anticipated draft revisions to ISO 9001:2008 Quality Management (now ISO 9001:2015) include a number of changes that more than 6,000 certified Canadian companies will have to implement before 2018.

Unlike many past revisions, these are significant.

It's no longer enough to have a high quality standards department that sends a report to the CEO every quarter. Executive leadership and management will have to play a direct role in the implementation of standards. This means plant owners must have an intimate understanding of how ISO management systems work, and how the company's overall business objectives and strategies will align with them.

Companies use standards for different reasons. In some cases, ISO certification is used to adhere to government and industry regulation. In others, it's a way to satisfy clients, set themselves apart from competitors or to simply improve the business. Moving forward, plant owners and managers will have to think differently about how to manage systems to be compliant with the certification changes.

Five other changes to consider include the following:

1. Better management of company knowledge. With aging workforces and day-to-day work becoming more knowledge-based, systems will be needed to ensure knowledge is transferred to new employees. Companies will be re-



Manage systems to be compliant with certification changes.

PHOTO: THINKSTOCK

Raising your STANDARDS

WHAT YOU NEED TO KNOW ABOUT ISO QUALITY MANAGEMENT REVISIONS

quired to ensure important 'documented information' is retained and maintained over time.

2. Integrated strategic thinking and ISO certification. There's a requirement for the objectives to support company goals and the creation of a plan to identify the resources needed to achieve them.

3. Making internal communications a priority. New standards will have more muscle regarding internal employee awareness. You'll need to better understand customer opinions about your company to ensure quality is maintained from their point of view.

4. No more preventive action. Prior to this round of changes, preventa-

tive action had its own stream for each standard. Prevention is expected to be present in all areas of the organization.

5. More tangible risk-based analysis. Risks within critical processes and areas of the business and actions to mitigate them are to be identified.

Quality isn't the only standard being revised. Many Canadian plants are certified to one or more of 'the big three standards: quality, ISO 14001 (Environmental Management) and OHSAS 18001 (Occupational Health & Safety Management, transitioning to ISO 45001). This means plant owners and managers should review the draft standards early and plan for implementation as quickly as possible.

Many companies have already implemented some of the changes as a way to improve business processes, putting them ahead of the pack.

Start training managers now (owners may want to attend a training session or two themselves) so they learn what to expect and have more time to analyze how the plant will be affected.

A well implemented ISO system, whether it's for quality, environmental management or health and safety, improves operational control, increases customer satisfaction, generates cost savings and benefits the bottom line. There are many resources and training programs available to help guide the transition and build a strong foundation for the years ahead.

Gary Robinson is the commercial director for BSI Canada Inc., a business standards company based in Mississauga, Ont. He's also a co-author of the Butterworth and Heinemann publication, "The ISO 14001 EMS Implementation Handbook." E-mail gary.robinson@bsigroup.com. Visit www.bsigroup.com/en-ca/.

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"This project is funded by the Government of Canada's Sectoral Initiatives Program"

» Training

More intensive coaching needed

People learn better when they get feedback

BY HUGH ALLEY

Too often employees are provided with a new piece of information or shown a new procedure, then left to figure it out, but without feedback they're unlikely to master it.

Professional sports teams are masters at giving feedback to their players and have more than one coach looking for patterns of behaviour that are helping or hurting performance. But there are differences between pro sports teams and plants (many of which with few coaches) that influence the need for feedback:

- Pro athletes are paid more, but employees are in charge of machines and material worth millions of dollars. Call it even.
- Pro athletes only compete a few hours a week. The rest of the time they have practices. Employees are

We're DIGITAL laggards

ALMOST 60% OF SMES DON'T HAVE WEB SITES

Canadians are heavy users of social media, they do a lot of buying online and they're actively embracing mobile technologies. But a whitepaper says SMEs' digital engagement is way behind.

The current competitiveness gap between Canada's digital economy and the gaps of other G20 nations can be closed with smart public policy, according to a whitepaper by The Internet Association, a group that calls itself the voice of "America's leading internet companies."

Reasserting Canadian Internet Competitiveness cites a 2014 report by Comscore that ranks Canada first overall in the number of web pages visited per month. A separate report by the Canadian Internet Registration Authority (CIRA) reveals Canadians are second to the US for the average number of hours spent online per user. Yet just 41.1% of Canadian SMEs have a website.

The whitepaper concludes that increased adoption of online activity by small and medium-sized businesses is desperately needed to encourage economic growth.

According to CIRA, the digital economy already accounts for 3% (\$49 billion) of Canada's GDP, which is 25% in other G20 nations.

The whitepaper says Canada's digital challenges stem from at least three factors: firms chronically underinvest in digital technologies; a lack of access to



69%
Canadians that use social media, the most in the world (per capita).



\$122 BILLION
The amount of goods and services ordered online in 2012, more than double 2007 levels, according to Statistics Canada.

CANADA'S DIGITAL DEXTERITY
Highlights from Reasserting Canadian Internet Competitiveness.

74%



Users watching an average of 24.8 hours of online video per month, (second, the UK) according to ComScore and CIRA.

75%

Canadians owning smart phones, well above the US and other developed markets. Users generated more than 77% more mobile data traffic per subscriber than the global average.



capital investment from domestic and foreign sources that creates a drag on dynamism in the digital economy; and policy-makers have been slow to embrace the internet economy as a source of dynamism, innovation and productivity.

Invest in technology

Digital Canada 150, a national digital strategy announced last April by the federal government, lists 39 initiatives, including a \$305-million investment to increase internet and wireless service accessibility to 98% of the population.

It also calls on the Business Development Bank of Canada to invest \$300 million in digital technology companies and \$200 million more in businesses looking to adopt the internet in business models.

An additional \$40 million would support up to 3,000 internships in high-demand fields with another \$15 million going to internships with SMEs.

Funding for the Canada Accelerator and Incubator Program will increase to \$100 million, and there's \$20 million over two years for the Business Innovation Access Program, which supports R&D by connecting SMEs with universities, colleges and other research institutions.

But the report warns the digital strategy won't be enough to bring Canada up to speed in the fast-moving digital world.

Among other recommendations, it notes Canada's rules governing the digital economy are unnecessarily complex and warns against introducing new barriers to digital commerce, citing CASL (anti-spam legislation) as an example.

"The government can grow the internet economy with supportive policies like tax credits that encourage small and medium sized businesses to adopt digital technologies," said Michael Beckerman, CEO of The Internet Association.

Visit www.internetassociation.org for a copy of the report.

Comments? E-mail mpowell@plant.ca.



Ask for feedback. PHOTO: THINKSTOCK

playing for real every moment they're at work. Greater need for feedback: employees.

- Pro athletes are very carefully selected, with only a few hundred making it to the pro leagues. Employees are selected from among 10 or so that get an interview, and they didn't hone their skills in a junior league. Greater need for coaching: employees.

