Plant

SUMMER 2022

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CANADA'S MANUFACTURING MAGAZINE

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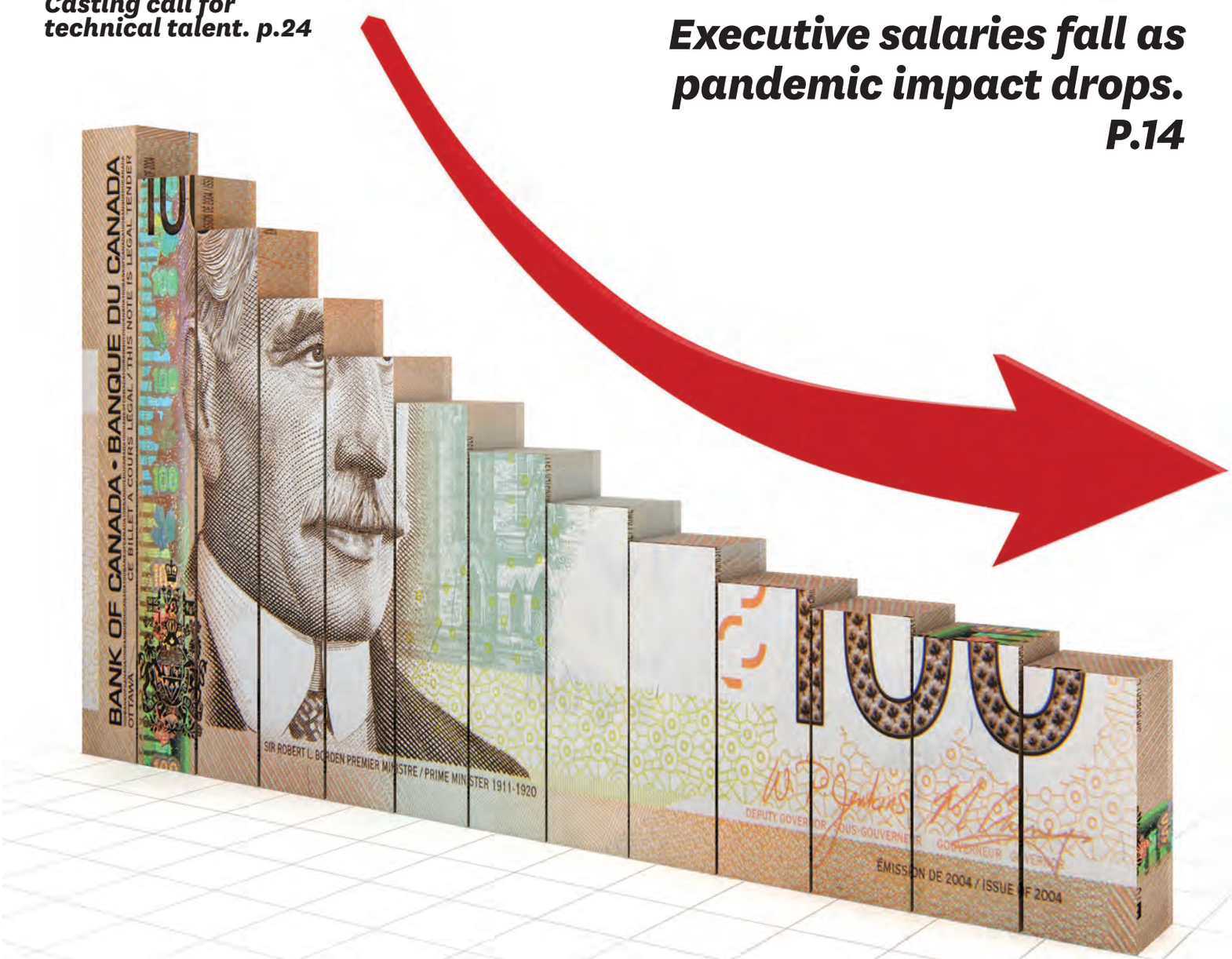

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INSIDE

SUMMER 2022

In every issue

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EDITORIAL
BY MARIO CYWINSKI

2022 Salary Survey

Age, experience, salaries dip; number of women up

The 2022 EMC-PLANT Manufacturing Salary Survey, was sent out into a neo-COVID-19 world. Where it is still in the back of everyone's mind, but for many life is going back to something resembling normal. This could be the reason that we saw a few swings in the data, including the average salary, average age, and level of experience.

Let's start with the average salary. In last year's survey, it was $129,685, which was a year-over-year increase. However, for 2022, it dropped to $119,726. This could be attributed to a number of factors. For one, the respondents may not all be the same; second, we had less respondents this year, compared to last. Finally, we found this year that respondents were in younger age groups, which could mean that more are in less senior roles.

Women now account for one in five (20 per cent) of the manufacturing survey respondents.

This year, the average age dropped to 51.1 years old, from 53.7 a year ago. The biggest shift was that the amount of respondents 56 years old and above was 39 per cent (down from 51 per cent in 2021), and those 26 to 45 was at 29 per cent (compared to 19 per cent. This middle group 46 to 55 stayed stable at 32 per cent (29 per cent in 2021).

If this trend continues, and is not simply a one year blip, this is great news for the manufacturing industry. It shows that more young workers are moving into more prominent executive roles. In combination with the current skills shortage, the number of older workers moving out of the workforce has created a shortage of workforce that is being put to the limit.

Conversely, with a younger workforce, the level of experience has also seen a dip for 2022. The average years of experience in 2021 was 25.9, while this year it has dropped to 22.3. While the biggest group (46 per cent) has over 25 years of experience, that is down from 57 per cent last year. With those with less than 10 years of experience seeing an increase to 19 per cent this year, up from around 10 per cent last year.

One other aspect I'd like to focus on is the increase of women in the manufacturing workforce. Last year we did a focus piece on women in manufacturing, at that time only 13 per cent of respondents of the survey were female. For 2022, this has increased to one in five (20 per cent). While this is still the minority, a seven per cent increase year-over-year is a big increase, and hopefully is a trend going forward.

One item of concern is that the average male salary is $128,680, while the average female salary is $85,249. This could be a result of varying roles, and a smaller sample size; however, such a large gap is not what you want to see.

With the COVID-19 pandemic slowly moving into the rear view, it is important for those in the manufacturing industry to keep moving forward. While many positives were observed in the 2022 salary survey, issues still remain.

Respondents found the most significant issues being: skill shortages, cost control, transportation, supplier relationship management, capacity utilization, technology upgrades, and many more.

To read all the results of the salary survey go to page 14, and to see our survey sponsor EMC's take, go to page 19.

Also, don't miss the plethora of other informative articles within these pages. Including articles on health and safety, advanced technology, human resources, skills development, and the 3D world. As well as *Reflections from the Hannover Messe* in this month's Postscript column. **Plt**

MARIO CYWINSKI, EDITOR
Comments? E-mail
mcywinski@annexbusinessmedia.com

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READER SERVICE
Print and digital subscription inquiries or changes, please contact customer service
Angelita Potal
Tel: (416) 510-5113
Fax: (416) 510-6875
email: apotal@annexbusinessmedia.com
Mail: 111 Gordon Baker Rd., Suite 400
Toronto, ON M2H 3R1

EDITOR Mario Cywinski
226-931-4194 · mcywinski@annexbusinessmedia.com

ASSOCIATE EDITOR Monica Ferguson
416-510-5206 · mferguson@annexbusinessmedia.com

SENIOR PUBLISHER Scott Atkinson
416-510-5207 · satkinson@ annexbusinessmedia.com

NATIONAL ACCOUNT MANAGER Ilana Fawcett
416-829-1221 · ifawcett@annexbusinessmedia.com

MEDIA DESIGNER Svetlana Avrutin

ACCOUNT COORDINATOR Debbie Smith
416-442-5600 ext 3221 · dsmith@annexbusinessmedia.com

AUDIENCE DEVELOPMENT MANAGER Beata Olechnowicz
416-510-5182 · bolechnowicz@annexbusinessmedia.com

GROUP PUBLISHER Paul Grossinger
pgrossinger@annexbusinessmedia.com

COO Scott Jamieson
sjamieson@annexbusinessmedia.com

ANNEX BUSINESS MEDIA
111 Gordon Baker Road, Suite 400
Toronto, ON M2H 3R1
Tel (416) 442-5600 · Fax (416) 510-5134
www.annexweb.com

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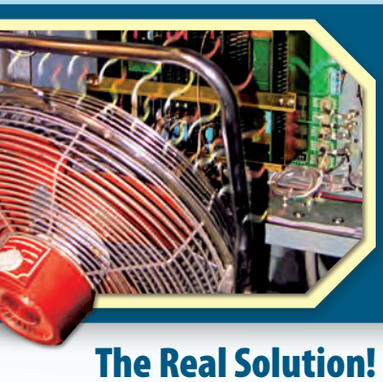

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NEWS

Photo: Canada Post

ELECTRIC

CANADA POST TO INVEST IN REACHING NET ZERO

Canada Post announced key commitments to reduce its environmental footprint and reach net-zero emissions by 2050.

It has invested $1 billion to cut emissions and transform its fleet. It will change over 14,000 vehicles to non-emitting transportation, with commitments to reach a 50 per cent EV fleet by 2030 and 100 per cent by 2040.

Additionally, opening in 2023, Canada Post's net-zero parcel sorting facility in Scarborough, Ont., will have the capacity to process over one million packages a day. The $470 million facility is the largest industrial project in Canada with a zero-carbon building standard designation.

Canada Post is launching a trial of an electric low-speed vehicle on a postal route covering neighbourhoods west of downtown Ottawa. The compact vehicle reaches maximum speeds of 40 kph. It will be used for delivery and collection activities for a year to evaluate its performance in operations and optimal safety procedures.

SECURITY

CLOUD STRATEGY AND DATA SECURITY: REPORT

Aptum announced part two of its annual Cloud Impact Report 2022, Solving the Data Security Equation. The report examines hybrid cloud environments and their implications on security, data governance, compliance, and disaster recovery. It finds that while companies are convinced of the value of cloud computing, its drivers have evolved.

Looking at the value of cloud, 91 per cent of respondents consider cloud computing to be essential for data management, while 54 per cent believe cloud transformation has had a positive impact on data governance.

Financial considerations have traditionally been a common driver, the study shows a shift in focus for many organizations, especially as security concerns evolve: 50 per cent of respondents cited efficiency as the top motivator for cloud investments, increased security is the second with 48 per cent citing it as a key factor. Resilience is a primary driver of cloud computing investments for 40 per cent of companies.


Iris Redinger
Photo: Mitacs

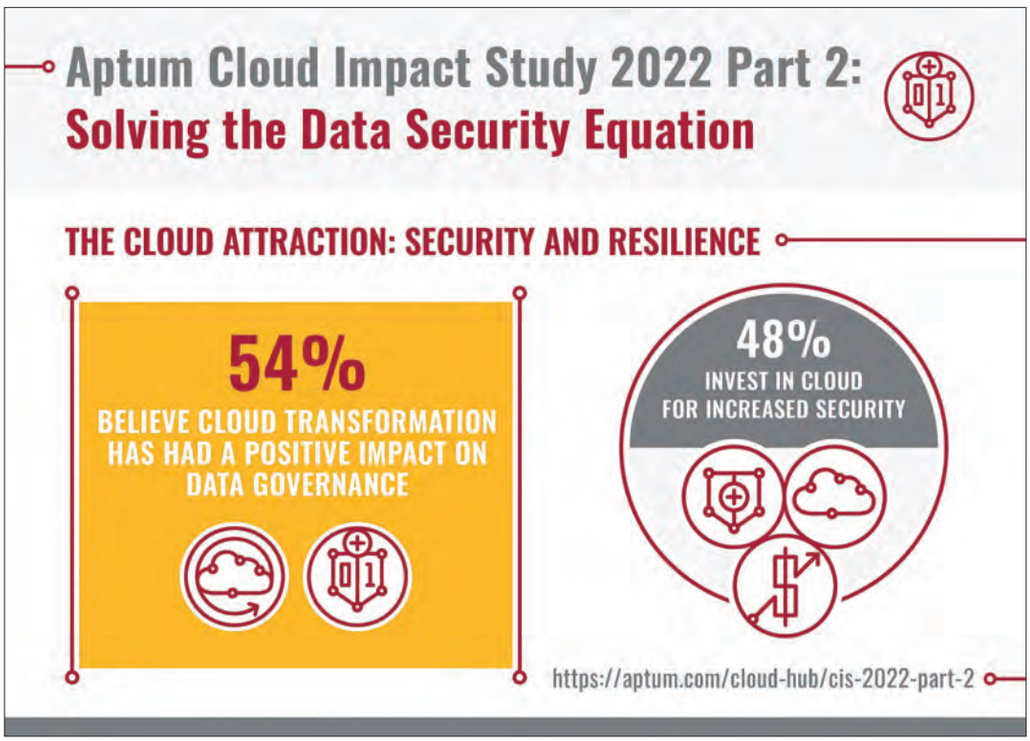

Photo: Aptum

AWARDS

WATERLOO INNOVATOR WINS AWARD FOR NATURAL TEXTILE DYE

Iris Redinger has developed an all-natural dyeing solution using microorganisms to 'grow' colour. Through Waterloo-based Material Futures, Redinger, was presented the Mitacs Environmental Entrepreneur Award.

