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PLANT WEST

ADVANCING CANADIAN MANUFACTURING

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CBV gives
retro-LP technology
another spin

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CIEN

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Close the innovation gap

Canadian manufacturers are inclined to do business close to home, but the conclusion of free trade deals with Europe, South Korea and now the countries involved in the Trans-Pacific Partnership will open doors for opportunities beyond North America.

To succeed on the diverse world stage, Canadian companies have to improve their competitiveness. Having quality products and being part of the great "Made in Canada" brand will not be enough.

One area crying out for more effort is innovation. Granted, we can all be proud that the Conference Board of Canada's annual innovation report card that compares Canada to peer nations, has upgraded us from a chronic D to a C. But the improvement is mostly a result of surging entrepreneurial vigour. Investment in R&D is actually slipping. Already a laggard, the Conference Board notes we have dropped from 15th to last place for spending as a share of GDP.

The Ottawa-based research firm views the nation's innovation story as being more about inaction and poor commercialization and PLANT's 2016 edition of the Manufacturers' Outlook survey tells the tale. Of the 365 senior executive respondents, most (40%) say they devote less than 1% of their staff to R&D, and 28% intend to invest just 1% to 3% in innovation. Forty per cent took advantage of the SR&ED tax credit in the past but far fewer did so this year (30%) and 46% have not taken advantage of the tax credit nor do they intend to do so.

The Conference Board notes Canada is pursuing more patents and trademarks, but so are its competitors. Not that the Outlook survey results offer signs of improvement: 61% of the companies are not actively pursuing patents or trademarks.

A study by EY and the Hunter Centre for Entrepreneurship and Innovation at the University of Calgary offers additional evidence of laxity. It reveals 93% of executives from more than 250 Canadian companies see innovation as important to their growth, but 70% say they don't separate it from the larger business strategy. And most don't have a leader accountable for innovation, an innovation process or a framework. Only 18% of companies have a specific innovation budget.

KPMG warns against the current "incremental" approach to growth and innovation as global competitors potentially surpass Canadian companies in key strategic areas. It says manufacturers need to narrow the gap with their peers. Its study shows 12% of companies focus on breakthrough innovation as their primary strategy, compared to 41% of global manufacturers, whose top innovation priorities are increasing R&D spending (44%) and adopting new technologies (48%). Canadian companies are way behind at 13% and 20% (respectively).

Outlook survey respondents describe themselves as optimistic about the year ahead and with good reason. Scotiabank is expecting US growth rates next year of about 2.6%. That's the fastest rate since 2006 for Canada's primary trading partner, which is good news for manufacturing.

But the US and Canada represent a mature market. Opportunities for more aggressive growth lie outside North America over the longer term. To be global player, manufacturers must amp up their innovation game by including it in their strategic plans, creating a specific budget, investing more in technology and R&D, taking advantage of the SR&ED tax credit program and directing a laser-like focus on product development and improving processes (which will help address lagging productivity).

Whether or not manufacturers consider the opportunities offered by recent trade agreements, they'll have to become more competitive to meet the challenges posed by the improved access offered to Canada's newest trade agreement partners.

Joe Terrett, Editor

Comments? E-mail jterrett@plant.ca.



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Publisher: Michael King 416-510-5107
mking@plant.ca, mking@ciennmagazine.com

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

Associate Editor: Matt Powell 416-510-5145
mpowell@plant.ca

Art Director: Kathy Smith 416-442-5600 ext. 3215
ksmith@plant.ca

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

Account Coordinator: Barb Vowles 416-510-5103
bvowles@annexnewcom.ca

Circulation Manager: Beata Olechnowicz 416-442-5600 ext. 3543
bolechnowicz@annexnewcom.ca

Editorial Advisory Board: Robert Hattin, ProVantage Automation
• Ron Harper, Cogent Power • Greg MacDonald, Wentworth International Services • Roy Verstraete, Anchor Danly

Annex Business Media
Vice President: Tim Dimopoulos (416) 510-5100
tdimopoulos@canadianmanufacturing.com

President & CEO: Mike Fredericks

PLANT—established 1941, is published by Annex Business Media
Tel: 416-442-5600, Fax: 416-510-5140
80 Valleybrook Dr., Toronto, ON M3B 2S9

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Annex Privacy Officer
privacy@annexbizmedia.com
Tel: 800-668-2374

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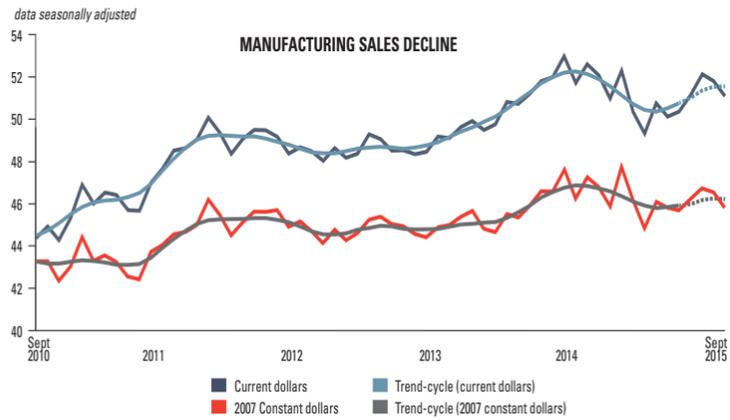
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» PLANT WEST PULSE



SEPTEMBER SALES DECLINE

Manufacturing sales in September declined in 13 (78.6%) of 21 industries by 1.5% to \$51.1 billion, according to Statistics Canada. The month's retreat followed a 0.6% decrease in August. Blame motor vehicle assembly and the petroleum/coal products industries for the decline. Sales were down 1.4% to \$5.7 billion in Alberta, the third consecutive monthly decline. It was driven by a 10.6% drop in petroleum/coal products sales. Higher machinery sales (13%) offset some of the decrease.

EI ELIGIBILITY AVERAGE IN 2014

Canada's eligibility rate for employment insurance (EI) benefits was 83.1% in 2014, down from 85.8% in 2013, but in line with the 83% average seen over the previous 10 years, reports Statistics Canada. Rates fell in six provinces, while they increased in Manitoba (to 91%) and Saskatchewan (to 85.4%).



WEST SPLITS ON SALARY INCREASES

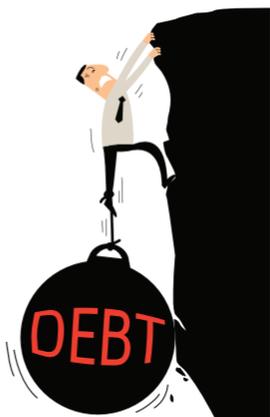


The average salary increase for non-unionized employees is projected to be 2.6% next year, according to the Conference Board of Canada's 2016 compensation planning outlook. The lowest salary increases will go to workers in BC (2.3%) and Alberta (2.4%). Saskatchewan (3.2%) and Manitoba (2.9%) will get the highest increases.

CARRYING DEBT IN BC

While 96% of British Columbians carry debt, given an extra \$1,000 each month, only 33% would use their disposable income to pay it down, according to a Vancity poll.

The BC financial co-op reports the rest of the respondents would put the money into investments or bank it, except for 6% who would do "something fun" with it. Equifax Canada reports Canadians' average debt (excluding mortgages) is \$20,910, up 2% from a year ago. British Columbians carry average debt of \$23,011 (up 0.4%).



EXTERNAL FINANCING REQUESTS



Just over half of small and medium-sized enterprises (SMEs) requested external financing in 2014, according to Statistics Canada. Of the SMEs with 100 to 499 employees, 71.2% requested financing, compared with 42.8% of those with up to four employees. Primary (61.3%) and wholesale trade (61.0%) sectors made the most requests, while the professional, scientific and technical services sectors (39.8%) made the fewest. SMEs most often requested trade credit (29.4%) and debt financing (28.1%), and equity financing (0.9%) was the least requested.

Canada Goose opens second Winnipeg plant

New factory will create over 350 new jobs by 2017

WINNIPEG — Canada Goose, a manufacturer of Arctic luxury apparel, has opened its second manufacturing operation in Winnipeg and expects to create more than 350 jobs by 2017.