It's tough for supervisors with more than 15 people reporting to them to spend time observing work, let alone make frequent

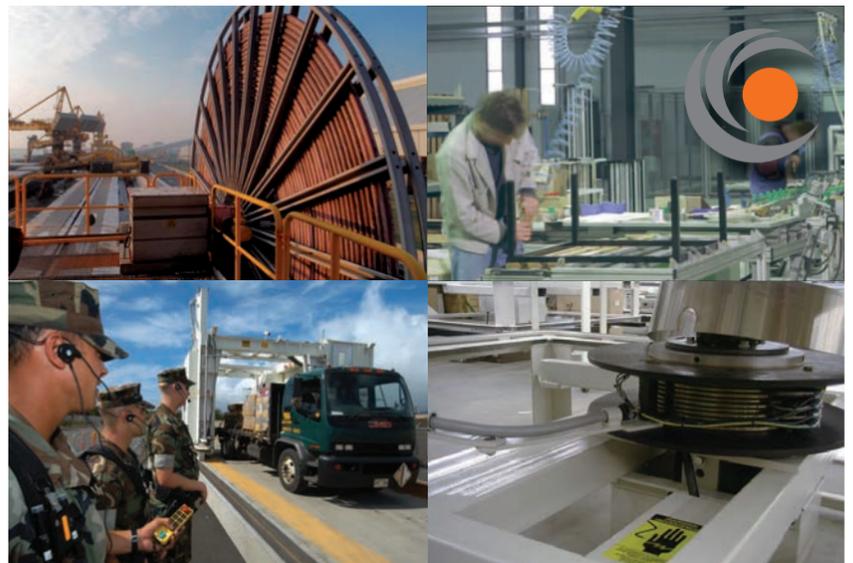
meaningful comments.

Ask yourself three questions:

1. Do your employees get enough feedback about their performance to improve the overall performance of your company?
2. Do your leaders (supervisors, leads, managers) have the skills to deliver effective feedback?
3. Are your leaders clear about their roles in providing feedback to team members, and they're supported by formal and informal reward systems?

If you're not happy with the answers, ask yourself what feedback you've been giving to people recently. Challenge yourself to provide them with regular feedback about what's important for the business. This will have as much of a positive training effect as any amount of instruction.

Hugh Alley is president of First Line Training Inc. in Burnaby, BC, which focuses on increasing productivity by improving the skills of front line managers and supervisors. E-mail halley@firstlinetraining.ca or hone (604) 866-1502. Visit <http://firstlinetraining.ca>.



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» Automation



March of the ROBOTS

PREPARE FOR ACCELERATED GLOBAL ADOPTION

The Boston Consulting Group is forecasting investment in advanced industrial robots will take off over the next decade.

BY PLANT STAFF

When it comes to labour productivity, Canada has been a chronic laggard, particularly compared to the US. Between 2008 and 2012, manufacturers were dropping 1.1% a year until registering a 1.9% advance the next year. The Conference Board of Canada notes in its *How Canada Performs* research that between 2002 and 2012, the US posted average annual compound labour productivity growth of

1.7%, while Canada posted 0.8%. Ontario and Quebec posted gains below 1%.

The Ottawa-based think tank warns low productivity levels “present an enormous challenge for Canada’s future economic prosperity.” In 2012, Canada’s level of labour productivity was US\$42, compared to the US at \$52, for 13th place among 16 peer nations.

Canadian manufacturers would be wise to take heed of a rapidly developing tech trend: adoption of advanced industrial robots. The Boston Consulting Group (BCG) is forecasting their impending take-off.

A BCG study projects annual growth will jump from 3% to around 10%. This could lead to changes of up to five percentage points in the cost competitiveness of major export economies (relative to the US) and reduce the cost of labour by 16% (on average) in the world’s 25 largest goods-exporting nations.

Robots currently perform about 10% of the manufacturing tasks that can be done by machines. By 2025, BCG estimates, the portion of automatable tasks they’ll will near 25%.

BCG says output per worker could rise by 10% to 30% over and above productivity gains that typically come from other measures.

Competitor nations such as South Korea, China, the US, Japan, and Germany – already well invested in robotics – will experience the biggest gains. BCG says South Korea, perhaps the most aggressive adopter, is expected to reduce labour costs by 33%, followed by Japan (25%), Canada (24%), the US, Taiwan and the UK (22%), Germany (21%) and Australia (20%).

Largest markets

And watch China: it’s one of the largest markets for robotics. BCG notes greater automation is a way for China to regain some of its edge, which has been dulled by rapidly rising wages and difficulty finding manufacturing workers. The International Federation of Robotics (IFR) in its *2014 World Robot Statistics* report predicts by 2017 there will be more industrial robots operating there than in the European Union or North America. Operating unit numbers will double from 200,000 today to more than 400,000, com-

pared to 300,000 in North America.

Nations such as France, Italy, Belgium and Brazil where robotics investment is projected to lag, are likely to see their manufacturing competitiveness deteriorate further over the next 10 years.

What’s stoking the advance of robotics? BCG cites total cost. Owning and operating an advanced spot welder has dropped 27% in the last nine years to \$133,000 and is expected to tumble an additional 22% by 2025. And there have been advances with vision sensors, gripping systems and information technology.

“For many manufacturers, the biggest reasons for not replacing workers with robots have been pure economics and technical limitations,” said Michael Zinser, a BCG partner who co-leads the firm’s manufacturing practice. “As the price and performance of automation improve, the business case for robots in most industries will be compelling, even for many small and mid-sized manufacturers.”

As robots become more affordable and easier to program, BCG says smaller manufacturers will use them on a wider scale. The “inflection” point for widespread adoption will vary by industry, country and various factors, but ramping up should begin when there’s a 15% savings over the cost of employing a worker.

BCG recommends manufacturers stay on top of changes within their industries, what their competitors are up to and update the skill levels of employees so they’re ready for the robot revolution.

Comments? E-mail jterrett@plant.ca.

A GOOD YEAR FOR ROBOTS

Robot orders and shipments in North America set new records in 2014. Here are some stats from the Robotic Industries Association.

- 27,685 robots valued at \$1.6 billion were ordered, an increase of 28% over 2013.
- Shipments were up 13% to \$1.5 billion.
- Automotive was the primary driver of growth in orders, increasing 45% year over year.
- Orders from non-automotive industries grew 7%. Biggest gains were in plastics and rubber (25%), semiconductor and electronics (21%) and metals (16%).
- Fastest growing applications were arc welding (58%), spot welding (57%), assembly (16%), and material handling (11%).

» Employment

Steeltown revival

Manufacturing to lead Hamilton’s job boom

BY PLANT STAFF

A resurgent manufacturing sector is expected to lead a jobs revival in Ontario’s steeltown, also known as “the Hammer.” Hamilton is set to outpace provincial averages for employment gains and economic growth than communities in its broader region, according to a recent economic outlook from the Hamilton Chamber of Commerce and the Credit Unions of Ontario.

Modest economic growth will come from a pickup in US demand, a favourable exchange rate and the 2015 Pan Am Games, which is good news for the region’s manufacturers. Roughly 13,000 jobs will be added over the next two years, with employment increasing by 1.6% in 2015 and 1.8% in 2016.

In 2014, Metro Hamilton posted employment growth of 2.2%.

Meanwhile, the region’s unemployment rate will continue a steady decline and is expected to remain below the provincial average, hitting 5.8% by 2016. This represents a significant turnaround from 2009, when the unemployment rate was at 8.4%.

“The ever increasing diversity of our economy and the strength of the real estate market has allowed this economic stabilization despite some global uncertainty coming out of the recession and challenges facing our manufacturing sector,” says Keanin Loomis, CEO of the Hamilton Chamber of Commerce.

Manufacturing’s influence on the city’s economy has dropped, with employment dipping to 13% of total jobs, down significantly from 20% in the early 2000s. It’s unlikely manufacturing jobs will ever return to those lofty levels, but the report sees the sector as a growth driver over the next few years. It notes National Steel Car’s announcement of 300 new jobs in Hamilton as a positive indicator.

There are challenges in the city’s steel production sector, such as US Steel’s application for creditor protection and Max Aicher’s ongoing labour issues, which will persist. Weak demand from Asian markets will also be an issue.