Redinger founded Material Futures in 2018, hiring researchers to help develop her method, which is patent pending. After identifying microorganisms that naturally produce colour, she applies genetic engineering techniques to make it their primary function. The end products are fully biodegradable colorants that can be substituted into existing manufacturing processes.

The technology has gone through performance and feasibility testing to ensure the naturally dyed textiles stand up to repeated washing without fading and meet thresholds for industry-grade fabrics.

Redinger is one of five winners of the Mitacs Entrepreneur Award who are being recognized for their efforts to turn their research into innovative businesses that impact the lives of Canadians.

She is a Mitacs intern who earned her Bachelor of Architecture at Waterloo University last year.

APPOINTMENTS

ELECTROVAYA NAMES NEW CFO

Electrovaya has appointed John Gibson as the Chief Financial Officer, reporting Dr. Raj DasGupta, CEO.

John Gibson
Photo: Electrovaya

Gibson is a certified professional accountant with over 15 years of experience in public and private corporations in accounting, finance, strategic and financial planning, internal controls, and systems. He previously served as vice-president of finance at Adlib Software. Gibson received his undergraduate degree in accounting from Strathclyde University and his master's degree in information technology and business from Glasgow University.

EXRO TECHNOLOGIES ADDS TO BOARD OF DIRECTORS

Rod Copes
Photo: Exro Technologies

Exro Technologies appointed Rod Copes to its Board of Directors. Copes experience in the electric mobility industry, along with management experience, will guide Exro into the commercialization phase.

Copes served as COO for American EV automaker Rivian, growing the team from a few hundred to thousands of employees globally leading up to the company's listing on the Nasdaq. He is a graduate of the Massachusetts Institute of Technology with a Master's in Mechanical Engineering and an MBA.

JELD-WEN APPOINTS SVP AND GM FOR NORTH AMERICA

Jeld-Wen announced the promotion of John T. Krause to Senior Vice-President and General Manager, North America. He will report to Gary S. Michel, Chair and CEO. Krause, is currently vice-president and general manager for the North America windows business, focused on residential and commercial construction.

John T. Krause
Photo: Jeld-Wen

Krause has over 25 years of general management, marketing, finance and operations experience. He joined Jeld-Wen in 2018 and has held leadership roles in North America windows and doors.

Credit: Boralex

CLEANTECH

FIVE BORALEX SOLAR FARMS OF ELECTRIC GENERATION UNDER A REQUEST FOR PROPOSALS

Boralex announced five solar farms totaling 540 megawatts (MW) of generation and 77 MW of storage have been selected by the New York State Energy Research and Development Authority as part of its 2021 solicitation for utility-scale renewable energy certificates.

Once constructed, the solar farms will generate over one TWh of solar electricity annually, enough to power over 141,200 homes annually.

The selected photovoltaic solar electricity generation projects will be located across upstate New York, which include:

- Fort Covington Solar Farm;
- Newport Solar Farm;
- Fort Edward Solar Farm;
- Foothills Solar Farm; and,
- Easton Solar Farm.

NEWS

Photo: De Havilland Canada

ENERGY

GLOBAL INDUSTRY INVESTS IN ENERGY EFFICIENCY: SURVEY

The global industry is accelerating investments in energy efficiency in the next five years towards Net Zero according to ABB's energy efficiency investment survey 2022.

A key finding was 54 per cent of companies are already investing, while 40 per cent plan to make energy efficiency improvements this year. Ninety per cent will increase spending over the next five years while 52 per cent plan to achieve Net Zero within the same period.

Industrial motor-driven systems hold potential for energy efficiency measures. Almost two-thirds of the survey respondents are upgrading their equipment to best-in-class efficiency ratings, such as high-efficiency electric motors controlled by variable speed drives.

The report showed half of the respondents listed cost as the biggest barrier to improving energy efficiency and 37 percent felt downtime was a barrier. While 41 per cent of respondents felt they had all the information needed regarding energy efficiency measures.

The survey conducted by Sapio Research targeted 2,294 companies in 13 countries, ranging in size from 500 to 5,000 employees. It outlines how industries across the world are planning to invest in energy efficiency measures to achieve Net Zero.

54%
of companies are already investing in energy efficiency.

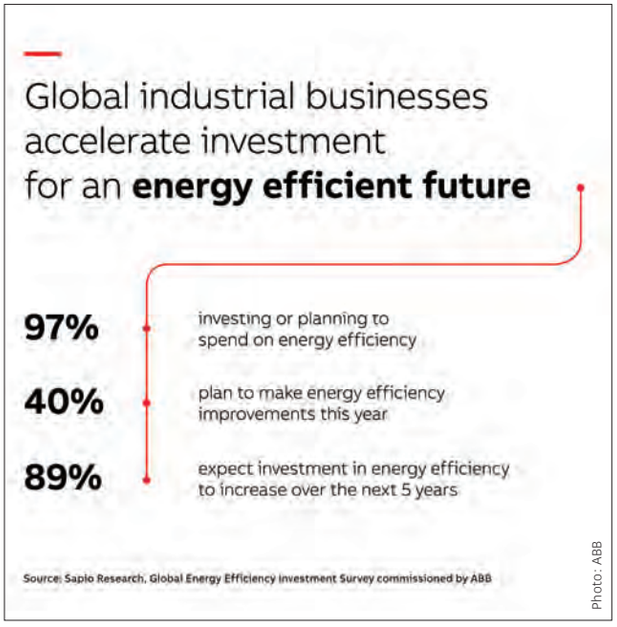

Photo: ABB

Photo: Emerson

AUTOMATION

EMERSON TO AUTOMATE JOTUN GLOBAL MANUFACTURING PLANTS

Emerson announced a framework agreement with paint manufacturer Jotun to automate and digitalize its global manufacturing facilities.

The five-year agreement will enable Jotun to implement Emerson's digital technologies to all aspects of manufacturing automation in new factories and upgrade some of its existing factories around the world.

Through the agreement, Jotun will increase process automation and create a standardized digital technology solution for new factory projects, with the goal of increased throughput, uptime and product quality, while reducing operating costs.

AEROSPACE

SERVICE PROGRAM DOUBLES THE LIFE OF DASH 8-100 AIRCRAFT

De Havilland Aircraft of Canada Limited announced Widerøe Asset AS of Norway has signed an agreement to incorporate Canada's Extended Service Program PLUS on 10 Dash 8-100 aircrafts.

Under the ESP PLUS agreement, service life of the Dash 8-100 aircraft will be increased to 160,000 flight cycles. The aircraft previously underwent an ESP to increase their service life from the original 80,000 flight cycles to 120,000.

Widerøe is the largest regional airline in Scandinavia, carrying approximately 2.8 million passengers annually and serving more than 40 domestic and international destinations.

In June, the team began manufacturing ASTM medical masks to help fill another critical gap in Canada's supply chain. By September, The Canadian Shield had manufactured 16 million face shields and donated nearly one million to frontline workers across the country.

Recently, the company announced their development of made-in-Canada medical mask manufacturing automation lines, and machine vision systems equipped with artificial intelligence technology.

*Visit **www.plant.ca/news** for more industry news and events.*

CanREA hosts first in-person Operations Summit since start of pandemic

The summit was a mix of panel discussions, networking sessions, presentations, and keynotes.

BY MARIO CYWINSKI

Photos: Mario Cywinski

Around 150 Canadian renewable energy operations leaders took part in the Canadian Renewable Energy Association (CanREA) 2022 Operations Summit. The conference returned to in-person, after going virtual in 2021.

"It has been more than two years since we met in this forum and there is not enough time to unpack what we have all been through in the time since we were last together," said Phil McKay, senior operations director, CanREA. "I want to personally thank you for keeping Canada's wind, solar, and energy storage fleet operating during this time."

Panel discussions included CanREA's 2050 Vision; Human factors presentations; Advancing operations in Canada's renewable energy fleets; and Workforce development. Each had industry experts sharing their expertise to the audience. A keynote address on day two was led by Michael Levitt, founder and chief burnout officer of The Breakfast Leadership Network, who led a session on how to Burnout proof your organization. Lunchtime presentations gave exhibitors a chance to briefly speak about new products and tools.

"What we can do today with solar, wind, and energy-storage equipment far surpasses what our electricity system has seen in the past century, and we are limited only by our creativity to think beyond the mere replication of the status quo and to form a new system, using the experiences we have gained at the leading edge," said McKay.

Networking was a big part of the event, as many attendees have not been able to meet in-person. Over a dozen exhibitors filled the exhibit hall, which was the meeting place during networking sessions and was busy for the entire two days. **PIt**

A foundation for a productive workplace: occupational health and safety training

Maintaining a successful health and safety program in manufacturing includes training for workers that is thorough, engaging, and regularly updated.

BY CANADIAN CENTRE FOR OCCUPATIONAL HEALTH AND SAFETY (CCOHS)

Although each facility is unique and will train on procedures and protocols accordingly, the primary purpose of any occupational health and safety training program is to instruct participants on protocols and procedures, and to raise their awareness and skills.

Consult health and safety legislation to see what is required by law in your jurisdiction, some form of program is a requirement in most. Make the required elements your foundation and build out from there.

Engage workers in program development

It's crucial to get employee input and participation as you develop your training program, so that training modules accurately reflect the experiences of workers on the floor. That starts with the health and safety committee: a forum for collaborative involvement of employees, representing both workers and the employer. These committees are legal requirements for organizations of a specified minimum size in all Canadian jurisdictions. In smaller

Photo: ©phatt1978/Adobe Stock

workplaces where a committee may not be required, a worker representative may be appointed.

A health and safety committee brings together workers' in-depth, practical knowledge of specific jobs and management's overall establishment of job interrelationships, general company policies, and procedures. As the employer, you have a duty to establish a committee that operates in compliance with the law, is organized and effective, has at least equal or more workers to manager participation, and has access to resources such as time, money, or meeting rooms to do its work. To function properly, the committee needs an appropriate structure, a clear statement of purpose and duties, and standard procedures for meetings.

Train your trainers

As supervisors will often be responsible for monitoring adherence to safety protocols and in some cases, administering the training, they should have a thorough understanding of policies and procedures and be able to explain the rationale for each. Supervisor training should cover topics such as legal responsibilities, the internal responsibility system, auditing, chemical safety including WHMIS, industrial hygiene, medical surveillance programs, and the duty to accommodate. Their training should also review the procedures associated with hazard identification and control, along with conducting risk assessments, incident investigations, planned inspections and task observations. Finally, supervisors will benefit from first aid training as well as coaching to develop their communication skills.

When conducting safety training for workers, plan the session beforehand, break the job down into steps, and have training aids available – documented safe work procedures are key here. With each procedure, explain what is to be done and describe the hazards and control measures. Demonstrate each step, stressing key points, and encourage and answer questions. To reinforce workers' learning, have them carry out each step and provide feedback and positive reinforcement where necessary.