The company said the 103,000 square-foot facility will help meet growing global demand for its Made-in-Canada outerwear.

The plant, built in 1982, has been repurposed with state-of-the-art manufacturing technology to produce Canada Goose parkas as well as new lightweight down styles, which will be sold in more than 50 countries.

Canada Goose sees its new factory as part of an effort to rebuild the apparel-manufacturing



Canada Goose president and CEO Dani Reiss (R) and Kevin Chief, Manitoba's minister of jobs and the economy, open Canada Goose's second manufacturing facility in Winnipeg.

PHOTO: LISA WALDNER

infrastructure in Canada, which Industry Canada says lost 12,000 jobs between 2010 and 2014.

This is the second facility the

company has opened this year and follows a recent expansion of both factory and office space at its global headquarters in Toronto.

New Flyer to supply 725 Xcelsiors

Boston deal for diesel-electric buses is valued at \$254 million

WINNIPEG — New Flyer of America Inc. has been awarded a contract by the Massachusetts Bay Transport Authority (MBTA) for up to 725 40-foot Xcelsior heavy-duty transit buses.

The contract includes a firm order for 175 compressed natural gas buses (XN40) and 150 diesel-electric hybrid buses (XDE40), plus options for an additional 200 clean diesel buses (XD40) and 200 diesel-electric hybrid buses (XDE40) over the next five years.

The bus manufacturer's portion of the contract is valued at approximately \$223 million with options valued at \$254 million. MBTA currently operates a fleet of 1008 heavy-duty transit buses, 70% of them built by New Flyer.

New Flyer, with more than 3,000 employees at facilities in Winnipeg and Minnesota, has also acquired Motor Coach Industries in a deal worth



New Flyer's Xcelsior heavy-duty transit bus.

PHOTO: NEW FLYER

\$455 million.

Founded in 1933 in Winnipeg, MCI has three manufacturing facilities and nine service and parts distribution centres.

MDA adds to MSS space contract

RICHMOND, BC — MacDonald, Dettwiler and Associates Ltd. (MDA) has signed a \$3.1 million contract amendment with the Canadian Space Agency for new camera systems going into the Mobile Servicing System (MSS).

The MSS with its Canadarm2, Special Purpose Dexterous Manipulator and the Mobile Base System, performs resupply, maintenance and servicing tasks for the International Space Station.

MDA is a global communications and information company based in Richmond, BC.

Jet Group acquires US PPE firm

VANCOUVER — The Jet Group, a supplier of tools, equipment and safety products, has acquired US safety equipment maker Sellstrom Manufacturing Co.

Jet, based in Vancouver, said the acquisition of the Schaumburg, Ill.-based Sellstrom broadens its safety portfolio and extends its reach into the US market.

Sellstrom will expand the range of its personal protective equipment (PPE) products in many existing categories and it will offer Jet's safety offerings, such as Hi-Viz apparel, FR apparel, industrial rain wear and work boots.

The US company will be a stand-alone division of the Jet Group. Financial details were not released.

Ballard, King Long to collaborate on fuel cell buses

VANCOUVER — Ballard Power Systems has signed a strategic collaboration with Xiamen King Long United Automotive Industry Co. to deploy a fleet of fuel cell-powered buses.

The companies will develop, optimize and produce a prototype bus, with Ballard supplying its proprietary fuel cell engine and a suite of other technology solutions.

King Long is a manufacturer of buses, coaches and minivans based in Xiamen, China. The company has three manufacturing bases in China where it produces 25,000 buses and 30,000 minivans annually.

Ballard, based in Vancouver, is a developer of clean energy products, including fuel cell engines for transportation applications.

Nanotech signs optical thin film MOU

VANCOUVER — Nanotech Security Corp., a Vancouver-based producer of advanced security products, is looking at collaborating with an Austrian firm to develop optical thin film for banknotes.

Nanotech and Hueck Folien GmbH of Baumgartenberg, Austria, which develops advanced security features for banknotes and documents, have signed an MOU to explore the production of a colour shifting security feature.

Initially, the product would be used in banknotes, then expand into other markets.

West Fraser to acquire Manning sawmill

VANCOUVER — West Fraser is acquiring Manning Diversified Forest Products Ltd. in Manning, Alta. and its timber harvesting rights.

No financial details were released.

The sawmill opened in 1993 and produces approximately 100 million board feet of lumber annually.

West Fraser, a forest products manufacturer based in Richmond, BC, plans to adjust current operations and expand annual production capacity to approximately 130 million board feet.

The harvest rights cover up to 440,000 cubic metres of coniferous trees per year.

Airbus, Coulson partner on water bomber

Prototype firefighting aircraft has been flying since 2013

OTTAWA — Airbus Defence and Space and the Coulson Group of Canada have signed an MOU covering manufacturing, supply and support of the new water bomber version of the Airbus C295W transport aircraft.

Coulson Group, based in Alberbi, BC, will manufacture a version of its Retardant Dropping System (RDS) through its operating company Coulson Aircrane Ltd. The RDS system is also used by a number of global firefighting outfits.

The C295W's system will consist of two roll-on-roll-off internal tanks, which are easily removed after the fire season. The bomber will then be available as a conventional ramp-equipped, multi-role transport able to carry cargo, troops, paratroops or stretchers.

The RDS has two internal tanks that transport 3,500 litres of water or retardant and are refilled in under seven minutes.

During a drop, the flow-rate is adjusted via the cockpit control panel according to the desired coverage, aircraft speed and height over terrain. A prototype C295W water bomber has been flying since 2013.



Two internal tanks carry 3,500 litres of water or fire retardant.

PHOTO: BOEING

Airbus Defence and Space, a division of Airbus Group, employs more than 38,000 employees. It was formed by combining the business activities of Cassidian, Astrium and Airbus Military.

Avcorp to produce camera fairings for Boeing

VANCOUVER — Boeing Co. has awarded Avcorp Industries Inc. production and supply of 767-2C panoramic camera fairings as part of its KC-46 tanker program.

The aircraft component manufacturer with a plant in Delta, BC says each shipset of panoramic camera fairings consist of large and complex composites and metallic components that are made into a fully integrated assembly.

This assembly attaches directly to the 767-2C fuselage and will be delivered direct to Boeing's production line in Everett, Wash.

Avcorp., which employs almost 390 skilled workers, operates 340,000 square-feet of facilities at its Delta location, which is dedicated to lightweight metal manufacturing and assembly, and a Comtek location in Burlington, Ont. that makes composites and does repairs.

No financial details were released.

TransCanada sells 49.9% of PNGTS

CALGARY — TransCanada Corp. is selling a 49.9% interest in Portland Natural Gas Limited Partnership (PNGTS) to its master limited partnership, TC PipeLines LP, for US\$223 million.

"The PNGTS transaction is a continuation of our strategy to drop down the remainder of TransCanada's US natural gas pipeline assets to the TC PipeLines partnership," said Russ Girling, TransCanada's president and CEO.

The asset sales provide TransCanada with cash proceeds to help fund its capital program and diversify the partnership's asset base.

PNGTS is a 474 kilometre (295 mile) high-capacity, high-pressure interstate natural gas pipeline that connects with the TransQuébec and Maritimes Pipeline near East Hereford, Que.

» Careers

Pacific Insight Electronics Corp. has elected a group of new directors to its board. The global electronics manufacturer based in Vancouver welcomes **J. Cowan McKinney, Stuart Ross, Gary Sutherland** and **Stuart McLaughlin**.

Canadian Pacific (CP) has appointed **Jeffrey Ellis** chief legal officer and corporate secretary, replacing **Paul Guthrie** who is retiring. Ellis joins the trans-continental railway from BMO Financial Group, where he had been executive vice-president, US General Counsel.

High Arctic Energy Services Inc. has appointed **Brian Peters** chief financial officer. Peters is a chartered accountant with nearly twenty years of experience in various finance and accounting roles, including CFO at both public and private oilfield service companies. He will oversee the overall financial management of High Arctic, a provider of oil and gas services.