But ArcelorMittal’s \$87 million investment to upgrade coke ovens over the next five years to reduce emissions, which



Steel producers will face ongoing challenges.

PHOTO: THINKSTOCK

signals stability for the plant going forward.

Home sales are forecast to climb to about 15,000 units by 2016, with the average price rising about 4% per year to \$438,000. That’s a \$100,000 increase since 2010, and a factor that’s expected to drive the Hamilton Census Metropolitan Area’s population, which includes Burlington and Grimsby, to 781,000 by 2016.

The report concludes Ontario will stand to benefit from a combination of higher US growth, a lower valued loonie, and cost savings from plunging oil prices that will drive the province’s real GDP growth to 2.7% in each of the next two years.

It’s a good time to be in “The Hammer.”

C I E N

CANADIAN INDUSTRIAL EQUIPMENT NEWS

» Pumps



Professional surfer Lauren McLean tests the wave at Oasis Surf Centre.

PHOTO: OASIS SURF CENTRE

HANGING 10!

KSB MAKES WAVES AT QUEBEC SURF CENTRE

Newcomers and surfing fanatics ride indoor waves as big as six feet thanks to high-flow Amacan axial pumps.

BY PLANT STAFF

Surf's up at Montreal's Oasis Surf Centre, and KSB Pumps Inc. is keeping the water moving.

The indoor surfing centre, located in Brossard, Que., just outside Montreal, opened last fall. It's equipped with a 24-foot wide machine that makes waves ranging from two-feet for newcomers to as big as six-foot "tubes" for challenge-seeking fanatics.

And creating a stable standing wave in a surf pool means moving water, and a

whole lot of it.

Oasis's SurfStream 5024 wave system, manufactured by Solana Beach, Calif.-based American Wave Machines, is powered by four KSB Amacan axial flow pumps, made for high volumes and relatively low heads.

"They're highly reliable and deliver very good energy efficiency," according to Joe Buckman, western US regional manager for KSB Inc.'s Water and Waste-water division.

German pump manufacturer KSB Group, with sales offices in Canada, has

outfitted a number of water-based entertainment facilities around the world with equipment both for surf pools and for attractions such as slides, flume rides and artificial white-water kayaking courses.

Wet-installed and outfitted with a submersible motor, the Amacan pumps are fitted with an axial propeller. A slim profile makes installation in single-stage, single-entry discharge tubes easy and they're rated to ATEX II G2 T3 for explosion protection.

Aside from surf pools, the pumps are also used for irrigation, drainage and stormwater pumping stations, handling of raw and clean water in water and effluent treatment plants, cooling water

Continued on page 22

» Supply Lines



Introducing Team Rousseau.

PHOTO: ROUSSEAU METAL

JOYEUX ANNIVERSAIRE!

Rousseau Metal is celebrating its 65th anniversary this year serving the industrial storage markets and others

The company, founded in 1950 and based in St-Jean-Port-Joli, Que., manufactures modular drawers, shelving and workstation systems, all designed, manufactured and tested in Canada.

Over the years it has kept pace with change, investing in technology, equipment and research and development to serve a range of markets, including industrial, institutional, automotive, military and aerospace, mining, healthcare and agriculture.

It has also invested in people and now has more than 300 employees.

MI ACQUIRES MILLER

Motion Industries Inc., an industrial parts distributor, is acquiring Miller Bearings Inc., an independent distributor of industrial MRO products based in Orlando, Fla.

No financial details were released but Motion Industries, based in Birmingham, Ala., said the acquisition better positions it for growth in the southeast US where Miller has 17 locations.

Motion Industries, the wholly owned subsidiary of Genuine Parts Co., has operations in the US, Canada and Mexico.

E+H CONSOLIDATES

Process automation supplier

Endress+Hauser Canada is constructing a new regional customer support centre in Edmonton.

The \$10 million, 20,000-square-foot facility will centralize inventory and provide advanced technical support, training and measurement instrumentation to customers in Alberta, BC and Saskatchewan.

The centre will include office space, a warehouse for process measurement inventory, a state-of-the-art customer training centre and a certified flow calibration lab. The company says the facility will accommodate more than 50 employees.

Endress+Hauser, a global manufacturer of measurement instrumentation and provider of services for industrial process engineering, has Canadian offices in Burlington, Ont.

Amacan creates signature waves

Continued from page 21

in power stations and industrial plants, industrial water supply systems, water pollution and flood control systems and aquaculture.

The surf machines “benefit from the availability of the efficient high-volume, low-head pumps, which create waves with very low head and translates to lower energy use and longer pump life,” said Bruce McFarland, president and founder of American Wave Machines.

The machines that drive wave pools mimic a natural phenomenon called a hydraulic jump. In open channels, fluid at an initial critical flow speed meets a slower-moving area of water and creates the jump. In wave pools, spoilers are positioned to manipulate the incoming flow rate and channel width, creating life-like waves.

Programmable controls and modular inserts create multiple wave types.

For experienced surfers the signature wave is a single five-foot barreling wave with 20-foot of face to carve. This set of wave modules is assembled in both right and left breaks to accommodate different riding styles. The system also has training and intermediate waves, which operate at lower power.

Multiple pumps

Surfers ride real surfboards with fins on a deep cushion of water that creates an endless wave. Fully adjustable wave size, shape and type, as well as multiple riding modes, are configurable through the SurfStream system.

The multiple pump set-up provides the wave machines with tens of thousands of gallons of water

per minute. The Amacan pumps are powered by 160 horsepower motors and equipped with variable frequency drives (VFDs), which adjust speed to create different wave conditions.

A maximum drive frequency of 60 Hz provides a 2-rpm rotation and moves up to 25,200 cubic metres of water per hour through the cast iron pumps.

Bearing temperature monitoring and thermal motor protection add to the pump’s reliability, and a standard moisture sensor provides additional motor protection.

The Amacan pumps install easily and require minimal maintenance. Self-sealed by an O-ring, they drop-in and self-centre in the discharge column. Because there are no anchoring or anti-rotation elements, installation and removal – especially with vertical installations – are quick.

“Vertical installations provide superior hydraulics, mechanics, and serviceability,” said Jared Wray, product manager for submerged propeller devices at KSB.

SurfStream’s units cost between \$700,000 to \$3 million, depending on system specification. The units are manufactured of moulded fibreglass, stainless steel, industrial controls and infrastructure-scale pumps, and consume between 90 to 495 kilowatts of energy per hour.

With sales for the global surfing market expected to reach \$13.2 billion by 2017, according to a 2011 report by San Jose, Calif.-based Global Industry Analysts, the sport is riding high, and KSB has the technology to keep the waves rolling.

Comments? Email mpowell@plant.ca.



KSB's Amacan pump.

PHOTO: KSB

Power and Motion

SPEED DRIVE REPLACES R-ANGLE GEARBOX

Baldor Electric Co.’s adjustable speed direct drive combines the Baldor Reliance RPM AC motor with a high-performance permanent magnet rotor to replace right angle gearbox and jack shaft installations used in many conventional industrial process cooling towers.

The fan couples directly to the motor and is controlled by the ABB ACS880 cooling tower drive to provide optimal variable speed performance that runs quieter with reduced energy consumption. Specific cooling tower parameters simplify configuration and a “quick start assistant” makes start up straightforward.



For industrial cooling towers.

The Inpro/Seal bearing isolator and slinger prevents water ingress along the shaft, and condensation drains relieve moisture that may collect inside the motor.