One of the most effective ways to develop a positive safe and healthy workplace culture is to encourage a dialogue with employees as you implement procedures and work to control hazards. Knowing your health and safety program goes beyond basic requirements, is informed by workers' experiences, and gets updated regularly can help keep workers engaged, feeling supported and working efficiently.

New worker orientation

Workers require safety training at the beginning of employment, when reassigned or transferred to a new job, or when returning from an extended leave. Training should also occur when new equipment, processes, or procedures are introduced or when there is a change to the legislative requirements.

Health and safety education should start with a thorough orientation when a worker joins the organization. Giving new workers a glimpse into your organization's safety culture, orientation sessions typically cover the functions of the work unit, organizational relationships, administrative arrangements, and various policies and rules.

They should also address the hazards of the job, when safety training will occur, and any safety equipment required including personal protective equipment. In addition, the sessions should review emergency situations: what to do in case of fire or another emergency, the locations of fire extinguishers, first aid kits and automated external defibrillators, first aid rooms and emergency assistance, and what to do when they have questions, are injured, or notice something off.

Pace training to ensure all the information or skills are learned, avoid overloading new employees with too much information all at once. It's a good idea to provide written information that outlines the points covered in the orientation sessions (this also serves as a checklist for the person leading the orientation). All workers, but especially new, inexperienced, or transferred workers, should be encouraged to ask questions at any time.

Test, refine, and seek feedback

Refresh your training program regularly to ensure skills and knowledge are up to date with legal requirements, good practices, and current workplace procedures. Have supervisors check-in with workers to ensure they're following safe work procedures, if there are questions or concerns, this could be an opportunity to review the training program or retrain personnel.

One of the most effective ways to develop a positive safe and healthy workplace culture is to encourage a dialogue with employees as you implement procedures and work to control hazards. Knowing your health and safety program goes beyond basic requirements, is informed by workers' experiences, and gets updated regularly can help keep workers engaged, feeling supported and working efficiently. PIt

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The Canadian Centre for Occupational Health and Safety (CCOHS) *promotes the total well-being — physical, psychosocial, and mental health — of workers in Canada by providing information, advice, education, and management systems and solutions that support the prevention of injury and illness. Visit www.ccohs.ca for more safety tips.*

Advancing the manufacturing industry through cloud technology

While cloud technology may present challenges, it serves as a foundation for digital transformation in enterprises and buffers them against the competition.

BY STEVE RICHMOND

As new competitors continue to enter the plant sector, competitiveness is a key business driver for many organizations. Manufacturing is driven by a quest for efficiency; using the least number of resources to deliver the optimal product in the shortest amount of time possible.

A key driver to achieve this level of competitiveness is to take advantage of new technologies. Business leaders are aware of this, as Accenture found that 77 per cent of executives know that their technology architecture is critical or very critical for the overall success of their organization. For many, this has meant adopting a cloud computing solution to manage data and workflows, and support business processes.

Cloud computing is expected by Markets and Markets to be worth $947.3 billion USD by 2026, with a compound annual growth rate of 16.3 per cent until then. The International Data Corporation (IDC) reports that spending on compute and storage infrastructure products for cloud infrastructure increased 12.5 per cent year-over-year in the first quarter of 2021, while investments in non-cloud infrastructure increased 6.3 per cent year-over-year in the same quarter.

Cloud computing is useful in several ways that directly improve competitiveness in the manufacturing industry, including managing supply chains, optimizing processes, facilitating automation, and allowing remote access.

Supply chain management

Each entity in the supply chain - vendors, suppliers, dealers, logistics companies, wholesalers, and retailers, relies on data from others to carry out specific tasks. Cloud technology makes it possible for everyone in the supply chain to connect, which facilitates real-time information sharing and a 360-degree overview.

Optimized processes

Process costs are directly under the control of the business. Optimizing processes, to reduce costs and minimize waste, contributes hugely to improved competitiveness. Cloud computing achieves both these objectives by incorporating Internet of things (IoT) devices into existing business processes.

According to IDC, by 2025 IoT devices will collect 73 zettabytes (ZB) in data. Most of the data originate from security and video surveillance industrial IoT applications. This data can be used to gain insights that will optimize processes. For instance, machine learning algorithms can work through massive data sets to find flaws in processes and suggest improvements, much faster than a human could. According to an IoT survey conducted by pwc, the biggest benefits of IoT for businesses are gaining new capabilities (35 per cent) and improved efficiency.

Photo: ©Tierney/Adobe Stock

Automation and intelligent systems

Cloud infrastructure is behind many of the latest technologies deployed in manufacturing. Components such as logic controllers, pneumatic and hydraulic systems, robots and cobots have become commonplace as they supplement human work and counteract human error.

The core strength of an intelligent manufacturing system, such as those enabled by fourth industrial revolution technologies, is its ability to integrate various systems, orchestrate collaboration between different robots, and be interoperable with all its component systems. This requires a very high level of compute capabilities and infrastructure, which cloud systems offer, and display through customizable dashboards at that.

In addition, Industry 4.0 requires advanced analytics and decision-making based on machine learning techniques, a major part of AI, all of which are facilitated by cloud computing.

Remote access

There are also very practical, real-life applications of cloud computing solutions in the industry. For many manufacturers, it is impossible to evaluate and oversee the operations of all company facilities, it is a bad use of senior managers' time to have them travel across the globe to do inspections. In such cases, cloud computing provides a solution, by using IoT sensors to automate manufacturing systems and remotely monitor and control operations.

The number of sensor systems used, and the diversity of their applications are ever increasing. These sensors can even "talk" to one another and collaborate or call on a human to intervene from anywhere in the world. Maintenance personnel can do visual inspections remotely using drones, robotics, augmented reality, and virtual reality, all made possible by cloud technology.

A more advanced form of remote access is the concept of digital twinning, which Research and Markets believes will become a standard feature/functionality for IoT application enablement by 2028. They predict that by 2026, up to 91 per cent of all IoT platforms will contain some form of digital twinning capability.

In these solutions, the cloud hosts virtualized representations (digital twins) of a plant and its machines which operate under identical conditions to those of the physical facility. This helps streamline maintenance and troubleshooting and optimizes asset performance.

Looking ahead

Modern industrial facilities are already closely integrated with cloud technologies. IoT devices, 5G connections, and affordable cloud service providers already make it easier to deploy digital solutions for plant operations. For smaller businesses, they offer a way to compete with large organizations that have huge budgets for technology architecture and infrastructure.

While cloud technology may present some challenges, it serves as a foundation for digital transformation in enterprises and buffers them against the competition.

With the advent of 5G, factories will likely be built entirely of highly interconnected, powerful, and continually updated devices. These devices will be capable of processing data throughout the manufacturing process with the same level of speed, reliability, and security that we currently anticipate from our smartphones.

Sounds like a solution to our original quest for efficiency by using limited resources to deliver the optimal product in the shortest amount of time possible, doesn't it? **PIt**

Steve Richmond *is the CEO and founder of Projetech Inc*

Photo: Worawee Meepian/iStock/Getty Images Plus/Getty Images

SALARIES DIP

While executive salaries fell, the average age of respondents moved younger. **BY MARIO CYWINSKI**

In 2021, *Plant magazine* ran its salary survey as COVID-19 restrictions were in place around many parts of the country, with COVID-19 protocols (which were introduced in 2020) being the norm across the manufacturing industry.

When we sent out the 2022 EMC-PLANT Manufacturing Salary Survey, from March to June, the landscape around the pandemic had shifted. We have entered a neo-COVID period, where it is still considered, but life is going back to (almost) normal.

Once again, the survey was jointly conducted by Excellence in Manufacturing Consortium (EMC), a national not-for-profit organization based in Ontario, and *Plant magazine*, a part of Annex Business Media. In all, 308 company executives, and senior management level personnel completed the survey, with an additional 11 answering at least part of the survey. For a total of 319 useable submissions.

JOB MOVEMENT AND COVID-19 IMPACT

Starting in 2020 and into 2021, many companies had to cut shifts, lay off employees, and temporarily or permanently close their doors due to COVID-19. In 2022, a larger portion of respondents moved to a new organization (eight per cent), while one per cent of respondents said they were laid off from the organization they worked for. The largest groups were: same job and salary but more responsibility due to reduced staff (26 per cent), and no change (46 per cent). Positively, 11 per cent of respondents were promoted.

Only 11 per cent of respondents believe their employment status change was a result of COVID-19 in 2022, while 43 per cent said they had no change in employment status, 40 per cent said their employment status change was not a result of COVID-19, and five per cent were not sure. When asked if COVID-19 affected their compensation, 15 per cent said it had a negative impact, with 10 per cent said it had a positive impact, and 75 per cent said it had no impact.

COVID-19 EFFECT ON COMPENSATION

Yes, positively 10%

Yes, negatively 15%

No 75%

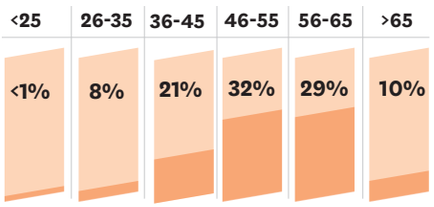
"Our view is that it has caused manufacturers to look more carefully at ways to ensure production is sustained when one or more elements of people, plant and/or process are impacted by external factors," said Scott McNeil-Smith, Vice-President, Manufacturing Sector Performance, EMC.

"Whether COVID-19 or other human illness, scarcity of supply/disruptions/costs, technology and other impacts such as cyberattacks, manufacturers better understand that having clear strategies for securing people, plant and process is vital to their immediate and long-term future, regardless of the opportunities, challenges or threats to success."

DEMOGRAPHICS

AGE

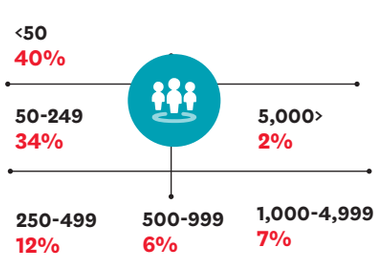
Average age 51.1



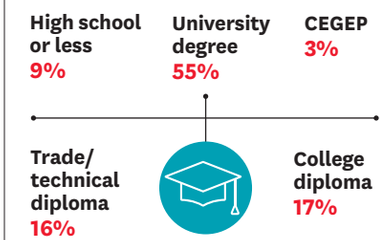
Two per cent or less represents a small sample and should be considered with caution.

EMPLOYEES

Average 478



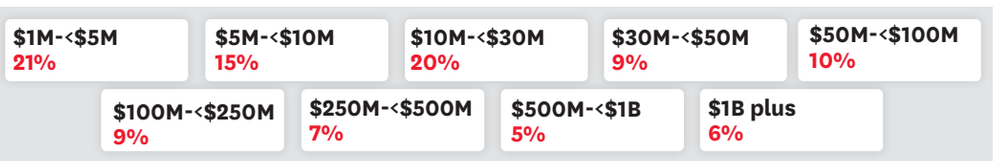
WHAT IS YOUR HIGHEST LEVEL OF EDUCATION?



WHAT IS YOUR ROLE IN YOUR COMPANY?

REVENUES

Average $178.3M



MANAGEMENT ISSUES

MOST SIGNIFICANT ISSUES	
Skills shortage	62%
Cost control	49%
Transportation	30%
Supplier relationship management	27%
Capacity utilization	25%
Technology upgrade	23%
Resource/asset management (ie. HR, capacity, financing)	23%
Risk management	20%
Forecasting	20%
The pandemic	16%
Overseas sourcing	16%
Reorganization	15%
Outsourcing	12%
Environment/Corporate Social Responsibility	10%
Cybersecurity	10%
IT issues	8%
Financing for working capital	8%
Other	8%
Global market expansion	5%

WHAT COMPANIES PAY FOR

- **59%** Educational courses
- **47%** Membership in professional associations
- **45%** Professional certification programs
- **27%** None of these

EXPERIENCE/SKILLS

From 2019 to 2021, the average years of experience in the industry went from 25.4 to 25.9 years. However, in 2022, that number dropped to 22.3 years. A majority (46 per cent) of respondents have been in the industry for over 25 years, while 36 per cent at 10 to 25 years, and 19 per cent with less than 10 years' experience. What has changed year-over-year is that the over 25 years group is shrinking, and those with less experience is increasing, especially those with under 10 years' experience.