Westport Innovations Inc. is restructuring the composition and governance of its board in preparation for its merger with Fuel Systems Solutions. **Warren Baker**, an existing director, has been appointed chairman. **Jill Bodkin**, board chairman since 2014, has resigned, but will remain with the company as a director. **Doug King** has also resigned. Westport, based in Vancouver, develops advanced natural gas engines and vehicles.

BC labour study IDs shortage of workers

VANCOUVER — A forecast for BC's labour market shows tight conditions for key occupations over the next five to 10 years.

The Asia Pacific Gateway Labour Market Information study looked at 56 occupations in the construction, rail, trucking, marine, managers, logistics and air sectors, plus occupations that support these sectors.

While the forecast focused on five and 10-year horizons (2015-24), it found tight labour conditions will take hold even sooner across all sectors in the first three years, and they will remain for most of the next decade.

A primary factor for the tight conditions is the number of new workers not keeping pace with job openings. There will be more than 46,000 new jobs available by 2024 and with retiring baby boomers, there will be almost 160,000 openings to fill over the next 10 years.

People new to the workforce will likely make up about 40% of the new supply of workers, and an additional 25% will be made up of workers new to the country.

The study also identifies regional impacts. For example, Northern BC faces a tighter labour market than the Lower Mainland. Individual reports will be available for each of the 56 occupations, and seven sectors in Northern BC, the Lower Mainland and BC.

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» Retro Manufacturing

Vintage VINYL

CBV LOOKS TO TAP A GLOBAL LP RESURGENCE

Canada's only record manufacturer has to wrangle decades-old equipment and related challenges, but sees a bright future linked to a renewed interest in analogue music.

BY KIM LAUDRUM

Dean Reid knew his dream of creating a hub for Calgary's music scene was coming close to reality when he came across a Nielsen Music report suggesting global sales of vinyl records had surged 52% in 2014.

His music brainchild now encompasses a warehouse space where musicians jam, a recording studio, coffee shop and a retail outlet for new music recorded, not digitally, but in the good, old-fashioned analogue format. Those recordings are produced on vinyl records.

Canada Boy Vinyl (CBV) is now the country's lone vinyl record manufacturer, and one of only 40 in the world. To make it happen, chief operating officer Reid successfully searched the globe to find the 1970s vinyl press equipment

needed to bring the plant to life.

"I wanted to do something in line with my passion," says Reid of his decision to start a private recording label in August 2013.

A bass guitarist with a family to support, he spent most of his career in construction before meeting partners Patrick Jakubec, CBV's president, and Dillon Romney, general manager. Together they formed CBV.

It was their initial research into starting a private recording label that led Reid to discover "it was probably one of the worst businesses a guy could get into."

In the late 1970s there were nine big recording studios, notes Romney. There are only three left – Universal, Warner and Sony. That's some stiff competition, but it also opens up a hole in the market for new independent bands that deserve to be heard.

When CBV looked into the LP business in 2014, Reid discovered there was a strong appetite for vinyl, and it was growing. Oddly enough, the upsurge in vinyl sales wasn't coming from an older, nostalgic group of consumers interested in padding their existing record collections, but instead from a much younger crowd: DJs looking to "scratch" records and create beats, hip hop, and rap. It also



included those with a new or renewed appreciation for the analogue recordings pressed with the warm sounds of vinyl.

People also wanted to hold something tangible in their hands. CBV's records include liner notes and covers designed by artists.

"I had no idea then that vinyl was going to go as crazy as it did," says Reid.

Romney doesn't think vinyl ever really went away, it just went underground. For the MP3 generation, though, the vinyl format is a whole new thing.

The company does a lot of work for Canadian independent bands.

"But we're a manufacturing company. Whoever needs records, we'll manufacture for them, including large or small labels," Reid notes.

Handling demand

Twelve people are currently employed full-time at CBV, but Reid says the existing team isn't big enough to handle the demand. He anticipates adding up to eight more workers, and expects annual

1. CBV's chief engineer has 24 years experience working with vintage record presses.

2. Vinyl pucks with labels are loaded into the record moulds automatically.

3. At the six-cell plating station, stampers are grown in a nickel solution.

4. A vinyl stamper given its final rinse of deionized water before heading to plating.

5. CBV's quality control team inspects each LP before it's packaged.



1



2



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Dean Reid, CBV's chief operating officer, with a test-pressing at his Calgary recording studio record plant.

PHOTOS: CANDICE WARD

and a 7-inch press. Romney says the company is in the process of installing three more 12-inch presses.

Maintaining the vintage record-pressing equipment is an ongoing challenge. To manage out-of-the-blue issues, CBV has hired two engineers who are constantly sourcing parts and having replacements made.

Managing maintenance

Did they had run into problems? Romney and Reid burst into laughter.

"I don't know where to begin," Romney says. "Our equipment is 40 years old. We have nothing but problems."

Fortunately, the very experienced chief engineer has a third year millwright training under him.

"We try to sort through our problems every day. Our maintenance is a little trickier than other manufacturers because of the vintage aspect," says Romney. "You have to be pretty McGyver-y here."

Sourcing parts and equipment from all over the planet is one of the most difficult aspects of CBV's maintenance activities, adds Reid. A lot of the parts are brought in from the US and they're finding the low Canadian dollar a challenge.

They are also not operating in a cluster of similar manufacturers.

"It's not like we can go next door and borrow something to tide us over," says Reid. "Sometimes it gets pretty lonely up here in the Great White North."

The challenges haven't deterred them.

"We're Canadians. We have lots of wrinkles to iron out. It's just like any other company, but maybe a little more complicated," says Reid.

"I want the world to know that Canadians make great records. We're all about building a community and nurturing talent. Calgary's not just an oil town anymore."

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

Comments? E-mail jterrett@plant.ca.

production volumes to exceed 1.8 million records. Since debuting in September, CBV has pressed 50,000 records.

Indeed, getting to this point hasn't been easy.

"There's a movie in there about how we obtained our equipment," says Romney.

CBV's record-pressing equipment was moved many times over four decades, and in a chance encounter online, Reid met someone who let him know where he might find it. Turns out, the record press he coveted had been abandoned in

an old barn outside Syke, a small village in Germany.

The press was not in good working order, and had to be stripped down.

"We brought in some consulting engineers and someone with 24 years of experience (the chief engineer) pressing records to figure it all out," says Reid.

It took two years, but eventually the equipment was shipped to the company's headquarters in Calgary.

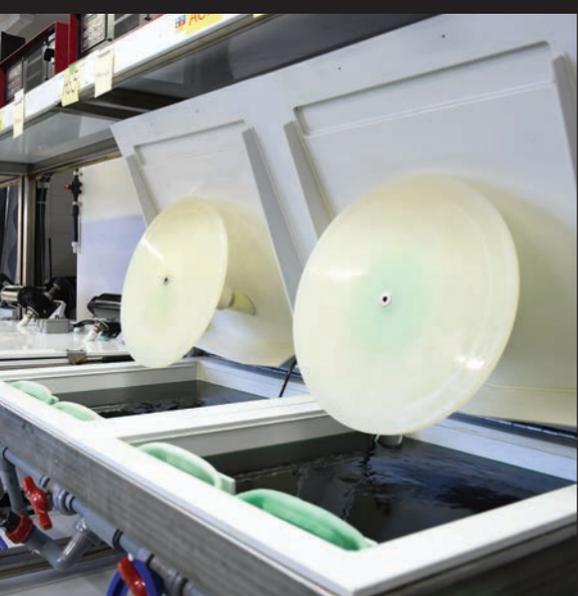
There are three major steps to making a vinyl record, Reid points out.

First, a lacquer master is created using a cutting lathe. The master is delicate, so a harder copy needs to be made from stamping.

Then a metal copy of the original lacquer is made of 99% pure nickel. It's a reverse of the record impression.

Finally, the nickel copy is placed on moulds, which stamp the A and B sides of the record.

CBV has a full lacquer mastering suite with cutting lathe; a fully functioning plating department; two 12-inch presses;



» Logistics

The resurgence of an old technology could help overcome the lack of infrastructure in the inaccessible North.