The electrical insulation system is manufactured using a vacuum pressure impregnation process that ensures long motor life even in the most extreme conditions.

Baldor Electric is a manufacturer of industrial electric motors, drives and mechanical power transmission products, and is a member of the ABB group. It’s based in Fort Smith, Ark.

www.baldor.com



BEARINGS TAKE STEEL MILL HEAT

SKF’s spherical roller and CARB toroidal bearings handle the axial expansion and contraction of rolls associated with induced axial loads and fluctuating temperature found in steel mill applications.

Two rows of self-guiding rollers with a common sphered raceway in the outer ring reduce friction, minimize heat generation, accommodate shaft misalignments and heavy loads, and contribute to longer bearing life.



Self-guiding rollers.

CARB toroidals are self-aligning radial bearings merging the benefits of standard “locating/non-locating” systems typically found in continuous caster applications. They accommodate misalignment (similar to spherical roller bearings) and normally supplied as full complement bearings to take advantage of their increased load rating.

They’re available in a range of sizes, specify them with specialized seals or customize them for demanding applications.

SKF is a Swedish-based supplier of bearings, seals, mechatronics, lubrication systems, and services with Canadian offices in Toronto.

www.skf.com



More consistent production rates.



RS DRIVE NUT IS BACKLASH FREE

The Amacoil-Uhing Model RS drive nut provides smooth backlash-free linear motion. The RS drive nut runs on a smooth shaft without threads, which eliminates clogging and jamming.

If debris does become lodged in the travel path, the drive simply slips until the operator removes the obstruction. Slipping, rather than the churning and grinding associated with screw-based systems, prevents damage to the nut and other components in the linear motion system.

The inner race of each rolling ring bearing inside the nut is specially machined. Each bearing is installed under pressure and contacts the shaft at a single point only. When the shaft is rotated, the rotary motion input is immediately converted into linear output as a result of the friction created. The point contact between the rolling ring bearing and the shaft assures there is no play or backlash during movement of the drive nut. This is true even during reversal.

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

www.amacoil.com

POWERFLEX SIMPLIFIES SAFETY DESIGN

A safe torque-off option built into the Allen-Bradley PowerFlex 7000 medium-voltage drive from Rockwell Automation simplifies safety design while meeting the demands of international safety standards.

When a safe torque-off command is issued, the PowerFlex 7000 drive immediately removes rotational power to the motor. The drive stays powered and reliably monitors this “safe” state, ensuring no unintended operation of the motor is possible.

The safe torque-off option works side by side with the drive’s control functions and does not require additional electromechanical components and the wiring that goes with them. Safety triggers – such as push buttons or light curtains – wire directly to the drive, removing the need for additional hardware.

PowerFlex 7000, used in industrial applications such as material-handling conveyors and grinding mills, is TÜV-certified. It’s also certified to Safety Integrity Level (SIL) 3 of IEC 6150, and Performance Level e (PLe), Category 3 of ISO 13849-1.

Rockwell Automation, based in Milwaukee, Wis., makes automation equipment and systems. <http://ca.rockwellautomation.com>



Torque-off option.

GEARBOXES ARE HIGH SPEED, LOW NOISE

B&R has added two helical gearboxes to its premium product line: the 8GP70 with a shaft output and 8GF70 with a drive flange. Both operate at high speeds but generate low noise levels.

Backlash is minimal but there's an option that reduces it to less than 1 arcminute.

These IP65 gearboxes handle high axial and radial forces for use in a wide range of applications.

Machinery easily adapts to changing requirements without making changes to the basic design. Both gearboxes come in five sizes with gear ratios ranging from i=3 to i=100.

B&R Industrial Automation Corp., based in Atlanta, makes automation equipment.

www.br-automation.com



Smooth operation.

IRONHORSE MOTORS EXPANDS LINE

AutomationDirect has added rolled steel AC motors to its IronHorse line.

The MTR2 56C/56HC TEFC single-phase AC motors, in 0.33 to 2 hp sizes, come in 1,800 and 3,600 rpm models and are equipped with removable bolt-on, bolt-off bases.

Accessories include start and run capacitors, centrifugal switches, manual locked rotor overload switches, junction boxes, fans and fan shrouds.

AutomationDirect is a distributor of automation products based in Cumming, Ga.

www.automationdirect.com



Single-phase AC motor.

POWER SUPPLY FOR DC BRUSHLESS MOTORS

Automation Systems Interconnect (ASI) Inc.'s high-output power supplies for DC brushless motors protect output to prevent failures arising from overvoltage generated during rotation and freewheeling.

With their reserve capacity, the units operate at 20% higher power levels (45 degrees C/113 degrees F) without exceeding standard temperature limits.

Short-circuit, overload and over-temperature protection are standard for heavy start-up load.

ASI is a manufacturer of electrical and electronic components based in Mechanicsburg, Pa.

www.asi-ez.com



3-phase DIN rail mount.

GEARBOXES KEEP IT CLEAN

Neugart USA's hygienic HLAE planetary gearbox is certified to 3-A Sanitary Standards and IP69K, the highest protection class available for washdown performance.

The stainless steel unit meets requirements for hygienic processing industries. There are no radial screws on the clamping hub to the motor shaft because this would create a space for bacteria to grow. Instead, a smooth electro-polished surface eases disinfection and washdown routines.

DAMPER BEARINGS HANDLE BOILER CONDITIONS

Metallized Carbon Corp.'s louver damper bearings avoid problems in high-temperature boiler applications that would occur with oil/grease lubricated bearings or plastic bearings.

At high temperatures, oil/grease lubricated bearings are problematic because the lubricants can melt, catch fire or carbonize, causing bearings to gaul and seize.

The Metcar bearings rely on graphite to self-lubricate. They're also dimensionally stable, not subject to deformation and provide low friction damper blade movement even after being stationary for many months.



Self-lubricated with graphite.

Self-lubricating carbon-graphite bushings are also used as stem bearings on high temperature butterfly valves, ball valves and wafer style dampers.

Standard pillow blocks and flange blocks with bearing inserts come with cast iron, stamped steel, or stamped stainless steel housings.

Standard flange block bearings are available in English and metric sizes for shafts up to 5 in. (127 mm) in diameter and standard pillow blocks will accommodate shafts to 3 in. (75 mm) in diameter.

Metallized Carbon, a manufacturer of bearings for severe operating environments, is based in Ossining, NY.

www.metcar.com



Efficiency of more than 97%.

It provides full-load efficiency above 97%, high stiffness, low backlash and an extensive range of output torques.

Neugart is a manufacturer of planetary gearboxes based in Virginia Beach, Va.

www.neugartusa.com

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CIEN

POWER AND MOTION



Reduces errors.

SOFTWARE IMPROVES MOTION EFFICIENCY

Version 4.4 of Siemens' Simotion motion control system adds functions and simplifies the engineering of motion control projects.

Applications such as packaging are engineered, configured and commissioned through the Siemens TIA Portal.

A link between new Simatic HMI panels and Simotion has also been implemented.

The range of motion control functions are used through the system's graphical interface and all parameters are selectable and modified by the click of a mouse.

The integration of the easyProject generator in Simotion Scout configures complex production machines in an easy-to-handle and standardized manner.

Software modules for different industries and applications are available.

Siemens AG is a global manufacturing conglomerate headquartered in Berlin. Siemens Canada is based in Mississauga, Ont.

www.siemens.com

PACESETTER CONTROLS MOTOR SPEED

Bodine Electric Co.'s Model 2999 Pacesetter AC motor speed control is simple to set up and handles stand-alone gearmotor applications that require variable speed, controlled acceleration and reversing.