Looking at how long respondents have been in their current jobs, the average time has dropped to nine years (from 12.9 years in 2021), 12.6 in 2020, and 12 in 2019). In all, 66 per cent have been in their current jobs for less than 10 years, with 25 per cent 10 to 25 years, and nine per cent over 25 years. In what has become the norm, years with the current company continues to decrease, down to 12.1 years, down from 16.4 in 2021. Years with the current company breaks down to 50 per cent (less than 10), 35 per cent (10 to 25), and 15 per cent (over 25).

Moving on to skills, the survey found that the top skills that respondents feel they need

MOST IMPORTANT SKILLS

- Management/ Supervisory 56%
- Interpersonal/ Problem Solving 45%
- Communication 45%
- Productivity/ Continuous improvement (lean etc.) 39%
- Industry specific technical skills 37%
- Analysis 36%
- Project management 36%
- Planning (forecasting, demand) 31%
- Financial (budgeting, accounting) 28%
- Negotiation skills 25%
- Sales skills 25%
- Technical skills (software, programming) 24%

CHANGES NEXT FIVE YEARS

Hiring new employees	68%
Investing in new production equipment/processes	51%
Expanding plant size	37%
Added/entering new lines of business	30%
Enter new geographic markets	23%
Enter new lines of business	22%
Acquiring other companies or lines of business	19%
Merging with another company	8%
Downsizing employees	6%
Closing of company	3%
Downsizing lines of business	3%
Downsizing plant size	3%

PAY PERKS

- RSP contributions 39%
- Performance or other bonus 38%
- Car/gas allowance 25%
- Travel expenses 24%
- Pension 21%
- Flex hours 21%
- Profit sharing 20%
- Training, executive development 19%
- Company vehicle 15%
- Wellness program 13%
- No additional benefits to salary 12%
- Access to private healthcare 11%
- Stock options 7%
- Club memberships 6%
- Other 3%

more training, include: financial budgeting and accounting (27 per cent), industry specific technical skills (26 per cent), people; interpersonal, relationship, management (25 per cent), productivity and continuous improvement (24 per cent), project management (24 per cent), and technical; software and programming (21 per cent).

Compared to the skills respondents feel are most needed in a job today: management supervisory at 56 per cent, communication at 45 per cent, interpersonal problem solving at 45 per cent, Productivity and continuous improvement at 39 per cent, and Industry specific technical skills at 37 per cent. It is clear that the skills workers need improvement in, are not all in demand.

The manufacturing sector is very diverse and has many different organizations. We amalgamated the list of sectors for 2022, to have a smaller number of categories. The most common include: electrical equipment, appliance, and component (17 per cent), plastics and rubber products (14 per cent), motor vehicle products and parts (13 per cent), chemical and petroleum manufacturing (11 per cent), and food manufacturing (11 per cent).

With the average age dropping to 51.1 years old in 2022 (from 53.7 in 2021), and as more people are leaving the industry (namely retirement), new talent has a plethora of options for a career in manufacturing.

SALARIES DROP

Looking at the COVID-19 period as an abnormal time, the drop in annual salary of nearly $10,000: $119,726 from $129,685, isn't much of a shock. Comparing it to 2020, which shows a smaller drop from $125,452, and when comparing it to 2019, the last non-COVID year, it has only dropped by just under $3,500, from $123,204.

Looking at salaries by province (only including those which had at least five per cent of total respondents), we see that Quebec has the highest salary at $127,064, Ontario is next at $122,391, British Columbia at $112,270, and Alberta at $109,631. Other provinces had higher (Manitoba, PEI) or lower (all others); however, as these had only a few respondents, they cannot be considered accurate.

Much like in 2021, this year most respondents (77 per cent) believe that over the next three years their salary will increase, with 32 per cent seeing a one to three per cent increase, 23 per cent a three to five per cent increase, 14 per cent a five to 10 per cent increase, and eight per cent seeing an increase over 10 per cent. On the flip side, 20 per cent don't see any change to their salary in the next three years, and three per cent think their salary will decrease.

Much like in previous years, survey respondents rated a healthy work life balance as an important aspect of job satisfaction again in 2022 (at 98 per cent); however, this years' competitive salary (99 per cent) took the top spot, followed by comprehensive benefits package (94 per cent), vacation time (93 per cent), job security (89 per cent), and support for career and professional development (87 per cent).

When asked how satisfied respondents were with different aspects of their job, we found that while the numbers are in the 69 to 88 per cent range, satisfaction could still be higher. Overall, satisfaction with job security was the highest at 88 per cent, the job overall at 87 per cent, vacation time (81 per cent), compensation (81 per cent), healthy work

SALARY COMPARISONS

GENDER

Male
$128,680
(80 %)

Female
$85,249
(20 %)

JOB TITLE

JOB TITLE	2022	2021	2020	%
Vice-President	$182,100	$191,617	$194,127	8%
CEO/President	$172,474	$166,824	$159,586	6%
Owner/partner	$154,833	$141,435	$131,095	9%
Director	$140,287	$153,769	$149,278	10%
Maintenance Manager	$127,273	$127,645	$121,680	5%
Design Engineering	$126,436	$108,392	$105,492	5%
Plant Manager	$115,829	$147,064	$141,587	8%
Production Operations Manager	$109,604	$106,107	$98,913	15%
Technician/Technologist	$104,931	$89,330	$87,380	4%
Materials Manager	$95,000	$82,000	$84,000	2%
Plant Engineering	$93,072	$118,326	$121,789	6%
Purchasing/Supply Manager	$85,525	$96,527	$95,832	4%
Administrative Management	$83,051	$107,823	$105,947	12%
Logistics Manager	$82,367	$117,500	$110,500	2%
Quality Assurance Manager	$73,200	$93,165	$91,363	3%
Safety manager	$71,886	$93,286	$94,143	2%
Average	**$119,726**	**$129,685**	**$125,452**	

Eight percent or less represents a small sample and should be considered with caution.

REVENUE

REVENUE	2022	2021	2020	%
$1M to just less than $5M	$109,162	$88,017	$87,153	21%
$5M to just less than $10M	$102,084	$132,325	$126,392	15%
$10M to just less than $30M	$128,038	$130,014	$126,346	20%
$30M to just less than $50M	$137,625	$135,820	$131,240	9%
$50M to just less than $100M	$102,321	$164,443	$166,549	10%
$100M to just less than $250M	$135,900	$186,327	$178,655	9%
$250M to just less than $500M	$152,000	$127,906	$125,352	7%
$500M to just less than $1B	$133,050	$173,892	$163,738	5%
$1B plus	$146,075	$151,326	$142,221	6%

SALARY COMPARISONS

INDUSTRY

INDUSTRY	2022	2021	2020	% replies
Aerospace product and parts	$116,885	$118,075	$106,575	5%
Beverage and tobacco product	$91,167	N/A	N/A	2%
Chemical/ Petroleum manufacturing	$123,386	N/A	N/A	11%
Computer and electronic product	$125,316	$141,889	$129,333	7%
Electrical equipment, appliance and component	$123,140	$133,396	$128,548	17%
Food manufacturing	$114,476	$165,617	$167,344	11%
Leather and allied product	$127,000	N/A	N/A	1%
Motor vehicle products and parts	$125,845	N/A	N/A	13%
Paper, Printing and related support activities	$106,850	N/A	N/A	8%
Plastics and rubber products	$108,975	$138,809	$144,791	14%
Textile Product & Clothing manufacturing	$90,160	N/A	N/A	2%
Wood product	$133,210	$134,653	$122,827	8%

Some industries were grouped together this year; past numbers were therefore not used.

EDUCATION

EDUCATION	2022	2021	2020	%
University degree	$132,129	$148,000	$143,813	55%
CEGEP	$109,444	$108,500	$103,000	3%
College diploma	$104,376	$117,577	$114,937	17%
Trade/technical diploma	$110,593	$122,726	$115,882	16%
High school or less	$96,296	$104,710	$105,762	9 %

YEARS OF EXPERIENCE

EXPERIENCE	2022	%
< 10	$96,044	19%
10 to 24	$118,472	36%
25+	$131,607	46%
Average Years of Experience		22.3

The average age has dropped, and is now at 51.1, down from 53.7 in 2021, and 53 in 2020.

AGE

AGE	2022	2021	2020	%
Under 25	$56,000	$66,000	$66,000	<1%
26 - 35	$75,274	$92,277	$86,150	8%
36 - 45	$117,566	$125,344	$118,826	21%
46 - 55	$132,846	$130,056	$125,998	32%
56 - 65	$122,768	$138,314	$136,517	29%
Over 65	$115,782	$129,737	$125,651	10%

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

life balance (78 per cent), benefits (74 per cent), and support received for career and professional development (69 per cent).

COMPANY PERSPECTIVE

As we continue to look at a neo-COVID world, more companies are saw an increase in their revenues in 2021 (compared to 2020 or 2019). When asked "Thinking about 2021, would you say your company's revenues have increased, decreased, or remained the same compared to 2020?", 58 per cent said they have increased. Asking the same question but comparing to 2019, 56 per cent said they have increased.

In 2022, when we asked respondents what the most significant issues their company will face in the coming year, skill shortage came out on top again at 62 per cent (up seven per cent from 2021), cost control (49 per cent), transportation (30 per cent), supplier relationship management (27 per cent), capacity utilization (25 per cent), technology update (23 per cent), resource and asset management (23 per cent), risk management (20 per cent), forecasting (20 per cent). The pandemic was only cited by 16 per cent (down from 68 per cent in 2020).

One thing that is constant, is change. Our final question asked respondents, "Thinking about the next five years, what changes do you anticipate occurring within your company?"

Most pressing, is hiring new employees (68 per cent), followed by investing in new production equipment and processes (51 per cent), expanding plant size (37 per cent), add new lines of business, (30 per cent), enter new geographic markets (23 per cent), enter new lines of business (22 per cent), and acquire companies or lines of business (19 per cent). PIt

Research Methodology

Research was conducted online between March and June 2022 among 319 Canadian Manufacturing leaders in partnership with Excellence in Manufacturing Consortium. Results were prepared by the Canadian research firm Bramm Research Inc. www.brammresearch.com

***Mario Cywinski** is the editor of Plant magazine, Machinery and Equipment MRO magazine, Food and Beverage magazine, and a member of the Automobile Journalists Association of Canada. He has over 15 years of editorial experience; over four years of maintenance, reliability, and operations experience; nearly 20 years of automobile industry experience, and small business industry experience.*

SALARY SURVEY – EMC's TAKE

Plant Magazine sat down with Jean-Pierre Giroux, President, and Scott McNeil-Smith, Vice-President, Manufacturing Sector Performance, from survey partner Excellence in Manufacturing Consortium (EMC), to get their take on the manufacturing industry and the salary survey results. **BY MARIO CYWINSKI**

Photo: ©David/Adobe Stock

***PLANT:* The average salary has dropped nearly $10K between 2021 and 2022, to $119,726. What do you attribute this to? And do you see this as a trend, or a short-term drop?**

EMC: Our understanding / experience is the salaries themselves have remained consistent; however, bonuses and other benefits may have changed due to economic impacts.

Further, $10,000 is not a significant shift in the aggregate salary average and is likely due to the following:

- Different respondents answering the question. (Conversely, the only way to assume is if the identical group of people answered for both years; including demographic shift and people retiring).
- Turnover in the occupations reporting, with the 'new' person earlier in their career (hence a lower salary) but in the same pay range.

***PLANT:* The percentage of females in the industry continues to increase (up to 20 per cent for 2022). Do you see this trend continuing in the years ahead?**

EMC: Absolutely. It is encouraging that more women are pursuing careers in manufacturing, as this is a key strategy EMC and the sector is employing, to grow the future workforce supply.