BY DAVID KENNEDY

Frost-bitten at the edge of Hudson's Bay, 1,700 kilometres north of Winnipeg and about 100 kilometres shy of the Nunavut border, Churchill, Man. is best known as a prairie grain terminus and a hotspot for polar bears. Like a number of other cities in Northern Canada, it's also the end of the line – a sleepy town where the road north just ends.

To say Canada has an infrastructure problem is understating the scale of the issue. Nearly 70% of Canada's landmass, or about 7 million square kilometres, is inaccessible by major roads or rail lines. Some areas can be reached seasonally by ice roads or ships, but the rest rely on light air transport, essentially cutting them off from the modern North American economy. This lack of transportation makes the cost of goods in remote areas two-and-a-half to three-times as expensive as in the rest of Canada, and makes getting valuable resources out nearly impossible.

But instead of clearing muskeg to build roads or using innovative techniques to lay track on permafrost, some experts believe Zeppelins can efficiently connect Canada's northern communities to the 21st century, at a fraction of the cost.

"It's been a long time in the wilderness... [but] the airship is finally finding itself a market," said Barry Prentice, a professor of supply chain management at the University of Manitoba.

The logistics expert and his fellow airship advocates are convinced the technology can be made safe and provide a cleantech solution to Canada's persistent issues in the Arctic.

Still, it will be a long way back for the "misunderstood" lighter-than-air flyer.

Though it's been nearly 80 years since the iconic footage of the flaming Hindenburg was first broadcast across the world, the spectacular conflagration has never really faded from public memory.

Today, airships have all but disappeared; nevertheless, there was a time when Zeppelins and other rigid and non-rigid airships were a relatively frequent sight. Through much of the 1930s, the technology was deadlocked with airplanes over which would become the dominant form of air transport.

"It isn't that the technology didn't work. The Germans took their Zeppelins from Brazil to Germany back and forth on a scheduled flight, and they never had an accident except for that famous one in New Jersey," Prentice said.

The public was enamoured with the much faster, sleeker – and, at the time, seemingly less explosive – airplane. The age of airships ended before it truly got off the ground.

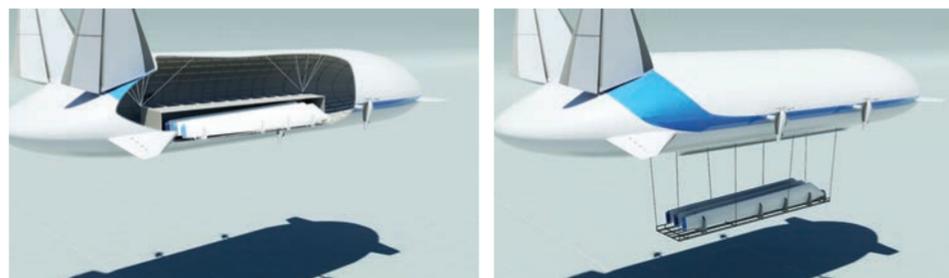


Worldwide Aeros' Dragon Dream takes its first flight.

PHOTOS: AEROCRAFT

Prevailing WINDS

RETURN OF THE AIRSHIP



Airship pilots Corky Belanger and Raymond Johns at the controls. (Bottom) Illustrations of an airship unloading turbine blades. Onloading and offloading is handled by the pilot.

Platform for cleantech

Modern airships are built to rigorous safety standards using materials such as ultra-light aluminum and carbon fibre.

While the safety standards have evolved, new airships maintain the Zeppelins' reputation for delivering weighty payloads. Worldwide Aeros Corp.'s Aeroscraft will be able to lift 66 tons. The rigid-structured airship is currently entering the early stages of production.

John Kiehle, the director of communications at Aeros, based in Montecello, Calif., said the 550-foot airship is ideal for military or heavy cargo operations.

"Whether it's for shortening the Gantt chart, helping people access stranded resources on the commercial side, or it's an ecological or humanitarian benefit, I think there really is quite a number of applications, especially up in the Canadian area," he said.

Likewise, US aerospace and defence company Lockheed Martin is developing

a hybrid airship aimed at greatly improving supply chains in remote areas.

"These airships allow access to virtually anywhere, water or land, in a wide range of weather conditions, without forward infrastructure or manpower required," Lockheed Martin Hybrid Airships program manager, Bob Boyd said.

Airships also burn significantly less fuel than conventional planes, Boyd noted. To get off the ground, airships employ a lighter-than-air gas, which fills the vehicle's envelopes, or cells. In the case of many traditional airships, engines are only necessary to provide forward thrust. In Lockheed's Hybrid Airship, gas provides 80% of the lift, while aerodynamic and direct lift account for the other 20%. The Aeroscraft makes itself lighter or heavier than air on demand.

Regardless of the system, an airship's inherent buoyancy means it requires significantly less fuel than traditional air transport. But it's the gas used to create

a Zeppelin's trademark lift that has most people feeling nervous. Well, there's no need. The overwhelming majority of airships designed today – including the Aeroscraft and Lockheed's Hybrid Airship – use non-reactive helium in place of the more combustible element at the opposite peak of the periodic table. Due to its abundance, and its ability to serve both as a lift agent and a fuel, Prentice thinks hydrogen still has a place. He pointed to the element's flammability relative to gasoline as evidence that hydrogen can be used safely if handled properly. A 4% concentration of hydrogen in the air is required to catch fire, while only a 1% concentration of gasoline is needed.

"It's very hard to get a 4% concentration. It helps explain why all those old, leaky airships from 1900 to 1940 didn't all catch fire... except when they crashed," he said.

Hydrogen advantage

Perhaps the most significant benefit of using hydrogen in airships would be the opportunity to refuel in the North; conventional aircraft accessing remote communities must carry enough fuel on-board to complete both legs of the trip, in case the pilot has no access to aviation fuel. Hydrogen, however, is relatively easy to synthesize and can easily be produced in remote communities using electrolysis. Airships would then be able to carry less fuel, allowing them to deliver heavier payloads.

Hydrogen also provides more inherent lift than helium – about 6% more – according to Boyd. Still, Lockheed elected to forego hydrogen in its airship design for several key reasons.

"It is a simple fact that hydrogen does combust, and once started it does so rather intensely," Boyd said.

In addition to the risk to personnel, Boyd said using hydrogen would also carry a significant insurance premium over helium to cover the flammability issue. Meanwhile, he anticipated higher safety standards being built into an airship as well, adding significantly to the overall cost and weight of the ship, something that would counteract hydrogen's advantages.

"While pure science indicates that hydrogen is a better choice than helium, practicality points the opposite direction," Boyd said.

Regardless of what companies may be using as a lift agent, what's important for infrastructure-starved Northern Canada is airships are once again on the production line. The re-imagined technology from the 1930s offers to bring modernity to communities that may never see a road or a rail line.

David Kennedy is an online reporter with CanadianManufacturing.com and a regular contributor to Cleantech Canada.

Comments? E-mail jterrett@plant.ca.

» Maintenance

You can extract reams of data from sophisticated management systems, but is it the information needed to make better decisions?

BY STEVE GAHBAUER

With such quickly evolving technologies, you can't continue to handle maintenance the old way. You need a plan and an implementation policy, followed by monitoring, frequent reviews and ongoing re-evaluation of your strategy. It's all about doing the right thing at the right time.

The MainTrain conference, convened in Niagara Falls, Ont. by the Plant Engineering and Maintenance Association of Canada, focused on doing just that.

Engineers design equipment and processes to minimize risks. But unforeseen circumstances sometimes arise. Managing equipment failure and the consequences is not always easy. Presenter Mark Hughes, the founder and president of Sintra Engineering, a forensic engineering firm with offices in Edmonton, Calgary and Vancouver, states the obvious when he says all large losses require a structural systematic approach, and that large property loss investigations – say after a fire – are complex. Few engineers understand or deal with litigation and subrogation issues.

Nevertheless, asset managers are faced with the need to make decisions every day. This often involves selecting one project over another, based on which one brings the highest value.