It drives 230 VAC, 50 or 60 Hz, inverter-duty, 3-phase gearmotors and motors rated up to 1 hp (746 W), operating from a single-phase, 115 or 230 VAC line.

The Pacesetter is housed in a NEMA-4X, IP-65 washdown and watertight aluminum die-cast enclosure and is of use in conveyor systems, packaging machines, food processing and lab equipment, and industrial automation.

Motor efficiency is high and noise is low. Linear acceleration



NEMA-4X, IP65-rated.

and deceleration is adjustable for soft-start applications.

A built-in forward-stop-reverse switch allows dynamic braking. User-friendly trimpots eliminate computer-like programming and jumpers allow the drive to be used with a range of motors without recalibration.

The control is factory-set for most applications and is GFCI compatible.

Speed control allows for up to 200% starting torque, ensuring startup of high frictional loads. Slip compensation with static auto-tune and boost circuitry regulates load over a wide speed range. A run/fault relay signals if the drive is in stop mode, or a fault has occurred, and turns the equipment off.

The control also includes a start/stop switch and a main speed potentiometer.

Bodine is a manufacturer of motors and motion control products based in Northfield, Ill.

www.bodine-electric.com

MATERIAL HANDLING



No external controller required

GRIPPER GETS A GRIP

Robotiq's two-finger 85 adaptive gripper for industrial robots with a payload between 5 to 10 kg handles a variety of part shapes with different gripping modes.

The technician controls finger force to pick up fragile or brittle items and tough parts.

The gripper connects directly to the USB port of the robot controller, so an external controller isn't required.

The bundle includes a series of templates for universal robots. The user only needs to import

the desired gripper programming templates, and add it to the robot's orders to set up the application.

Robotiq is a manufacturer of automation tools and sensors based in St. Nicolas, Que.

www.robotiq.com



Maximum speed of 80 m/min.

TARGETS BULK INGREDIENTS

Thermo Fisher Scientific's Xpert B400 and B600 bulk x-ray systems provide food processors with a new and more thorough way to address potential contaminants in bulk food ingredients.

The bulk flow conveyor belts widths, available in 400 and 600 mm versions, run at a maximum speed of 80 m/min. to handle a range of bulk flow products. They detect foreign objects such as seeds, nuts, fruits and vegetables.

The platform is easy-to-use, doesn't limit throughput and is sensitive to metallic, as well as non-metallic contaminants such as rocks, glass, plastic and rubber. Typical detection sensitivities are 1 to 1.5 mm for metals and 3 to 4 mm for glass and rocks.

They're outfitted with front-, back- or side-slotted bulk flow input funnel. An adjustable metering device facilitates consistent product level to optimize detection, while multilane inspection software minimizes rejected material. High resolution sensors and high power X-ray sources maximize sensitivity.

Thermo Scientific is a manufacturer of analytical equipment based in Minneapolis.

www.thermoscientific.com

CONNECTORS

CONNECTORS TAKE THE HEAT

Harting's Han High-Temp connectors circumvent the limitations of deploying connectors in hot manufacturing applications up to 200 degrees C such as mould machines and casting equipment.

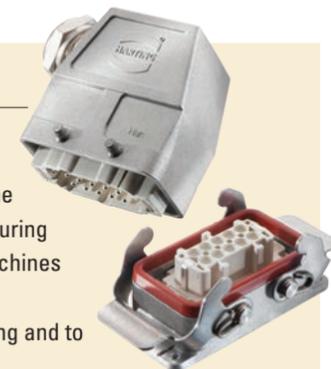
Install them right at the machine to save on cabling and to potentially simplify machine design and wiring.

The connectors, based on Harting's Han B and Han E series and using the same panel cut-out dimensions, come in aluminum die cast hoods and housings with a highly compressed surface and non-stick properties that allow them to unmate without the gasket sticking.

Rugged inserts made of injection-moulded, liquid crystal polymer plastic deliver high temperature resistance and mechanical stability. Temperature-resistant contacts connect with minimal contact resistance even at extreme temperatures.

Harting is a connector manufacturing based in Minden, Germany. It has Canadian sales operations in Montreal.

www.harting.ca



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POWER SUPPLY



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BIG DC POWER LOADS ARE COMPACT

B&K Precision's 8600 programmable DC electronic loads deliver the performance of a modular system.

Three models of the compact benchtop units range from 150 to 250 W DC electronic loads with sink current up to 60 A at wide voltage ranges up to 500 V.

With transient operation speeds up to 25 kHz and 16-bit resolution, they're used for testing and evaluating a variety of DC sources, such as power supplies, converters, batteries, LED drivers, and photovoltaic arrays.

Measured and set parameters are viewed simultaneously with a dual-line display. Other features include adjustable current slew rates, built-in rise and fall measurement, and voltage turn-on capabilities to start and stop discharging power sources at specified voltage levels.

Standard GPIB, USB, and RS232 interfaces support USBTMC and SCPI communication protocols for remote control and programming.

And protection modes, including overvoltage, overcurrent, overpower, overtemperature and local/remote reverse voltage protection, prevent damage under test.

B&K Precision is a manufacturer of test and measurement equipment based in Yorba Linda, Calif. www.bkprecision.com

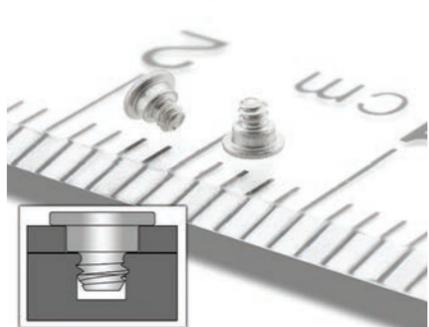
FASTENERS

REPLACES PESKY MICRO SCREWS

PennEngineering's microPEM Tack-Screw fasteners integrate proven self-clinching technology for permanent sheet-to-sheet attachment while also incorporating a unique thread-like feature for fastener removal. This adds functionality for thin sheet attachment applications, such as compact electronics.

The hardened stainless steel Type TS fasteners attach a top sheet or panel to a base material for laptops, notebooks, and tablet computers to smart phones, gaming and hand held devices, and wearable electronics.

Clinch technology resists vibrational



Self-clinching.

loosening in service and the fastener's low-profile head adds cosmetic value.

The fasteners install in thin sheets by preparing properly sized mounting holes in the sheet. After inserting the fastener into a hole, it's pressed into place, then clinches into the base panel so its head holds the top sheet (as thin as 0.2 mm) firmly and permanently in place. The base panel can be as hard as HRB 89 / HB 187 or less on the Rockwell "B" and Brinell scales and as thin as 0.91 mm.

The RoHS-compliant fasteners are installed automatically for high-volume applications and reinstalled once by screwing them back into the sheet and using a thread-locking adhesive.

PennEngineering is fastener manufacturer based in Danboro, Pa.

www.pemnet.com

SENSORS

SENSOR IMPROVES MEASUREMENT ACCURACY

Ophir Photonics' 1000WP-BB-34 high-power water-cooled thermal sensor improves the accuracy and reliability of measurements thanks to a 34 mm aperture, measuring power from 5 to 100 W and energy from 400 mJ to 300 J.

Broadband absorbers measure a spectral range from 190 nm to 20 μm, and the sensor provides a damage threshold of six kW/cm² at full power.

A "Smart Connector" interface operates with the company's StarLite, Nova II and Vega smart displays, and Juno PC interface. The display is automatically configured and calibrated when plugged into one of the company's laser measurement heads.