Engaging women (along with youth and other underrepresented groups) represents a significant opportunity for manufacturing employers to address current skills gaps and labour shortages. It is a long-term strategy that is looking to immediate needs, but also five-, 10- and 20-years out.

***PLANT:* Skill shortage and cost control are the most significant issues facing companies. How can companies tackle these problems?**

EMC: The overarching way we do this is by connecting the manufacturers with the best and brightest experts to help them solve the problems directly.

EMC also connects them with each other, to leverage the consortium for advantage.

- **Address capacity issues** related to staffing (skills and labour), supply chain relationships and sources, logistics for getting finished goods into customer hands.
- **Skills shortages** through upskilling/reskilling, training, micro-credentials, onboarding tools for employers, and equity, diversity and inclusion strategies.
- **Labour/vacancies** can be addressed through work integrated learning, on-the-job placements, pre-apprenticeships, recruiting foreign trained workers, and other experiential, path-to-employment opportunities.
- **Cost of manufacturing** through adoption of best practices, efficiencies, technology, advanced manufacturing processes. EMC is supporting directly with group model programs designed to reduce the cost of certain elements, such as energy, health and safety, training, materials and more.

***PLANT:* The average age of survey respondents for 2022 dropped by over two and half years from 2021 (51.1 from 53.7). A younger workforce is a great sign, isn't it?**

EMC: A younger workforce would speak to future viability; however, the workforce age is still quite high. With approximately 20 per cent of the workforce eligible to retire in the next 10 years, compounded by the current gaps, vacancies and shortages, the demand for replacing this aging workforce will require a 20 to 30 percent growth (through 2030) in workforce supply just to sustain. Like salaries, this is also a statistic that is affected by different respondents answering the question, and turnover in the occupations reporting, with the 'new' person earlier in their career, for same occupation.

***PLANT:* The average years of experience dropped for 2022. Do you attribute this to younger working joining the work force or older working leaving?**

EMC: Yes. We currently see 20 per cent of the workforce eligible to retire over the next 10 years. The current supply entering the workforce is not sufficient to address this expected retirement, let alone the current vacancies and demands for talent. **Plt**

Mario Cywinski *is the editor of Plant magazine, Machinery and Equipment MRO magazine, Food and Beverage magazine, and a member of the Automobile Journalists Association of Canada. He has over 15 years of editorial experience; over four years of maintenance, reliability, and operations experience; nearly 20 years of automobile industry experience, and small business industry experience.*

Wages aren't as important as you might think

BY SHAWN CASEMORE

Last week I stopped by the McDonald's drive-thru, picking up a hot fudge Sundae for my two boys following their very warm, but successful baseball game.

As I pulled up to the order kiosk, I noticed a faded piece of paper taped to the board announcing that McDonald's was hiring. Starting wage was $16 per hour and increased to $19 per hour for a shift leader. My oldest son, who mows a neighbour's lawn, commented that he made almost three times that wage in one hour of mowing the lawn.

It seemed like an odd response, considering my first job came with a starting wage of $4.35 per hour. On the other hand, he had a point. After all, what can you get for $16 these days? If you're lucky, it'll buy you lunch, but that's about it.

I'm not suggesting that these wages are too low, but rather an 'hourly rate that is competitive' is no longer enough to incentivize today's younger employee to give up their time.

Not all that long ago, a "competitive" wage, coupled with benefits, was enough to lure employees. Today, with most of the working population between the ages of 25 and 40 years of age, benefits aren't all that appealing, at least not yet.

Therefore, what else can an employer offer to attract the millennial generation given that wages and benefits don't seem to cut it?

Here are a few areas to consider:

Remote work opportunities: According to a study by Great Place to Work - post pandemic, a great percentage of millennials no longer feel the need to return to an office. For many, having proven working from home can be successful is enough to challenge the idea of having to spend their days commuting to and from an office, just to see colleagues who they could connect with in other ways.

Flexible work: I was recently speaking with the president of a wood pallet manufacturing company. He mentioned that for years he struggled to hire students. When he asked his nephew why he never asked for a job, his nephew responded that he couldn't commit to regular working hours. The president decided to create a "work what you can" shift, appealing to younger students to work any days or hours they could. The last we spoke, they now have nearly a dozen students employed part-time, with many others seeking the opportunity.

Accelerated career progression opportunities: A study conducted by Gallup found that 87 per cent of millennials are attracted to companies that offer rapid career progression opportunities. The days of expecting an employee to stay for years in a role, or even a single department like sales or accounting, are gone. Demonstrating career path options early on, and then supporting employees in pursuing these opportunities are a key attraction and retention tool.

Despite introducing benefits such as these, the main reason most employees decide to stay or leave, is their boss. A fact discussed by Leigh Branham, author of *The 7 Hidden Reasons Employees Leave*. Although this isn't new, what's not so obvious is how the definition of a "bad boss" has broadened in its scope.

Early in my career, 20 years ago, a bad boss would have been commonly defined as someone who yelled at their employees or slammed doors and pounded their fist. Today, a bad boss might be polite and helpful but not provide enough feedback, encouragement, or support to their employees.

The main reason we aren't attracting and retaining talent today is because our view of what is appealing is outdated. Is wage important? Sure it is, and it's often the fastest way to sift through dozens of job openings to identify opportunities.

It's not until we dive deep into what younger generations are seeking in a job that we uncover new offerings and benefits that will attract and retain top talent in a tight job market. PIt

Shawn Casemore *is keynote speaker, consultant, and author of three books, including his latest book, The Unstoppable Sales Machine. To learn more about Shawn and his work, visit www.shawncasemore.com.*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It's a 3D World

A fun part of being a consultant is visiting different companies, which allows for comparison between organizations, and the ability to find organizations with innovative ideas. However, you also get to where their is still opportunities for improvement or progress.

BY STEPHEN CHERLET AND MANOJ KUMAR

Photo: ©Gorodenkoff/Adobe Stock

Back when studying engineering, everything was pencils, t-squares, set squares, ovals and perhaps a flex-curve. My first job at the aircraft factory, the design team had massive tables and full-sized drawings of the "master lines" of the aircraft. The print room worked with aperture cards and printed massive amounts of paper. Working as a support engineer, we had to ask for a fresh print (hard copy) to check even a few dimensions. Back then, there was no such thing as looking at information on a screen except for standard items like for fasteners, washers, and rivets, all of which could only be viewed on microfiche, microfilm, or in a parts catalogue.

Back in those days, 2D was expensive and 3D design tools cost fortunes. I remember at various subsequent employers we had two designs teams – one with drafting tables and one with a 3D CAD (Computer Aided Design/Drafting) tools. As 3D was emerging technology at the time, the hardware and software was so expensive firms could not afford to convert all at once.

Surprisingly, a lot of paper drawings are still in use today. Though I seldom encounter companies generating new paper-based drawings, the legacy data still remains intact as hard copy. Typically the vellum and old prints have been scanned making the drawing available in an electronics format, usually through PDF, these are typically old items that are not in production but needed for spare parts. They can be part of really old designs. When the need for change arises, these companies may take the opportunity to redraw the part using a CAD tool. This slowly brings everything into a digital world. Depending on the item, firms may only re-create the part in 2D. This is especially true if the part is not used in a higher assembly, eliminating the value of creating the item in 3D to check for fit.

2D was the rage

Eventually, the cost of both hardware and software came out of the stratosphere. Instead of paper and electronic design/drafting teams, we had a combination of 2D and 3D teams. Paper was slowly being phased out. With 2D, there was some improvement in overall drafting time. Derivative parts were easier to create. Electronic information sharing got simpler both internally and externally. Then, and still today, companies print a hard copy for signature. This prolongs the concept of paper as the master data source.

Moving to 3D

Although 3D design does seem to be expensive still, hardware costs have come down. For the same cost as a 1980s word processor, you can get a good workstation today. Gone are the days of high-end reduced instruction set computer (RISC) workstations from various companies. Now regular PC hardware, properly specified, can get the job done. Cost is not a real obstacle from a hardware perspective. Software, and its accompanying maintenance, or annual licences fees, can still be a concern for small to medium sized enterprises, although there are lower cost products available that are affordable.

But what about the benefits?

Beyond the original benefit of being able to model full assemblies to check for interference and fit, there is a cornucopia of tools able to import a 3D model for a variety of analyses.

Figure 1
Part re-creation
Photo: IDS Infotech Ltd (India)

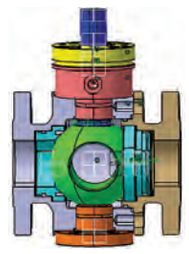

Figure 2
Assembly validation
Photo: Velan Inc.

Also, we cannot forget about industrial engineering. Computer aided manufacturing (CAM) software facilitates the creation of numerical control programs for the production of machined parts, laser and water jet cutting, electrical discharge machining (EDM) and robotic welding. In addition to generating tool paths, the software can often check for interference between part and machine.

If the fixtures have been designed in 3D, then the process team can often also check for machine, or tool, interference with the fixture. Not only is there a decrease in the cycle time to prepare for production, there is a decrease in tool-part-fixture collisions potentially causing serious damage, injury or delay.

From the design side, having a 3D model lends itself to design validation through finite element analysis (FEA). FEA can be used to predict how a product will reacts to real-world forces, vibration, heat, and fluid flow. FEA guides designers as to whether a product will break, and at what point, or work the way it was designed.

For parts involving castings, the ability to simulate metal flow and cooling for the parts after pouring is a great feature. High end software tools can all contribute to improving the designs of castings, improving product quality and yield. Such analysis could detect part shrinkage, and directional solidification, resulting in the potential to add a riser(s) at critical locations in the mold. It is better to find problems, and

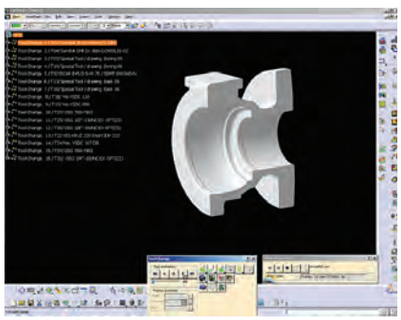

Figure 3
NC programming
Photo: Velan Inc.

resolve them in advance, instead of on the foundry floor.

The availability of the digital object is a key to supporting supplier collaboration for any process. Some foundries will offer to run the casting simulation for you if the 3D model is provided. Machine shops, and many suppliers with robotic processes (like welding or painting), will also appreciate being supplied with a model.

With the advent of 3D printing or additive manufacturing, companies can send the digital model to a supplier and receive a physical part back. Also, the option to invest in the printing equipment and bring the process in-house, is available. New printing process are permitting the use of advanced materials. Direct metal laser sintering (DMLS) is an industrial metal 3D printing process that "prints" fully functional metal parts in days from start to finish. A range of metals produce final parts that can be used for end-use applications. Those materials now include cobalt chrome, titanium, Inconel, tantalum, tungsten, stainless steels, and custom alloys.

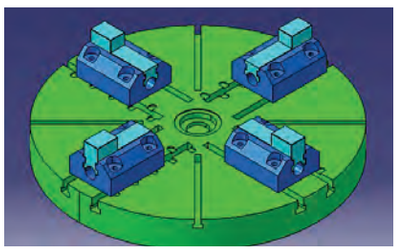

Figure 4
Holding fixture for machining
Photo: Velan Inc.

Where to next?

Simulations can be produced as instructional videos. They can guide machine operators with respect to fixture installation on a machine, part placement in the fixture, and provide a preview for the tool path. In the assembly department, videos can be used as general training aids or for specific tasks. Still images from any of the simulation can also be used. If you have customer serviceable products, the in-house assembly videos can be turned into instruction aids for customers or authorized repair centres. Ultimately, all of this can be done in a completely immersive virtual reality environment.

How do I get there from here?

For those who still have hard copy documents, there are a variety of services to digitize your information. Scanning services to produce 2D vector drawings have been around for a long time, and the quality of the output has improved. Some services will offer human expertise to review and clean up the newly vectorized results.