New asset management standards encourage the use of bottom-up, risk-informed and time-variant decision-making techniques to achieve truly optimal outcomes. Good governance suggests that every proposed investment should be presented with multiple options or alternatives. With this in mind, Boudewijn Neijens of Burnaby, BC's Copperleaf Technologies, a capital planning firm, suggests that the most common and successful decision optimization technique is linear programming. It uses the Simplex algorithm and computers to solve complex real-life problems. Linear programming has been applied extensively in the financial and operational worlds for decades but is only now being adopted by the asset management community to address maintenance and investment optimization challenges.

The Simplex algorithm, devised by G.B. Dantzig more than 50 years ago, uses a large set of equations to evaluate thousands of possible combinations in a multidimensional model representing conditions and constraints and showing them in a polytope. Neijens concludes linear programming techniques can significantly improve the speed and quality of decisions and allow for sensitivity analysis and multiple scenario investigations that would otherwise be far too complex and time-consuming.



A master plan ensures buy-in from all stakeholders. PHOTO: THINKSTOCK

Getting it RIGHT

DEVELOP A STRATEGY THAT ADDS VALUE

Real asset management is about providing guidance and direction through the best and worst of times. It includes physical equipment, general facilities (grounds, buildings, etc.) and human resources. A robust and effective reliability program requires a clear maintenance strategy, but it needs to be continually reassessed.

So how do you develop an effective strategy? Jason Ballentine, engineering manager of North American Operations at ARMS Reliability, a global asset reliability firm with North American headquarters based in Austin, Tex., suggests practising proactive maintenance; building a plan and implementing it by using reliability-centred maintenance (RCM); and remaining dynamic.

Link to business goals

To be proactive, a maintenance work management system needs continuous improvement loops and asset management policies that are linked to business outcomes.

Capitalizing on what RCM delivers facilitates the understanding of failure behaviour such as infant mortality, random failure, aging and wear-out, which determines the type of applicable maintenance tasks.

RCM also advocates preventive maintenance, which extends equipment life and prevents machinery from entering the wear-out zone prematurely. Thus, defining maintenance tasks and setting proper PM intervals are important elements of an effective maintenance strategy.

Implementation keys are education, a process map and a supporting standard. Strategies must be aligned to business goals; be applicable to current equipment; and take advantage of new technologies, which are quickly evolving.

So staying dynamic is important. The best strategies can quickly become useless, or at least ineffective, when they're not updated. Triggers for review include calendar, new realities and Pareto charts that document equipment and system performance.

An effective maintenance strategy also links tasks to business goals, considers failure behaviours, qualifies maintenance task values, defines and devises an integration process, and conducts regular revisions. It's also useful to include information derived from conditioned based maintenance (CBM).

It tells us that we should schedule a

maintenance task when the machine condition requires it and to do nothing when it doesn't. Monitor equipment condition, focus on the most critical equipment, determine what preventive action should be taken, and implement corrective actions through the work order system. CMMS will help make this procedure work smoothly, but most of the work can be done independently.

The problem with CBM is too much data, thanks to automation. This can mask the true trends and obscure the underlying problem. Tying the data collected to a functional failure and failure mode will help to overcome this problem.

Used effectively, CBM is a very useful addition to the range of maintenance tactics, but it's not a silver bullet. Apply the standard test of all tasks – does it add value?

You will certainly do so by implementing an effective maintenance strategy that aims at asset life cycle management, and reviewing it frequently.

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.



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» Food



Model of the no-power fridge.

Students chill out

Electricity-free way to keep food cool

A team of students from the University of Calgary has developed a clever way to curb food waste by keeping it cool without an expensive fridge, or electricity for that matter.

The technology, dubbed WindChill, has also been awarded the first place prize in the student category at the Biomimicry Global Design Challenge, which awards one team a \$100,000 prize for a project that addresses sustainability issues with nature-inspired solutions. The Challenge is hosted by the Biomimicry Institute, based in Missoula, MT, in partnership with the Ray C. Anderson Foundation.

Team members Jorge Zapote, Mitchell Weber, Xi Cheng and Michelle Zhou said they were inspired by how some animals regulate body heat. And their easy and inexpensive way to avoid food spoilage would benefit people in remote and warmer climates without easy access to electricity, such as rural Africa.

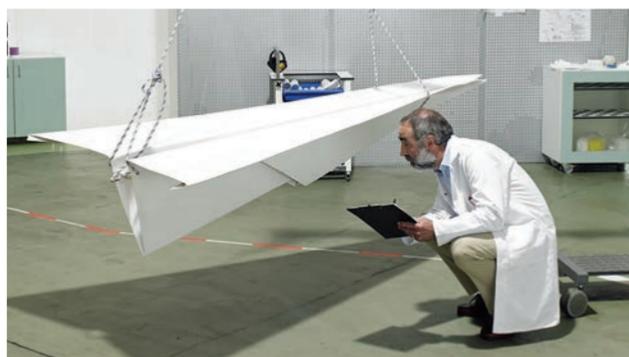
The innovation uses a funnel to catch air and bring it into a pipe immersed in fluid that evaporates around a coil to cool the air inside. It then moves to the below ground refrigeration chamber to keep food chilled.

The design mimics siphoning in air (like an elephants ears) that is then cooled by tubes that run partially underground (digging termites).

The team is now working on a prototype for the next round of the competition striving to reach their temperature goal of 4.5 degrees C, the necessary level to ensure food doesn't spoil.

Leaders want innovation

...but aren't planning for it



Define your innovation strategy.

PHOTO:THINKSTOCK

Canada's business leaders are struggling to develop a strategic approach to implementing innovation despite a rapidly evolving and highly-competitive global market where technology is a premium, according to a study by EY and the Hunter Centre for Entrepreneurship and Innovation at the University of Calgary.

"There needs to be a shift in where ideas are coming from. Traditionally companies have relied on R&D departments, but great ideas are also coming from employees, customers and by partnering with other organizations – even competitors," said Lance Mortlock, EY's national strategy services leader.

Innovation: from ideation to activation – A Canadian cross-sector market study, reveals 93% of executives from more than 250 Canadian companies admit innovation is either important or very important to growth. But 70% say they don't separate innovation from the larger business strategy.

At the same time, most don't have a leader accountable for innovation, or an innovation process or framework. Only 18% of companies have a specific innovation budget.

EY, based in Toronto, is a global assurance, tax, transaction and advisory services firm.

WEST is the best for small business

CALGARY, KELOWNA, EDMONTON ARE TOP ENTREPRENEURIAL COMMUNITIES

A CFIB report suggests fallout from oil prices is pushing businesses starting from middle-Canada towards the west coast.

BY PLANT STAFF

Entrepreneurs looking to start and grow a business should look west, according to the eighth annual Entrepreneurial Communities report by the Canadian Federation of Independent Business's (CFIB).

The communities around Calgary took top spot for the second year in a row, with Kelowna and the area surrounding Edmonton close behind major cities.

"The west is still best, but we're seeing the beginnings of a power shift away from the traditional entrepreneurial power centres in the prairies towards BC, as the fallout from oil prices continues to hit the region. Parts of central Ontario are also becoming more desirable for entrepreneurs," said CFIB chief economist Ted Mallett.

Saskatoon, Guelph, Barrie, Regina, Moncton and the grouping of communities that ring the cities of Toronto and Vancouver round out the top 10 major



The Calgary skyline.

PHOTO:THINKSTOCK

cities. Of mid-sized cities, BC's Penticton fares best, followed by Grande Prairie, Okotoks, and Brooks, Alta., and Collingwood, Ont.

The report found suburbs and regions surrounding cities tend to have better entrepreneurial environments than city centres because of lower relative costs, while still having reasonably strong access to large markets.

"Each city has its own unique development story, but the one thing they have in common is the entrepreneurial spirit that drives them," said Mallett.

CFIB is Canada's largest association of small- and medium-sized businesses with 109,000 members across the country in every sector and region.