Ophir Photonics is a Newport Corp. brand based in North Logan, Utah that manufactures industrial instrumentation products.

www.ophiropt.com



34-mm aperture.

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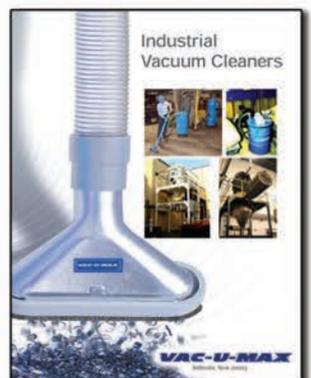
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TRANSMITTERS



Outputs of 0-5, 0-10 VDC.

TRANSMITTERS ARE CONFIGURABLE

Operators can select from two accuracies, three outputs, 12 pressure ports, and five electrical connectors for a customized sensor without delay with *tecsis* LP's SP007 configurable pressure transmitter's gauge.

It handles demanding conditions thanks to a welded stainless steel construction and 3x safe overload rating.

Transmitters come in 26 ranges from 0-0.5 to 0-5,000 psi with standard accuracy of 0.25% or optional high accuracy of 0.1%.

Amplified output of 0-5, 0-10 VDC or 4-20 makes integration into most systems easy. Operating temperature is -40 to 115 degrees C, compensated from 4 to 60 degrees C.

tecsis is a manufacturer of sensors and pressure transducers based in Worthington, Ohio.

www.tecsis.us

AUTOMATION

ISOLATED RS232 SERIAL COMMUNICATIONS

ACCES I/O Products Inc.'s mPCIe-ICM PCI Express Mini Cards measure just 30 x 51 mm and are fitted with four or two ports of isolated RS232 serial communications for use in harsh environments in automation applications.

Isolated serial communications have 1.5 kV isolation port-to-computer and 500 V isolation port-to-port on all signals at the I/O connectors. RS232 ports are compatible with industry-standard serial COM devices, and support TX, RX, RTS and CTS.



Supports TX, RX, RTS, and CTS.

The card provides ± 15 kV ESD on all signal pins to protect against damage to sensitive electronic devices due to electrostatic discharge. They're outfitted with Tru-Iso to provide port-to-port and port-to-PC isolation.

Serial ports are accessed using a low-profile, latching, 5-pin Hirose connector.

Optional breakout cables are available, and bring each port connection to a panel-mountable DB9-M with an industry compatible RS232 pin-out.

The cards, which meet RoHS standards and handle operating temperatures between -40 to 85 degrees C, were designed using 16C950 UARTS and use 128-byte transmit/receive FIFO buffers to decrease CPU loading and protect against lost data in multitasking systems.

They're software compatible with current PCI 16550 type UART applications and maintain backward compatibility, useful in applications where there are high common-mode external voltages, such as factory automation, energy management, and manufacturing test and process monitoring.

Isolation is required to guard electronics from transient voltage spikes and offers greater common-mode noise rejection in electrically noisy surroundings containing industrial machinery and inductive loads.

ACCES I/O Products Inc. is a manufacturer of data acquisition equipment based in San Diego, Calif.

www.accessio.com



Minimal crosstalk between ports.

frequency bands.

Low PIM improves DAS system performance because PIM reduces or degrades base station performance. A low PIM spec of -155 dBc at 2 x 20 watts (2 x 43 dBm) ensures high data rates to support streaming video for mobile devices.

Configurations include an N-female connector and a Mini DIN version. Both are housed in injection-moulded radomes and are RoHS compliant and PIM certified.

Pulse Electronics is a manufacturer of interconnect components based in San Diego, Calif.

www.pulseelectronics.com

CONTROLS

ACCESS INFORMATION LOCALLY OR REMOTELY

Precision Digital Corp.'s Vantageview PD6730X modbus scanner is a rugged, NEMA 4X/IP65 Modbus, slave, or snoop (sniffer) that accurately displays and quickly accesses information locally or remotely in wet or dirty environments.

It accepts up to 16 individually programmed profrom multiple devices and four calculations on multiple PVs. SafeTouch through-window buttons allow operation without removing the cover. The pulse input accepts a range of flow transmitting mV input from a magnetic flowmeter, as well as high frequency signals.



View angles of up to +/- 40 degrees.

The unit is housed in an injection-moulded thermal plastic enclosure and includes backlighting, two open collector outputs, and analogue output.

The lower display for both models is 0.4 in. high, with seven alphanumeric characters, for process variables, custom units or tags. A bright LCD display is easily read under varying lighting conditions and from viewing angles of up to +/- 40 degrees. It also rotates in 90-degree increments to increase readability.

Power options include DC with battery backup, DC only, output-loop, or output loop with battery backup. An element-resistant enclosure provides three threaded conduit holes and integrated pipe or wall mounting holes. Operating temperatures range from -40 to 75 degrees C.

Precision Digital is a manufacturer of digital display and control instrumentation based in Holliston, Mass.

www.predig.com

MACHINE VISION

COGNEX REVS UP 2D BARCODE READING

Cognex Corp.'s PowerGrid technology reads 2D matrix and direct part mark (DPM) codes from the inside-out.

Based on a texture-based location algorithm, the technology looks for a pattern of alternating light and dark modules within the code to increase read rates in 2D barcode-reading applications where a part's geometry, poor lighting, occlusion, or print-registration errors make it difficult to capture an image of the entire code.

Cognex Corp. is a manufacturer of machine vision technology based in Natick, Mass.

www.cognex.com



Texture-based location algorithm.

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CUTTING TOOLS

GRADES IMPROVE TOOL LIFE

Walter's Cut Tiger-tec Silver CVD grooving and parting grades deliver higher metal removal rates while improving tool life, wear resistance and cutting speed.

The GX WKP13S, WKP23S and WKP33S models provide continuous cutting on bar stock to machining interrupted cuts.

They're available in combination with UD4, UA4, UF4, RD4, GD3 and CE4 geometries. Wear-resistant cutting material delivers an increase in cutting parameters, while maintaining or improving tool life.

The thicker Tiger-tec coating with aluminum oxide and optimized microstructure maximizes crater wear resistance and reduces friction to enhance cutting speed. A new silver flank face permits easy wear detection and full use of the cutting edge.



Easy wear detection.

A second generation mechanical post-treatment creates compressive stresses, enhances toughness, reduces the chance of cracks on the cutting edge, and boosts load capability and metal removal rates.

The grades are used under good machining conditions on ISO P and ISO K materials including steels such as high grade, bearing and carbon steels.

Walter Tools is a manufacturer of metal cutting equipment based in Tübingen, Germany with US production in West Waukesha, Wis.

www.walter-tools.com

WELDING

AUTOMATED LATHE REDUCES LEARNING CURVE

Mavrix Welding Automation Inc.'s horizontal and vertical welding lathes with PLC-based controls improve productivity of remanufacturing slab caster rolls, shell rolls, zinc pot rolls and mandrel bars.

With adaptive spindle speed compensation, operators do not need to adjust wire-feed speed or spindle speed to accommodate changes in diameter.

The multi-process horizontal lathe is capable of sub arc, open arc and gas-



Adaptive spindle speed compensation.

shielded welding processes using a single torch. An onboard second torch is ready for quick changeover for bores welding down to 4-in. in diameter.

Programs are developed by defining which axis will step or run when welding begins. It includes a 12-in. colour and easy-to-use open-naming convention for part configuration storage.