The real issue is getting from paper, or 2D CAD, to 3D. This still takes a human being, so, if you are not doing this in-house, you will need to contract a services company. Choosing a business partner with the correct experience is paramount to a successful conversion project. A critical success factor is to have an agreement on the key parameters of the model, dimensioning standards, defined use of layers, and tolerances on precision. This is needed to ensure the quality of the result and to avoid over specifying needs, which can result in massive file sizes.

Another option is to use 3D scanners and create the basic model from an actual part. Scanners have come down in price but are still expensive. Depending on the part, some holding fixtures could be needed, but it is still a faster way to get started on your digitization project. The downside is the model will reflect the as-is dimension of the actual part, not nominal dimensions with tolerances. That will have to be applied afterwards.

Some firms are scanning plants and piping to generate models of the "as-built" configuration. This provides the foundation for documenting the state of the building and can be integrated with EAM and CMMS.

The glue that binds all this digital information together is the product lifecycle management (PLM) system. PLM provides the relationship of all the data to each other, manages changes and allows you to execute at speed.

Therefore, it is becoming a fully digital world and the time has come to embrace it. From concept to production, all the processes in between are accomplished easier digitally. Digital supports both customer and supplier collaboration. Mock-ups and models can be produced for visualization to aid in the design process. At the other end of the supply chain, suppliers can get ready for production, and produce faster, with a full 3D model. Take full advantage. **Plt**

Stephen Cherlet *is a senior management professional with 35+ years of experience. Stephen is the owner/founder of FarStar S.A.C. Consulting. He is also the Chair of the National Board of Directors at Supply Chain Canada. He can be contacted at stephen@farstarconsulting.com*

Manoj Kumar *is a senior management professional with 22+ years of experience. He is working as a Business Head at Inde Dutch Engineering & Aerospace Services Limited (IDEAS). Manoj can be contacted at manoj.k@ideasengg.com*

Casting call for technical talent

The health of the workforce hinges on upskilling and reskilling in-demand trades. BY REHANA BEGG

The intended theme of the FABTECH Canada 2022 leadership exchange panel, was that advanced manufacturing introduces new technology to enhance, rather than replace, traditional manufacturing.

However, that central idea would inexorably alter focus, as no Canadian conference agenda can be complete without a nod to the reality that about 700,000 skilled trades workers are expected to retire between 2019 and 2028.

For panelist Martin Cloake, advanced manufacturing is an idea whose time has come, and the logical progression is for the industry to harness the promise and potential of new technology to address labour shortages. To drive home his point, Cloake relayed a story of a machine shop owner, presumably a client, who designed his business process in a manner that allowed the plant to train an employee to run machines within two months.

"He is hiring 19 or 20-year-olds at a machine shop and is basically expecting them to produce within a few months and stick around for two years," said the CEO of Raven, a manufacturing technology firm that develops automated contextualization and OEE software.

Talent and technology

Manufacturers ought to look to technology to help manage Canada's workforce, Cloake said, because we can no longer expect people to stay on the job for 30 years. "That's just not what young folks coming into the workforce today are looking for. That's not necessarily a good or bad thing, we just need to adapt."

700,000

# of skilled trades workers expected to retire between 2019 and 2028.

Rather than a hindrance, data generated by the manufacturing process ought to be viewed as a collaborative tool for an incoming generation of tech-native employees, Cloake said. Much like a vehicle's GPS system, technology can enhance efficiency, particularly when it runs in the background and serves to provide operators with actionable insights, so they can complete tasks efficiently, he explained. Over the long haul, advanced manufacturing technology could be used to solve the reskilling problem by using it to eliminate inefficient processes on the shop floor.

Holistic approach

The research to support the changing landscape due to the uptake of digitization has been floating around for some time. According to the Canadian

Photo: © sittinan/Adobe Stock

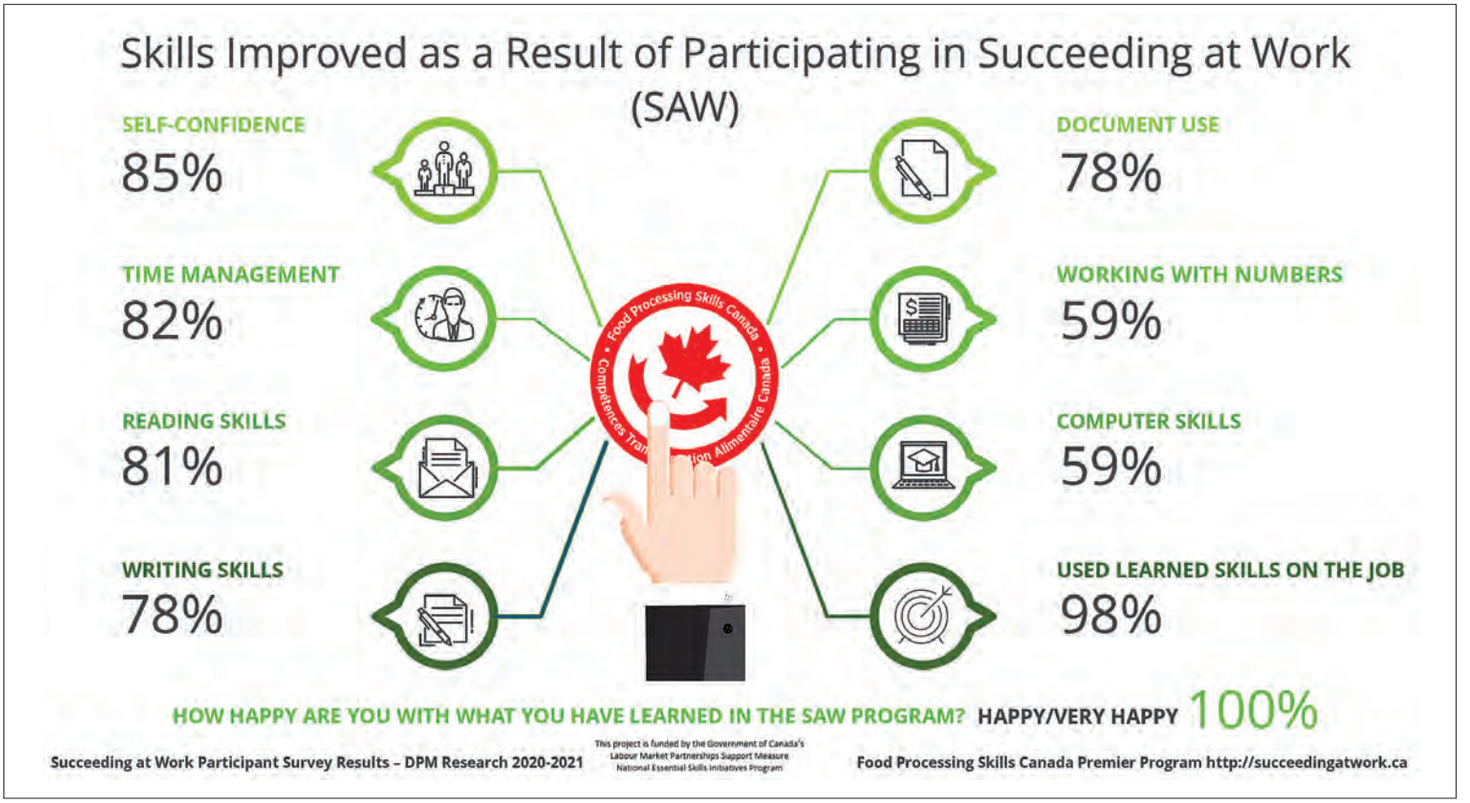

Photo Credit: Food Processing Skills Canada / Succeeding at Work

Apprenticeship Forum's *Apprenticeship Analysis*, 90 per cent of businesses use digital technology at the workplace with computers most commonly used in the service and manufacturing sectors and smartphones most commonly used in the construction sector. Included in this mix is the trend to incorporate electronic sensors/controllers into equipment, and diagnostics and electronics-based testing equipment and the programming of machinery and equipment.

Ian Howcroft, CEO, Skills Canada, and a fellow panelist, agreed that technology has given operators and companies far greater control than they've ever had "in terms of understanding and prediction," but was less inclined to declare it an industry-wide magic bullet, particularly for manufacturers who have grappled with addressing perception and skills shortages for decades.

"Some people invest in technology without determining what are they trying to cure," said Howcroft. "What are they trying to address? Is it the right technology for them? I think engagement of your staff is crucial. But I also think it's important to engage with your customers. How can we provide success to the customer base? What are you doing to make sure that what you're providing them is meeting their needs now and into the future? I think you must take all that into account."

Recalibrate skillsets

The average age for starting an apprenticeship is 28, which indicates a missed opportunity, said Howcroft. "What we need to do is get into the schools, get in front of kids at a younger age and let them see what manufacturing is about, what technology is about and give them exponential opportunities to get hands-on experience."

One of Skills Ontario's mandates is to meet prospective students across the province to help motivate them to pursue skilled careers. Skills Ontario's latest initiative, Trades and Tech Truck, is designed to inspire youth to explore skilled trades and technologies. Fix Network, the automotive aftermarket franchise network for collision, glass and mechanical repair services is a major partner and has helped to kit out the mobile learning unit with activities and simulators, such as modules simulating auto-painting, welding, electrical systems, and heavy machinery. Other partners are the Government of Ontario, Black & McDonald, Carpenters' District Council of Ontario, Collège Boréal, CWB Welding Foundation, IHSA, LiUNA, Milwaukee, Mohawk College, Sheridan College, St. Clair College, and Workplace Safety & Prevention Services.

Homing in on the food and beverage industry, where nearly 8,000 food and beverage manufacturing entities employ about 300,000 workers, Food Processing Skills Canada (FPSC) is another organization proving its commitment to helping employers build skilled and motivated employee teams. For example, Succeeding at Work (SAW) is FPSC's two-stream (job seeker and employer), fully funded training program with an industry specific curriculum and the facility to match participants with employers.

The program offers basic computer literacy, as well as soft skills, such as critical thinking, adaptability, and troubleshooting. A defining characteristic, however, is that the Job Seeker program attracts non-traditional sources to the labour pool. Initially set up at Trent University, the program invites a diverse cohort of students and targets not only individuals who have faced barriers to employment. Deanna Zenger, regional coordinator and national project manager, Food Processing Skills Canada, explained that program addresses these barriers through workplace essential skills and social-emotional learning, or emotional intelligence.

The SAW Language Stream project is a subset of the program, which offers instruction in six languages in addition to English and includes e-courses in digital technology, good manufacturing practices, workplace industrial safety, lock out tag out, and oral communication. A lack of comprehension places immigrant workers at risk of being furloughed due to the extra effort required to keep them informed, stated the SAW web site. To this end, Ontario, home to the largest number of sector businesses (2,530 or 35 per cent), is especially vulnerable.

"What we need to do is get into the schools, get in front of kids at a younger age and let them see what manufacturing is about, what technology is about and give them exponential opportunities to get hands-on experience."

"I was leading a class that was very geopolitically at odds with one another," said Zenger. "We have many different cultures from many different countries. When we first started, there were people who would not sit next to each other, which was surprising to me. But one must respect those differences. Within several weeks, not only having the technical courses, but working through the emotional intelligence programming, we began to see changes in people. It was as though they gave themselves permission to be able to do and say things that they were afraid to do or say. In many cases, especially with women, the growth of the individuals was incredible, as were the literacy gains."

Another "aha" moment stemmed from developing a hybrid curriculum (including in-person and online components) for English as a second language (ESL) learners. "We know from experience that knowledge of spoken English is better than written [knowledge] when you have programming instruction with an instructor who speaks slowly, clearly, to make them understand concepts," said Zenger. "But when you have an online learning system that is narrated, and you also see the written word, the literacy gains are outstanding."

Topics such as food safety contain critical information that cannot be watered down or shortened, and Zenger said she has rewritten some the programming to clarify the language.

Retention and productivity

SAW offers benefits for people who have established roles in the industry. The program's employer stream was created from a need to address not only retention issues but also production issues. "We have a labour force shortage, so it's very difficult to take people away from operations and production," said Zenger.