» Energy Production

Feeling the pain

Oil industry slated to lose more than \$2 billion in 2015

Canada's oil extraction industry is expected to post a pre-tax loss of \$2.1 billion this year, compared to a profit of close to \$6 billion in 2014, according to the Conference Board of Canada's *Canadian Industrial Outlook: Canada's Oil Extraction Industry*.

Low oil prices have taken a toll on producers' revenues and cash flows, forcing them to pull back on investments. Industry revenues are expected to fall by 22% this year, but start recovering next year. From 2016 to 2019, revenues are projected to grow at an annual rate of 14%, driven by slowly recovering oil prices and production increases.

Seven of Canada's largest oil producers have reported combined capital expenditures will be approximately 39% lower this year than in 2014, and the report says future global demand for crude will be limited by weaker economic growth prospects.

Despite low prices, investment cutbacks and a sharp decrease in conventional drilling activity, Canadian crude oil production will continue to grow over the next five years.



Oil sands production is to increase.

PHOTO:THINKSTOCK

Weaker economic growth decreasing oil intensity weakens the outlook for global demand, so prices will also be weak in the near term.

The US Energy Information Administration (EIA) and the International Energy Agency (IEA) forecast growth in crude oil demand to slow over the medium term, rising by an annual average of 1.1 million barrels per days compared with 1.5 million barrels per days between 2010 and 2014. Prices will start to recover next year, but won't return to 2014 levels until at least 2020.

Given oil sands projects require large upfront capital investments and lead times that can span several years, projects currently under construction will continue, which will drive production higher, despite the industry's ongoing challenges.

Outlook for 2016

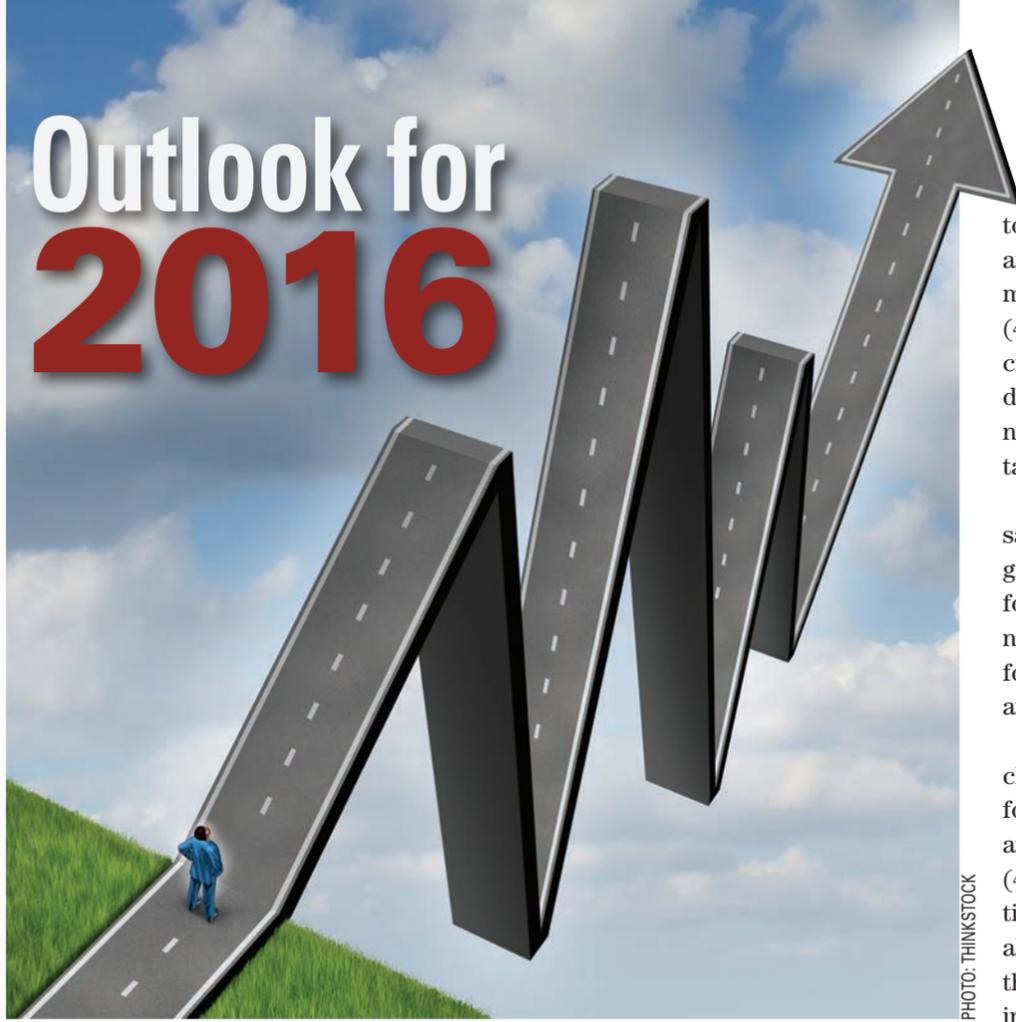


PHOTO: THINKSTOCK

» Forecast

This year's survey responses show manufacturers continue to bet on markets that are close to home, but opportunities offered by recent trade agreements beckon.

BY JOE TERRETT

Short-term economic forecasts for growth in the global, US and Canadian economies may be uninspiring but 32% of respondents to the 2016 edition of the Manufacturers' Outlook survey describe themselves as optimistic about the year ahead, but most (57%) temper their optimism with caution.

The survey, conducted by Northstar for PLANT in partnership with sponsors Grant Thornton LLP and SYSPRO Canada, is based on 365 replies from senior manufacturing executives, and has a margin of error of +/- 5%, 19 times out of 20. Most companies (69%) fall into the small business category (under 100 employees), 24% are medium-sized (100 to under 500) and 7% are large firms (500 employees or more). Here are the highlights:

- Just over half (56%) of the senior executives are expecting orders and sales to increase next year, while 53% expect pricing to remain the same (34% anticipate an increase) and 40% are predicting higher profits.
- Companies cite their biggest challenges as pricing (53%), a change from past surveys, which have consistently identified controlling and reducing costs (this year 47% and fourth on the list). Increasing sales (50%) and the value of the loonie (49%) are in the second and third spots.
- The most significant constraints to growth are general economic concerns

OPTIMISM BUT, MOSTLY CAUTIOUS

for 58% of companies, difficulty hiring skilled workers (43%) and production capacity (27%). The preferred mode of financing for 48% of companies is internal.

- Most companies (60%) anticipate hiring over the next three years and 40% will add new lines of business. New product development tops the list of growth strategies for 56% and over the next three years 69% of companies intend to invest in machinery and equipment. Thirty per cent say they'll invest from \$100,000 to \$500,000 next year.
- Manufacturers stick close to home with 89% deriving their revenues from trade in North America, 64% in Canada. With the conclusion of free trade deals with Europe, South Korea and now the countries involved in the Trans-Pacific Partnership, doors have been opened for opportunities beyond North America. Forty-five per cent of respondents see value in these agreements, but of those

seeking new markets, 36% intend to look within Canada, 37% in the US, 13% in Mexico, 17% in Central, South American countries, and 10% in Brazil. Currently 2% are doing business in China but 10% plan to enter that market.

- Most companies (40%) devote less than 1% of their staff to R&D, 28% intend

to invest 1% to 3% in innovation efforts and 53% say they will increase investment over the next five years. Most (40%) took advantage of the SR&ED tax credit in the past (40%), but far fewer did so this year (30%), while 37% plan to next year. But 46% have not taken advantage of the tax credit or intend to do so.

- Ninety-four per cent of respondents say productivity is key to business growth, but just 38% are pursuing a formal strategy although 28% are planning to create one. Most firms (71%) are focusing efforts on employee training, and 55% are investing in technologies.

- Managing productivity is most challenging on the shop floor for 44%, followed by marketing and sales (40%) and purchasing (19%). Most companies (49%) collect and analyze the information manually, but 22% don't collect it at all. About a third of the companies say they aren't likely to connect shop floor information systems to the top floor, while 23% are tentative.