The welding lathe is preconfigured for a variety of accessories including servo oscillator, water cooler with loss of flow sensing, pressurized flux delivery and recovery and exhaust system integration. An onboard gravity flow flux hopper includes an ultra-sonic level sensor that reduces air consumption and informs operators when the system is low on flux.

Mavrix is a manufacturer of automated hard facing and metal build up systems based in New Berlin, Wis.

www.mavrixweld.com

LIGHTING

LEDS SAVE THE DAY

Appleton Electric's N2LED emergency egress LED fixture is more than 50% smaller and lighter than traditional models, but provides up to 130 lumens of illumination per lamp while consuming 75% less power.

It's enclosed in a compression-moulded and fibreglass-reinforced polyester formed with a continuous silicone gasket to provide lighting during a normal power interruption of up to 180 minutes. Typical applications include hazardous locations where flammable gases or vapours may be present, such as manufacturing facilities, refineries or chemical plants.



NEMA Type 4X and IP66-rated.

An integrated illuminated "push" test button provides an instant status indicator, along with automatic self-diagnostics that check the battery, lamps and load transfer circuitry every 30 days. During emergency operation, the battery is protected from deep discharge damage by a low-voltage disconnect (LVD) circuit that automatically disconnects and reconnects the load, based on battery condition.

The lights are rated for NEC Class I, Div. 2 areas (A, B, C, D), and for Class I, Zone 2 IIC, NEMA Type 4X and IP66.

Appleton Electric is a manufacturer of lighting and electrical control products based Rosemont, Ill.

www.appletonelec.com

POWER CONVERSION

POWER SUPPLIES TIGHTLY REGULATE OUTPUTS

MicroPower Direct MPG-120S 120 W open frame AC/DC power supplies meet energy saving eco-design standards across six standard models that operate from a universal 85 to 264 VAC input.

They provide tightly regulated outputs

SWITCHES

ENSURE PRECISE TIME SYNCHRONIZATION



Accuracy of less than 1 µs.

Moxa Inc.'s EDS-405A-PTP five-port managed ethernet switches' IEEE 1588v2 PTP hardware time stamping ensures precise time synchronization of networks running the company's Turbo Ring and Turbo Chain topologies. Both provide less than 20 ms recovery in networks with up to 250 switches.

The switches support IEEE 1588 Boundary Clock and Transparent Clock. While in Transparent Clock, they provide End-to-End (two-step) and Peer-to-Peer (two-step) modes. High-precision time accuracy is less than 1 µs. Modbus TCP, PROFINET RT, and etherNet/IP support provides better SCADA integration.

Other management functions include IGMP snooping, IEEE 802.1Q VLAN, QoS, RMON and relay warning.

Moxa is a manufacturer of industrial networking and automation products based in Brea, Calif.

www.moxa.com

of 12, 24, or 48 VDC for a range of industrial applications.

Fitted on a miniature 3 x 5 in. PC board, they combine high power density, robust performance and economy. Standard features include 89% efficiency, filtering to EN 55022 Class B, and PFC to EN 61000-3.

All models are protected for over voltage, and short circuit faults. With only 7 cfm airflow, the unit may be operated to 150 W.

They're approved to EN 60950 and are also compliant with the ErP directive. The MTBF (per MIL HDBK 217F) of the MPG-120S series is greater than 400,000 hours.



85 to 264 VAC input.

Each model is rated for operation over a temperature range of -20 to 70 degrees C.

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

www.micropowerelect.com



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DUST AND FUME

FARR GOLD COLLECTORS GET AN UPGRADE

Camfil Air Pollution Control has updated its Farr Gold cartridge dust and fume collectors.

A patent-pending clamping system on the door hardware increases locking strength and makes it easier to close the door. Compression leverage is increased to a 50:1 ratio when closing the door, providing a reliable seal with 6.5 psi standard strength and eliminates the need for a high-pressure door adder.

Laser-cut, welded-in brackets are used instead of bolted-in brackets to hold the clamping bars to the tube sheet. Camfil says this ensures highly accurate tolerances and allows the clamp bars to swing freely, making filter change-out easier. The welded design eliminates bolt holes between the dirty and clean air plenums.

Corner brackets are made of unpainted stainless steel to maintain grounding throughout the unit.

Camfil is a Jonesboro, Ark. manufacturer of dust collectors for industry. Canadian offices are located in Concord, Ont.

www.camfilapc.com



Increased locking strength.

FLUID DISPENSING

DISPENSING SYSTEM INTEGRATES EASILY

Nordson EFD's automated fluid systems combine precise dispensing with fast and easy programming for streamlined integration into manufacturing operations.

Vision and laser height sensing are combined with closed-loop encoding for an automated solution that sets up quickly, plus it's easy to program and manage.

A smart vision CCD camera simplifies programming by capturing detailed component part images and converts them into high-resolution digital files. The vision system is integrated with EFD's Dispense-Motion software for precise dispensing.

Fully integrated laser height sensing



Three-dimensional motion control.

detects variations on the product surface and makes corrections to the dispensing height to prevent uneven deposits and tip or workpiece damage.

Programming of dots, lines, circles, arcs, compound arcs and complex patterns is easy with true three-dimensional motion control.

The systems are configured for precise dispensing using the EFD syringe barrel and valve systems. They're available in platform sizes of 200 x 200, 300 x 300, 400 x 400, and 500 x 500, and handle a range of applications and work as standalone or automated solutions such as in-line transfer systems, rotary tables, and pallet assembly lines.

Nordson EFD is a manufacturer of fluid dispensing systems based in East Providence, RI.

www.nordsonefd.com

CAMERAS



GigE PoE compatible.

3D CAMERA SIMPLIFIES BIN PICKING

Imaging Development Systems' Ensenso stereo 3D camera handles complex vision tasks, including challenging bin picking and on-the-fly volume measurements.

It's easy to integrate and eliminates complicated setups. Currently available with a standard USB connection, the manufacturer of digital industrial cameras based in Obersulm, Germany says it will soon be available with a GigE PoE connection.

The camera integrates two global shutter CMOS sensors in a compact housing and an infrared pattern projector. A random pattern of dots is projected onto the object, highlighting hard-to-see structures.

The object is then captured by the two image sensors. 3D coordinates are calculated for each pixel using geometric relations.

The camera, measuring 150 x 45 x 45 mm, handles working distances from 130 to 2,000 mm. Focal lengths of 3.6 to 16 mm cover a range of distances and sizes.

Its software calculates mounting position, and 3D data is represented in the robot's coordination system. The 3D point clouds are analyzed by standard machine vision programs, including the HALCON interface, which is included in the software package, alongside an API for C, C++ and C#.

www.ids-imaging.com

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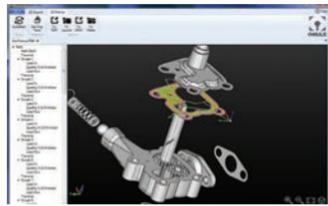
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CUTTING PARTS TO THE INTELLI-MAX

Advanced JetMachining centres from OMAX Corp. interface with the abrasive waterjet company's Intelli-MAX software suite to easily generate 3D tool paths and quickly perform 3D to 2D file conversions.



Supports many file formats.

The advanced software tool simplifies the cutting of complex precision parts on OMAX machining centres. The 3D Pather tool quickly generates multi-axis, machine-ready tool paths from complex solid models and automatically recognizes viable cutting surfaces from those 3D shapes, including variable bevels and tilted cones. This eliminates adding 3D attributes manually to a 2D file.