The program includes 23 courses designed to validate benchmarks of learning along the way. Since employees can take the courses in their own time, there is no loss of production or operations time.

Zenger has found that learning from home is often preferred. "Many employees are not digitally literate," she said. "In our industry, we have a generational gap in the knowledge of technology. We have many people who have never finished grade eight. It's just the way it is. And we have many new Canadians and many women who have never finished high school. To have a certificate nationally recognizing you in your own name [means a lot]."

Set priorities straight

Food and beverage manufacturers are short an average of 25 per cent of their workforce, according to Public Safety Canada. That makes labour a key issue preventing the sector from realizing its growth potential, noted Food and Beverage Canada.

With no immediate signs of the skills gap going away, Howcroft and Zenger will attest that demand for innovative, practical solutions that address the changing needs to succeed in the workplace is high priority. Cloake might add that advanced manufacturing technology is integral to the equation.

All would agree that the future health of manufacturing is tied to the evolution of the hiring pool. "We need to take a look to see what the employers need," said Zenger. "Because we have less than one generation to rescale and upskill the entire industry." **PIt**

***Rehana Begg** is a freelance writer. Reach her at rehanabegg@rogers.com.*

Scheduling optimization helps manufactures with supply chain woes

An effective production schedule maximizes productivity and finds the most efficient production route possible. BY NIGEL FLYNN

Manufacturing execution systems (MES) innovations are enabling manufacturers to better assign skills and tasks, and to manage contingencies. They provide precise, real-time data to help with decision-making. While keeping the plant on track of the progress made on each product order and update the production schedule in real-time. A significant aspect of more resilient plant operations is the attention paid to production monitoring, quality, traceability and maintenance, and MES scheduling software helps in this regard.

Addressing the issues

It starts by looking at the data and developing an understanding of how the current processes are working for a manufacturing facility. This may involve having an industrial processes consultancy on site working with a company's IT group and implementing a solution to gather the information on how plant production lines are performing. This is always the first step in a facility knowing where they are at and what problems they may be facing.

When it comes to production scheduling, all internal roles need to come together. Meaning full customer engagement and communications on all fronts. The engineering department must ensure the system is properly specified and all equipment is fit for purpose. The maintenance department must ensure that the systems are properly maintained and fully available for production. The IT group must ensure the network and connectivity to the shop floor automation is robust and able to transfer data. Operations and human resources must be ready with properly trained staff capable of carrying out their daily tasks. With alignment of all stakeholders and systems, only then can the scheduling system push forward and deliver on the production requirements.

Scheduling in the manufacturing business can be quite complicated. Looking at an example in the packaging materials industry, a company who needed help with increasing overall production capacity, but found that it was production scheduling that was the problem. They had hundreds of product SKUs running on multiple production lines, each line having slightly different capabilities and capacities. Couple that with competing customers looking for immediate fulfillment and the task becomes even more challenging. All while only one experienced person handled the scheduling tasks for the entire plant.

Utilizing experience and spreadsheets, they went about their planning. After development of a complex matrix including all the capabilities, capacity limits and interconnected variables, the solution provided was a software package that automates the entire order scheduling process. The solution also ties into the existing ERP, allowing for quick inventory checks, and reordering of raw materials to satisfy the schedule.

The scheduling interface can be accessed locally or remotely. It runs through a set of queries such as: what makes the most sense to produce; what would be the most productive; and what would get the company closest to its customers' lead times?

The outcome is an effective production schedule that maximizes productivity and finds the most efficient production route possible. The company can even set rules in the scheduler system for 'priority' customers.

Identifying the ideal partnership and end-to-end solutions

When looking to automate scheduling activities consider that it requires a measured and forward-thinking approach. Upfront consultancy between the supplier and the customer is crucial to the success of the project. This in conjunction with current and future manufacturing requirements, will drive the selection of the appropriate MES solution.

The project doesn't end with the initial implementation. It is important to work with a partner who offers full support throughout the project lifecycle and with a solution that is easy to integrate, while being scalable and measurable. Most importantly customers want to find a supplier who understands their business, their needs and expectations and has the wherewithal to deliver on those elements.

Addressing future requirements

Anything related to supply chain is relevant to a company's well-being. Although efficient scheduling does help in the manufacturing phase, we can't ignore the logistics side, where warehousing facilities need solutions to track their finished goods more effectively. Access to all this real time data is essential, and advances in cyber security ensure that cloud-based applications will have a part to play. With this data, operations staff have the tools to make decisions that result in production targets being met, maximized capacities, and satisfied stakeholders. PLT

Nigel Flynn *is the client manager with Actemium Toronto.*

Photo: Flexicon.

FLEXICON MOBILE SANITARY IBC UNLOADING CONVEYOR

Flexicon mobile sanitary IBC unloading and conveying system transfers contamination-sensitive bulk solid materials from intermediate bulk containers to downstream processes, dust-free.

The discharger frame is mounted on casters for mobility, while a hinged subframe supporting a surge hopper, flexible screw conveyor and support mast can pivot down for maneuvering through doorways and low-headroom areas.

The IBC frame is forklifted onto receiving cups, which position the IBC outlet onto the surge hopper inlet. Material flowing from the IBC into the charging adapter of a flexible screw conveyor is propelled at an incline and discharged into elevated process equipment and storage vessels.

The screw is the only moving part contacting material and is driven by an electric motor positioned beyond the discharge point. The system is available in carbon steel with industrial coating, with stainless steel material contact surfaces, or in all-stainless steel.

www.flexicon.com

AUTOMATIONDIRECT FANDIS FILTER FANS

AutomationDirect added a line of enclosure filter fans to their inventory of thermal management devices. Fandis Virdis series filter fans have a thermal management solution for applications where the surrounding cooler air can be used to reduce inter-


Photo:AutomationDirect.

Virdis series are available in NEMA 12 and 3R models. NEMA 12 rated models are for indoor use, and NEMA 3R versions are designed to preserve components housed within an electrical enclosure located outdoors.

The series includes vents and grilles that draw filtered cooler ambient air into the enclosure. Fandis filter fans are available in various voltages and dimensions, with roof mount units offered for limited space applications.

https://www.automationdirect.com/enclosure-fans

BLOCKCHAIN APPLICATION TO AUTHORIZE CAD DATA

Photo: Prostep.

Prostep showed how technology can be used to prove the authorship of CAD models at a blockchain committee set up by the German Association for Mechanical and Plant Engineering.

Dr. Martin Holland, head of strategy and business development at Prostep, presented a blockchain-based solution for the forgery-proof exchange of 3D printing and process data and the identification of the printed components. It was originally developed as part of the collaborative SAMPL project.

The solution can store history describing the creation of CAD models in the blockchain and provide proof of the authorship of the data.

https://www.prostep.com

FRICTION BEARING UNIVERSAL JOINTS


Photo: Ruland

Ruland friction bearing universal joints are available in various sizes, styles, and materials. Components are manufactured to tight tolerances for accuracy, torque capabilities and durability.

Components are selectively heat-treated and ground for higher strength, giving them a precise and prolonged life. Single universal joints are suited for space-constrained applications with angular misalignment up to 45 degrees. Double universal joints are designed for applications with a wide distance between shafts or those in need of extreme angular misalignment accommodation up to 90 degrees.

The joints can be equipped with nitrile boot covers for abrasion and oil resistance. They are manufactured from alloy steel for high torque ability or stainless steel.

https://www.ruland.com

RITE-HITE RAPTOR MAX DOORS

Rite-Hite added to its lineup of rubber doors with Raptor Max, designed for a variety of openings (interior, exterior, and high-wind applications).

Covering openings up to 20 feet tall by 20 feet wide, Raptor Max doors are made from quarter inch styrene-butadiene rubber.


Photo: Rite-Hite

Based on wind load requirements in the American Society of Civil Engineers criteria, Raptor Max doors—depending on exact size—can take on static wind loads of up to 20 psf, which is the equivalent to a 115-mph wind.

https://www.ritehite.com

CORTEC OUTDOOR STORAGE SHRINK FILM


Photo: Cortec

Cortec VpCI-126 HP UV shrink film allows for expanding storage outdoors with corrosion protection.

It combines high strength resins with ultraviolet light stabilizers and vapor phase corrosion inhibitor technology. This film construction provides multi-metal protection for parts, equipment, and vehicles for up to three years in aggressive outdoor conditions.

Corrosion inhibitors in the film vaporize and condense on metal surfaces within the enclosed space to protect metals in direct contact with the film and those in recessed areas.

The film can be shrink wrapped with a variety of shrink tools to create a streamlined unit that provides a secure environment for protecting idle assets from the elements.

VpCI-126 HP UV shrink film may be supplemented with other VpCI materials such as VpCI oil additives, VpCI emitters, and VpCI fogging fluid for flexibility and protection.

www.cortecpackaging.com

Photo: Fluke Networks

FLUKE NETWORKS EXPANDS NETWORK CONNECTIVITY TESTING

Fluke Networks upgrade its LinkIQ Cable+Network Tester that expands the tester's ability to test and troubleshoot IP networks, test industrial Ethernet cabling, and support users in 12 languages.

LinkIQ can now be configured to perform IPv4 or v6 ping tests and will display the response time for four pings to a target device of the user's choosing. The test results display the DNS and DHCP servers and the gateway router. LinkIQdisplays the IP address of the nearest switch. The new version of LinkWare PC includes this information in its test reporting.
www.flukenetworks.com/LinkIQ

SAMOTICS ENERGY EFFICIENCY SOLUTION

Photo: Samotics

Samotics launched Sam4 Energy, a product that offers energy savings of 10 to 15 per cent and cuts CO_2 emissions.

Sam4 Energy provides industrial companies access to a 24/7 energy audit, generates advice on how to reduce electrical inefficiencies and, once advice is implemented, Sam4 Energy tracks subsequent energy savings and carbon offsets. The energy efficiency platform provides a reporting tool enabling real-time insight into the performance of assets across a variety of performance metrics.

Samotics' has launched Sam4 Energy to market, following successful industrial trials. One trial deployment identified a foul pump at a sewage pump station that was operating at a very low efficiency caused by low flow operation. Following automatically generated advice to open a partially closed discharge valve, yearly electricity savings of 40 to 55 per cent were achieved.
https://www.samotics.com

BPS CONTROL SYSTEMS FOR BULK PROCESS

Photo: Best Processing Solutions.

BPS controls systems are done from start to finish, and can design and fabricate control systems for an existing operation.

BPS systems utilize networking technologies available from control manufacturers. Using these networking and control technologies allows BPS control systems to be installed and implemented in shorter periods.

BPS does the upfront engineering and sizing of control components based on the mechanical design and specification of the equipment and bulk processing control needs. BPS handles the startup and commissioning of the system, installation oversight of mechanical equipment and electrical paneling.
www.bpsvibes.com

WAGO EDGE COMPUTER

Photo: Wago.

Wago has introduced 752-9800 Edge Computer, which can help increase plant floor performance by leveraging applications operating in docker containers fed with harvested plant floor information.

This industrial computer offers low latency control and simplified north/south connection with cloud-based services.

WAGO's new Edge Computer is ideal for Linux users who want an industrial grade computer running their applications such as Node Red, Grafana, AI and digital twins.

With a dual-core i7 Intel processor, 16GB RAM and 256GB flash, this device has the capacity to store large amounts of information, and the flexibility to align to industrial hardware specifications.
www.wago.com

WALTER PROFILE MILLING CUTTER

Photot: Walter USA, LLC.

Walter's profile milling cutter, Xtra·tec XT M5460, offers precision, tool life, and surface quality in machining of freeform surfaces and deep cavities. It has an internal coolant channel, enabling chip evacuation using compressed air or MQL.

Xtra·tec XT M5460 has been designed for difficult materials, particularly for hard machining of steels up to 63 HRC. In field tests, the M5460 with this latest grade WHH15X, achieved increases in tool life of up to 500 per cent.