- Finding skilled people continues to be a concern. Sales, marketing and customer support leads the list of problem areas for 39%, followed by production (35%). Half the respondents are addressing shortages through internal training.

Download a PDF of the survey results and roundtable report at www.plant.ca.

Comments? E-mail jterrett@plant.ca.

» Human Resources

High cost of benefits

Companies are adopting new containment tactics

Spending on benefits for employees continues to be a significant cost for Canadian companies, despite recent "containment" efforts, according to a benchmarking survey conducted by the Conference Board of Canada.

It shows the average cost of providing benefits for employees is \$8,330 per full-time person. Here are some highlights:

- Employers will increasingly focus on health education, promotion and prevention to reduce benefits claims and manage costs.
- 52% reported increases in benefits costs for active employees, averaging 6.2% between 2013 and 2014. Cost management efforts include generic drug substitutions or excluding certain drugs from coverage; higher employee premiums; and programs aimed at physical and mental health promotion with early assessment and intervention.
- More than half of employers offer benefits after employees retire, primarily covering prescription drugs, vision care, hospital stays, dental and paramedical care. Between 2012 and 2015, the percentage of companies limiting retiree benefits to "grandfathered" employees doubled.
- Almost all the companies provide vision care (92%); private or semi-private hospital accommodation (96%); out-of-country medical coverage (99%); services like massage therapy, chiropractic coverage and physiotherapy (99%); major restorative dental services (98%); accidental death and dismemberment (91%); and long-term disability (99%).
- Nearly all organizations provide benefits for permanent part-time employees.



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When we asked **Albert Hoogendoorn, President of Triple H Concrete Products**, a 30,000 Sq. Ft. State-of-the-Art Facility just outside of London, Ontario what he thought about his DV Systems air compressor, he was happy to say that it delivers all the air they need to power their plant efficiently & reliably 24/7.

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BUILT BETTER

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CANADIAN INDUSTRIAL EQUIPMENT NEWS

» Networking

The AirLink Raven RV50 network gateway provides customers with a plug and play option that harnesses the power of the IoT as simply as possible.

BY MATT POWELL, ASSOCIATE EDITOR

The Internet of Things (IoT) promises to change the way industrial companies do business and manage their operations, including those in the oilfield, advanced manufacturing and grid automation sub-sectors.

Cisco, the global communications manufacturing giant, suggests IoT will eventually become a \$19 trillion market that accelerates the way people and machines connect, and improves the way companies are using big data to maximize efficiency within their supply chains and in the field.

Sierra Wireless is doing its part to further that revolution by providing the infrastructure and tools needed to encourage industrial customers to connect IoT technologies with as little fuss as possible.

This is a company, which a few years ago, was making those little devices from Rogers, Bell or Telus that plugged into your laptop to connect to the internet wirelessly. The connections are now built into laptops, so Sierra turned its attention to IoT solutions.

The Richmond, BC-based company generated revenues last year of more than \$600 million and employs more than 1,000 people globally with R&D centres in North America, Europe and Asia.

“There’s a business case to aggregating more and more things; there are always assets that [industrial companies] need to collect data from. Our job is to ensure those technologies are accessible and affordable enough to make that happen,” says Olivier Puzet, Sierra’s vice-president of marketing and market strategy.

Founded in 1993, it provides a portfolio of 2G, 3G and 4G embedded modules and gateways that integrate seamlessly with secure cloud and connectivity services. The multinational manufacturer has sold more than 100 million machine-to-machine devices worldwide, has devices operating on more than 80 global networks globally and has secured more than 400 patents in wireless technologies.

“We’re in a position to understand what energy and industrial firms need in terms of deployments, and bring the right technology to the table,” adds Puzet.



ALMS manages remote devices used in oil and gas infrastructure.

PHOTOS: SIERRA WIRELESS

Connecting with industrial IoT

SIERRA WIRELESS WORKS TO MAKE INDUSTRY 4.0 PAIN-FREE



AirLink Raven RV50 gateway.

“But we’re also capable of delivering the devices combined with the services to ensure they’re getting a full IoT package – that’s a critical component to easing the pain related to implementation.”

Mission critical gateway

The company serves a number of industries including automotive and transportation, energy, field service, industrial and infrastructure, mobile computing and consumers, networking, and security.

Sierra’s latest mission critical gateway promises to enhance LTE communication and remote monitoring for industrial IoT applications, including utilities, oil and gas and infrastructure.

The AirLink Raven RV50 consumes less energy than competing models and provides reliable connectivity in demand

remote applications, even when solar panels are the only available source of power.

The unit installs directly into existing infrastructure without increasing capacity, which allows cost-effective upgrades to LTE technology with additional functions, such as remote video surveillance.

AirLink Management Service (ALMS) cloud management manages remote devices, but also alerts and monitors key variables such as signal strength, location, temperature and voltage.

The ALEOS Application Framework (AAF) is included. It’s a powerful embedded programming environment for onboard data gathering, real-time data processing and alert generation.

The application framework delivers critical real-time data and information, reliably and securely over LTE networks, to Sierra’s IoT Acceleration Platform or other software applications and operational systems.

It also provides SIM-based network operator switching, which automatically configures new network settings.

Although IoT may seem overwhelming, Sierra Wireless intends to provide innovative technology that makes the transition smooth.

Comments? E-mail mpowell@plant.ca.

» Plantware

MONITOR FROM THE CLOUD

Cosen Saws is taking blade performance analysis to the cloud. The manufacturer of industrial band saws based in Charlotte, NC says its MechaLogix Cosen Predictive Computing system accurately forecasts the number of remaining cutting hours left before a saw blade dulls and is no longer cutting with precision, or a complete break occurs. This will minimize waste and scrap.

MechaLogix delivers real time performance data and reports issues such as excessive vibration, overheating and changes in fluid line pressure. And the root cause of an issue is reported in real time.

The technology is intuitive and user customizable. Adjustable alert notification settings work seamlessly with a mobile app.

www.cosen.com



Includes enhancements to the platform.

VANTAGEPOINT UPDATED

Making swift use of big data is easier with an addition to the FactoryTalk VantagePoint (v7.0) software from Rockwell Automation.

Import and configure mobile-based workflows make configuration a manufacturing intelligence solution a one-time event.

Access to Logix-based data is seamless thanks to the simple, guided work flow that stores and visualizes information. Everything from installation, configuration and visualization has been enhanced and consolidated – so users interact with control data from a PC, tablet or smartphone.

Store and visualize specific data views and trends, and easily share them with collaborators across the enterprise.

The software will also silently install with FactoryTalk Historian SE software. When it’s done, the user will be greeted with a VantagePoint mobile web page, including the new import and configure options, then browse through the FactoryTalk Directory server to an online controller, select the tags to collect data, and configure scan rates and additional historian parameters. When this process is complete, the tags are stored and automatically configured for FactoryTalk VantagePoint.

Rockwell Automation, based in Milwaukee, Wis., is a provider of advanced industrial automation.

www.rockwellautomation.com

SENSORS



3/4-turn setpoint adjustment.

COMPACT SENSORS FOR CROWDED PANELS

AutomationDirect's AcuAMP AC and DC current sensors provide flexibility and durability in a rugged industry-standard feed-through package across many current ratings.

The ACSN100-AE-F AC current switch has a fixed setpoint of 0.5 A and monitors conductor current up to 100 A. The normally open solid-state switch output rated for 120 VAC/DC, 0.15 A is small enough to fit in crowded control panels.

ACSN250 AC current switches in fixed and split-core styles also have a fixed setpoint (fixed core: 0.75 A, split core: 1.25 A) and monitor conductor current up to 250 A. The normally open solid-state switches have an output rated for 240 VAC/DC, 0.15 A.

A 3/4-turn linear setpoint adjustment is indicated on the product label and sets without load current present. The sensors, which monitor conductor current up to 150 A, have a two-second delay before contact transfer to ignore motor inrush current.

Additional ACTR series AC current transducers include models with a flexible split core-sensing coil for easier installation around large conductors in crowded panels. True RMS current sensing covers 500, 1,000 or 2,000 A with a 4-20 mA output.