Machine-ready cutting geometry is generated through a few mouse clicks. With the 3D file imported, extract the desired 2D profile directly from a slicing plane, shadow or face. Intuitive navigation tools make it easy for users to position and orient the slice – including rotations around all axes, orienting to a face, or projecting as a shadow.

This free update operates as a standalone application or in tandem with several of the popular third-party 3D CAD systems. It supports a wide range of neutral and native 3D file formats, such as CATIA, SolidWorks, Solid Edge, Autodesk Inventor, Siemens NX, Pro/E, Creo, Step, IGES, VDA-FS, ACIS, Parasolid, 3D DXF and DWG.

OMAX, based in Kent, Wash., manufactures advanced abrasive waterjet technology.

www.omax.com

DETECT EQUIPMENT PROBLEMS EARLY

A new version of the Proficy Monitoring & Analysis Suite (PMAS) detects a broad range of equipment problems across a variety of assets, load ranges, and failure modes.

The GE Intelligent Platforms software integrates Proficy Historian with advanced analytics capabilities, Proficy SmartSignal and uses the Predix platform for the industrial internet.

Proficy Historian collects, organizes, stores, visualizes and analyzes data, and the Advanced Analytics software based on Proficy SmartSignal provides the earliest detection of emerging equipment failure.

This institutionalizes knowledge to create standard diagnostic procedures, ensuring they capture best practices for timely action.

GE Intelligent Platforms, based in Charlottesville, Va., supplies industrial control and automation products.

www.ge-ip.com

INCREASE MACHINING VOLUMES

Version 3.5 of Tebis America's R8 CAD/CAM software increases machining volumes and produces higher cutting speeds for roughing to finishing milling applications with better surface quality.

It supports all high-speed and high-feed milling cutters with specific geometries and precisely offsets their contours.



Precise calculations.

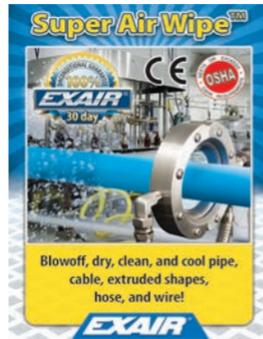
A new function measures paths created with the same methods as toolpaths, using the same automation functions. A measuring probe determines the quality of the manufactured components directly at the machine. Deviations from the target are displayed at the machine controller for immediate correction.

Milling with 3D radius correction compensates for tool wear. The deviation from the target is easily calculated for direct measuring at the machine. Additional information is added to the calculated toolpaths to be evaluated by the machine controllers for radius correction. If the real tools differ from the data in the tool library, enter the correction values directly into the controller.

Tebis America, based in Troy, Mich., develops CAD/CAM systems for tool, die and mould manufacturing.

www.tebis.com

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EXAIR Corporation

MOST POPULAR VACUUM CUPE



Vi-Cas Manufacturing's new 16-page, full colour brochure details the company's most popular vacuum cups. In addition to dimensional information (including lip diameter, height and mounting holes), the new literature shows photos of each cup to guarantee accuracy. Vacuum cups and accessories are used extensively in all types of packaging and labeling operations. www.vi-cas.com

Vi-Cas Manufacturing

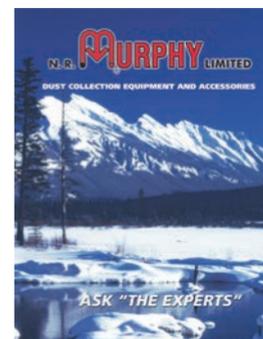
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DUST COLLECTORS NEW - FULL LINE LITERATURE GUIDE

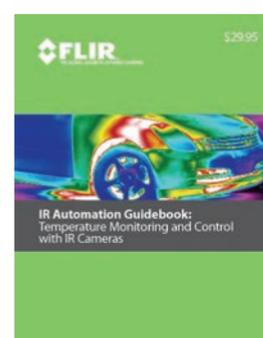


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Let's simplify innovation

BY MATT POWELL, ASSOCIATE EDITOR

Manufacturers need to get over their love/hate relationship with innovation. With plunging oil prices and a lower valued loonie, it's a good time to embrace it.

Manufacturers have been hectored to be more innovative, but they'll offer plenty of reasons why they lag their global peers. They're nervous following the 2008-09 financial crisis. They don't have the necessary talent onboard. Or SRED is too much of a pain.

"Great innovation does something differently instead of doing something better..."

There's plenty of help for those feeling lost in the innovation vortex. We have good government programs (which could still be better), a skilled labour force and a phenomenal education system that's breeding Canada's next generation of business leaders. These tools are underutilized.

"Smart investment in skills and innovation is key to enhanced productivity and competitiveness," the Conference Board

of Canada wrote in a 2013 report, where Canada ranked 25th out of 144 peer countries. Playing catch up is not a winning formula, it concluded.

The best innovations aren't complicated. In his book *Smartcuts*, which has been praised for its focus on rethinking convention, Shane Snow suggests simplification is often what makes the difference between good and amazing.

We have bastardized the word "in-

novation," he says, equating it now with change or general improvement – "a buzzword meaning bigger." But he contends some of the most world-altering innovations are rooted in simplicity.

Great innovation does something differently, instead of something better. Cars overtook the horse-and-carriage because they made transportation simpler. E-mail usurped postal mail because it was instant. USB drives overtook disk drives because they had more memory. And then cloud storage overtook USBs because it makes files accessible anywhere in the world.

Ken Tencer, a branding and innovation thought guru, notes in a recent *Globe and Mail* column that people don't need to be creative to be great innovators.

Canada's post-secondary education system has been ranked 18th among 144 countries, according to the World Economic Forum, and we're pumping out more engineers than ever before.

So what's Canada's problem?

Finding leverage

There's a disconnect. Industry is slow to leverage in-house innovation ability and hasn't applied the breadth of skill our university students and research centres offer. This is further proved by our 19th place WEF ranking for university/industry R&D collaboration.

And there is a price to pay. More innovative countries are passing us on metrics such as income per capita, productivity, and social program quality.

Two of the three pillars in Ontario's \$2.5 billion Jobs and Prosperity Fund are founded on building R&D capacity, improving productivity and competitiveness, supporting innovative businesses, and developing strategic partnerships. Canadian Manufacturers' & Exporters is heavily promoting its SMART program, and Niagara College has broken ground on a \$4.2 million expansion at its Advanced Manufacturing Technology Research Centre in Welland, Ont. The school's advanced manufacturing innovation program, founded in 2013, provides Ontario-based companies with state-of-the-art equipment and research facilities, plus faculty and students ready to collaborate. It also provides students a way to connect with more than 850 regional industry players and earn much needed work experience.

Governments need to do a little re-thinking too.

The Ottawa-based, left-centric, Broadbent Institute, has called on them to move away from providing tax credits for industrial innovation. Doing so would ensure that rewards are pooled equally instead of favouring larger companies with deep pockets.

Manufacturers need to fear innovation less, collaborate more and engage the young people who will lead in the future to play a role in building it.

Comments? E-mail mpowell@plant.ca

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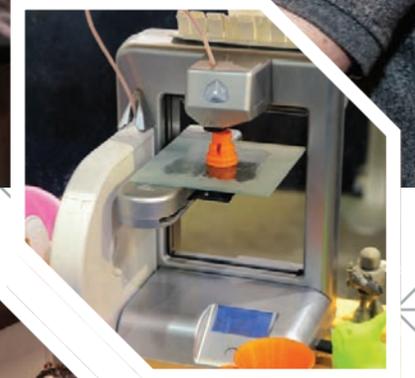


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