This profile milling cutter can be used in steels, cast irons, stainless steels, and hard materials.
www.walter-tools.com/us

ARCWORLD WORKCELLS INTEGRATES ROBOTICS INTO WELD PROCESSES

Photo: Yaskawa Motoman

ArcWorld expanded its family of pre-engineered robotic arc welding workcells. They include the ArcWorld RS and ArcWorld HS, which are flexible and compact options for integrating robotics into current weld processes.

Each solution is designed for optimizing small- to medium-size part production for medium volume fabrication. Offering a single high-speed, six-axis AR900 arc welding robot with YRC1000 controller and a digital weld interface for all power source brands.

Requiring 25 square feet of floorspace, the ArcWorld RS utilizes a rotating station design, manually indexed by the operator with two fixture tables and a 100-kilogram payload capacity per side. This facilitates quick changeover, allowing parts to be safely loaded and unloaded while the opposite station part is welded. Parts up to 425 x 700 x 990 millimetre can be processed.

ArcWorld HS needs 15 square feet of floorspace and offers a hinged station design, allowing access for loading and unloading of parts. The workcell has a single fixture table with a 100 kg payload capacity and can process parts up to 550 x 500 x 1,050 mm in size.

For more products, visit: ***www.plant.ca/technology-centre***

POSTSCRIPT
BY JAYSON MYERS

Reflections from the Hannover Messe

After two years of pandemic lock downs the Hannover Messe fair reconvened in person earlier this year. Hannover Messe is the largest advanced manufacturing trade show in the world. The fair usually takes up 43 mega-size exhibition halls and attracts over a million visitors a year – most of them engineers, technicians, and high-level decision makers – from around the world. It is the place to go to see the latest in advanced manufacturing technologies, equipment, and industrial energy solutions and to exhibit innovation and production capabilities to a global audience. Ultimately, it's a great place to meet people and do business.

NGen brought several of its members to the fair. We partnered with the Canadian, Ontario, Quebec, and Alberta governments to host an exhibit highlighting Canada's advanced manufacturing capabilities in digital technologies and AI, automation, and electric vehicles. We were joined by several other Canadian exhibitors who were also participating in the show, including a delegation of hydrogen technology companies. All parts of Canada were represented. Our reception on the Tuesday evening drew a huge crowd.

After four days of intense networking, we came away tired but also with some lasting impressions. First and foremost, how great it was to travel and meet people again. There was a real buzz at the fair this year and a lot of good discussions. Participants seemed to want to meet each other more than ever and to have fun, and our delegation made great connections.

However, there were some notable gaps this year. A lack of many Chinese companies and very few American exhibitors; making it a primarily European show. Uncertainty and limited prep time played a role. We found it difficult to recruit as many company reps in person as we would have liked to, but made up for that by running a virtual showcase and being there in person and situated in the Digital Ecosystem exhibit hall. I'm sure next year will be bigger and will once again draw the international audience that previous shows have.

You can't attend Hannover Messe without having a sense of how fast advanced manufacturing is changing. With the exception of EVs and hydrogen systems, there weren't as many new manufacturing technologies on display this year, there wasn't a particular technology theme like the fair has had in previous years. However, what became clear from walking the floor, was in every field of application – from product design and development, automation systems, energy, motors and drives, robotics, additive, to digital systems – how much connectivity, high power cloud and edge computing capabilities, and AI have become embedded in the latest technology solutions available to manufacturers.

Ten years ago, advanced manufacturing exhibits were contained in one hall. This year most of the industry exhibits were about digital manufacturing and automation systems. It was only four years ago that the fair highlighted AI applications. The year before that it was additive. In 2019, it was cloud computing and 5G networks. Now connectivity is taken for granted. Additive, AI, and advanced computing capabilities were not only highlighted throughout the show but part of the automation and control systems on display. We are past the dawn of Industry 4.0. Now it's smart products, processes, and materials, with digital solutions everywhere.

In my discussion with exhibitors, I was impressed by how similar their views are of the challenges and opportunities they see when it comes to adopting their technologies. The show is always a good place for engineers and technicians to meet, see what their competitors are up to, and find potential business partners. Yet, when you ask how business is going, the response is pretty much the same, and much different from what I hear in Canada. Tech providers are finding it difficult to make the business case to manufacturers. It's not just about the features or potential benefits of their technology; it's about how it can be integrated into operations, successfully managed, and sustained.

Most of the solution providers I spoke to talked about the importance of helping their customers identify opportunities for implementation to improve processes, demonstrate applications in actual use cases, manage data, and develop the skill sets required to manage their technologies productively. As impressed as they were with the technologies on display, most manufacturers were simply looking for solutions to the business challenges they face in delivering higher value to customers or cutting costs. It's difficult to look beyond the tech in Hannover Messe, but that's exactly what manufacturers need to do to figure out where in their business, production, or supply chain processes new solutions could be implemented to improve performance and meet business objectives.

When these two perspectives come together, magic happens. When they don't, tech providers don't get much business at the fair. Manufacturers who pursue the tech for tech's sake usually end up disappointed because they don't improve their business, often because they don't have the expertise, IT capacity, or skill sets to implement in a profitable way.

Which leads me to perhaps my biggest takeaway of all. I was highly impressed by the enthusiasm and expertise of the young people exhibiting advanced manufacturing solutions at the fair. Leon, a graduate from Paderborn University, who is setting up an open-source AI platform for systems optimization. Sylvie, whose start-up company is working with nanomaterial coatings for EV battery casings. Mark, the 20-something CEO of a lean consulting company that specializes in automation and AI installations for auto parts suppliers.

Gorve, the young employee from Siemens Canada who took our delegation on a tour of the Siemens exhibit.

The last day of the show is usually open to students from across Germany, and as usual this year they flooded into the fair. Noise levels kicked up a notch that day. You could feel their excitement and see their interest and the engaged discussions they were having with exhibitors.

Labour and talent shortages are not only a concern for manufacturers in Canada, but around the world. Yet, I couldn't help but think advanced manufacturing will be in pretty good hands in the future and how great it would be to invite a cohort of Canadian students to attend the fair. I'm sure it would be equally as exciting for them. Like me, I'm sure Hannover Messe would leave a lasting impression. **PIt**

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

ADVANCED **MANUFACTURING** OUTLOOK 2023

CANADA'S LARGEST ANNUAL SURVEY OF MANUFACTURERS

Plant magazine and CanadianManufacturing.com are undertaking an annual survey focusing on Advanced Manufacturing and the Canadian manufacturing sector that will be the foundation of a blueprint report for Canadian companies to use on their next-generation manufacturing journey.

This in depth survey takes **under 10 minutes** to complete and will provide analysis of the overall awareness and the current status of Canada's manufacturing sector and the level of understanding of the future benefits of the "connected factory".

The Advanced Manufacturing Report, will be released this fall with the survey findings and additional commentary from industry experts on the challenges and solutions to effectively implementing Advanced Manufacturing Technology.

Everyone who completes the survey will have the opportunity to enter into a draw for a **$500 Best Buy Card.**

PLEASE TAKE A FEW MINUTES TO COMPLETE THE SURVEY.

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CM CANADIAN MANUFACTURING Insight. Innovation. Impact.

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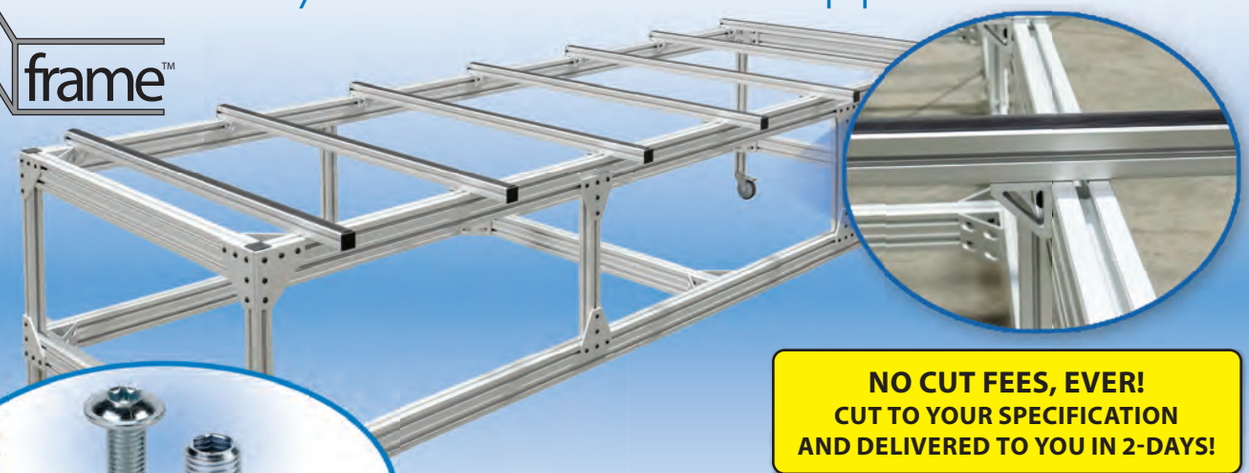
Cut how you need it and shipped fast

Sure frame™



NO CUT FEES, EVER!
CUT TO YOUR SPECIFICATION AND DELIVERED TO YOU IN 2-DAYS!

Sureframe	AutomationDirect	vs. McMaster-Carr	80/20	Framing Tech
77" (4) 1.5" x 3" light weight	$277.20 1530CL	$415.80 4706T809	$348.36 1530-LS	$349.08 1.5X3.0/240INCH
34.5" (4) 1.5" x 3" light weight	$124.20 1530CL	$186.30 4706T809	$163.06 1530-LS	$161.36 1.5X3.0/240INCH
27" (4) 1.5" x 3" light weight	$97.20 1530CL	$145.80 4706T809	$130.36 1530-LS	$128.24 1.5X3.0/240INCH
Total Extrusion Cost	$498.60	$747.90	$641.78	$638.68
Cut Charge	$0.00	Hidden in pricing	$3.16/cut	$2.25/cut
2 Day Delivery	$0.00	Unknown upfront, added during billing. 3-4 day only available	$300.38	$389.04
Total Cost		$747.90	$942.16	$1,027.72

All prices are U.S. published prices. AutomationDirect prices as of 04/06/2022. Prices and specifications may vary by dealer. McMaster-Carr prices are from https://www.mcmaster.com 2/10/2022. 80/20 prices are from https://8020.net 2/10/2022. Framing Tech prices are from https://www.framingtech.com 2/10/2022. Prices subject to change without notice. Prices for aluminum do fluctuate. Check vendors websites for latest current pricing.

SureFrame T-Slotted Aluminum Rails

SureFrame T-slotted aluminum rails are available in the most popular profiles and dimensions. T-slotted rails are ordered in your custom cut-to-length sections for maximum flexibility and minimum waste.

We also offer a full selection of assembly hardware for T-slotted rail systems, which includes T-nuts, fasteners, connecting components, joining plates and brackets, as well as floor, door and panel elements. SureFrame T-slotted rails, along with the assembly hardware components offered, are compatible with many other brands.

Also Available

- AC variable frequency drives (VFDs)
- Motors
- Wiring and electrical connection solutions
- Just about everything you need to complete your automation projects!

Features

- You specify length and cut angles for each piece
- No cut fees
- Free 2-day delivery on all orders over $49*
- Available in 1 inch, 1.5 inch, 30mm, 40mm and 45mm profiles
- Complete selection of Fath installation hardware available

Research, price, buy at:

www.automationdirect.com/t-slotted-rails

Orders over $49 get FAST FREE SHIPPING

Our shipping policies make it easier than ever to order direct from the U.S.!

Fast free standard shipping* is available for most orders over $49 U.S., and that includes the brokerage fees (when using an AutomationDirect nominated broker). Using our choice of carrier, we can reach most Canadian destinations within 2 to 3 days.

*Free shipping does not apply to items requiring LTL transport, but those shipments can take advantage of our negotiated super-low flat rates (based on weight) that include brokerage fees.

See Web site for details and restrictions at:
www.automationdirect.com/canada

To see all products and prices, visit www.automationdirect.com

All prices shown are U.S. Dollars

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