DCT Series DC Current Transducers are for higher current sensing ranges of 500, 750, 1,000 or 1,200 A. The 24 VAC/DC-powered units have a larger diameter aperture to accommodate larger conductors

and provide a 4-20 mA output; the fixed core housing is designed with a built-in 35 mm DIN rail mounting.

Automation Direct is a supplier of automation products based in Cumming, Ga. www.automationdirect.com

NOZZLES

NOZZLES PREVENT DANGEROUS BLOWBACK

EXAIR's 1006SS 1/4 NPT air nozzles blow debris and liquids from pipe or hose inside diameters, channel, bores, holes, internal threads and other internal parts to eliminate safety hazards.

The nozzle delivers 360 degree airflow to clear out coolant, chips and light oils from machining processes and prevents blowing chips farther into a part, tube or pipe.

It has a small profile and fits inside openings as small as 7/8 in. but is effective on diameters up to 4 in.



Corrosion resistant.

The CE-compliant nozzles, made of type 316 stainless steel, are corrosion resistant. Sound level is low at 80 dBA, meeting OSHA noise requirements.

Chip shields are available. Extension pipes from 12 to 72 in. provide necessary reach for longer tube and pipe clean out.

Exair is a manufacturer of compressed air products based in Cincinnati. www.exair.com

MACHINING

D4580 DELIVERS TWO-IN-ONE MACHINING

Walter's D4580 chamfer body combines drilling and chamfering in a single tool that reduces machining time and tooling



Suits a variety of materials.

costs in automotive applications.

It suits a variety of materials, including ISO material groups P, M, K, N, and S, and for all holes with 45 degree chamfers.

The chamfer body is available in 6 in. and metric body sizes with chamfer widths up to 0.011 in. It's suitable for all corresponding solid carbide drills.

Walter is a manufacturer of metalworking tools based in Waukesha, Wis. www.walter-tools.com

TEM TECH REMOVES BURRS INSTANTLY

Removing particles from intersected holes and ensuring there's no micro-contamination is an ongoing challenge. Customized complex valves, gears, pinions, and thousands of other components can be machined in seconds, but require minutes to finish completely, creating production bottlenecks.



Uses a pressurized gas mixture.

Kennametal proprietary EXTRUDE HONE TEM (thermal energy machining) removes burrs on intersected holes and cross-sectional holes from machining operations with a pressurized mixture of a combustible gas and oxygen.

It's injected at five to 10 atmospheres of pressure into a containment chamber sized both by the amount of material to be removed and the volume of parts in the chamber.

An ignition system ignites the gas mixture, releasing heat energy from the oxidation of fuel in a 20-millisecond, high-speed energy wave.

With their raised surface areas and thin cross-section features, even internal burrs and flashings burn away instantly. Because the gas mixture engulfs the entire work piece, all internal and external surfaces are exposed to rapid oxidation. Internal cross-drilled holes and intersecting edges that are difficult or impossible to reach are instantly processed.

Kennametal Inc., based in Latrobe, Pa., supplies tooling and industrial materials. www.kennametal.com

FASTENERS

SCREW ASSEMBLIES MOUNT IN ONE PIECE

ReelFast surface mount, spring-loaded captive panel screws from PennEngineering install precisely and permanently on printed circuit boards.

The all-metal screw assemblies mount in one piece using the pick-and-place method and install in the same way and at the same time as other surface mount components prior to the automated reflow solder process. The captive screw technology eliminates risks associated with handling, installing and potential standard screw loosening.

They're supplied on tape and reel, conform to industry standards and are compatible with existing SMT automated installation equipment.

There's a polyimide patch affixed to the end of the fastener for vacuum pickup, and unlike conventional fasteners, there's no secondary installation, which typically damages boards and creates scrap.

An anti-cross thread feature corrects off-angle installations and prevents thread damage.

The fasteners install in boards of any hardness as thin as .063 in. They're available in thread sizes #4-40 through #6-32, M3 through M3.5 and in multiple screw lengths.

PennEngineering is a fastener manufacturer based in Danboro, Pa. www.pemnet.com



Anti-cross thread feature.

» Events

2016 AHR EXPO

International Exposition
Jan. 25-27, Orlando, Fla.

The international heating, ventilation, air conditioning and refrigeration gathering features more than 2,000 exhibitors, plus education sessions. Visit www.ahrexpo.com.

Science and Technology Talks 2016

AGAT Laboratories
Jan. 28-29, Calgary

For industry professionals to learn and discuss relevant topics in the energy, environmental, industrial and health and safety sectors. Visit <http://agatlabs.com>.

CCOHS Forum 2016

CCOHS
Feb. 29-March 1, Vancouver

A two-day national event that brings together subject experts, workers, employers, and governments to share their knowledge and experience around current and emerging health and safety issues. Visit www.ccohs.ca.

FABTECH Canada

SME
March 22-24, Toronto

For businesses that specialize in fabricating, metal forming, welding, and/or finishing. Visit <http://fabtechcanada.com>.

Reliability 2.0

ReliabilityWeb
April 11-15, Las Vegas

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Don't blame oil prices for Alberta's deficit

BY STEVE LAFLEUR AND CHARLES LAMMAM

Alberta's budget contains the province's seventh deficit in the last eight years, most recently projected at \$5.9 billion. A popular narrative blames declining oil prices for the government's deteriorating financial situation; however, a recent Fraser Institute study found Alberta's fiscal woes are primarily driven by successive governments not controlling the rapid growth in spending over the past decade.

The following is further evidence of the tenuous link between Alberta's budget balance and the price of oil.

There are three distinct periods worth noting. From 1990-91 to 1993-94, Alberta recorded four consecutive large deficits. After implementing a series of fiscal

“Alberta has run surpluses when oil was close to US\$20 per barrel and has run deficits when oil reached nearly US\$110 per barrel...”

reforms, the provincial government was able to run surpluses over 14 consecutive years starting in 1994-95 up to 2007-08. Since then, the province has been in deficit with the exception of a small operating surplus in 2014-15.

If the narrative about oil prices driving deficits was true, we would expect the province to run deficits in years with relatively low oil prices and surpluses in years with relatively high oil prices. But that relationship simply does not hold. Alberta has run surpluses when oil was close to US\$20 per barrel and has run deficits when oil reached nearly US\$110 per barrel.



Oil sands bucketwheel reclaimer.

PHOTO: THINKSTOCK

To further illustrate the lack of a relationship between oil prices and Alberta's fiscal balance, consider the averages over three periods.

From 1990-91 to 1993-94, Alberta ran deficits averaging -3% of GDP while the price of oil averaged approximately US\$37 per barrel. In the next major period from 1994-95 to 2007-08, Alberta recorded surpluses averaging 2.2% of GDP with oil at an average of roughly US\$43 per barrel. In the final period from 2008-09 to 2015-16, the province averaged a deficit of -0.5% of GDP, despite oil prices averaging a whopping US\$88 per barrel.

Increased program spending

All this suggests oil prices alone are not a good predictor of Alberta's fiscal balance. The province has balanced its books when oil prices were lower than what they are today.

While oil prices are currently below their historic highs, successive governments spent as though high resource prices (and thus revenues) would last forever. Between 2004-05 and 2014-15, the provincial government increased program spending by 98.3%. That's nearly double the growth rate necessary to keep pace with increasing overall prices (inflation) and a growing population, which collectively grew by 52.1% over the period. Program spending also outpaced the rate of provincial economic growth (by 88.6%).

Had governments restrained spending growth since 2004-05 to the rate of inflation plus population growth, Alberta could expect a \$4.4 billion surplus this year rather than a \$5.9 billion deficit. That's a \$10.3 billion difference.

Put simply, Alberta's deficit is mainly due to past spending choices, not declining oil prices. The key lesson for governments is to spend prudently in good times to prepare for the bad ones.

Steve Lafleur, senior policy analyst and Charles Lammam, director of fiscal studies at the Fraser Institute, are co-authors of the Fraser Institute study Alberta's Budget Deficit: Why Spending is to Blame. Visit www.fraserinstitute.org. This column is distributed by Troy Media © 2015.

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