

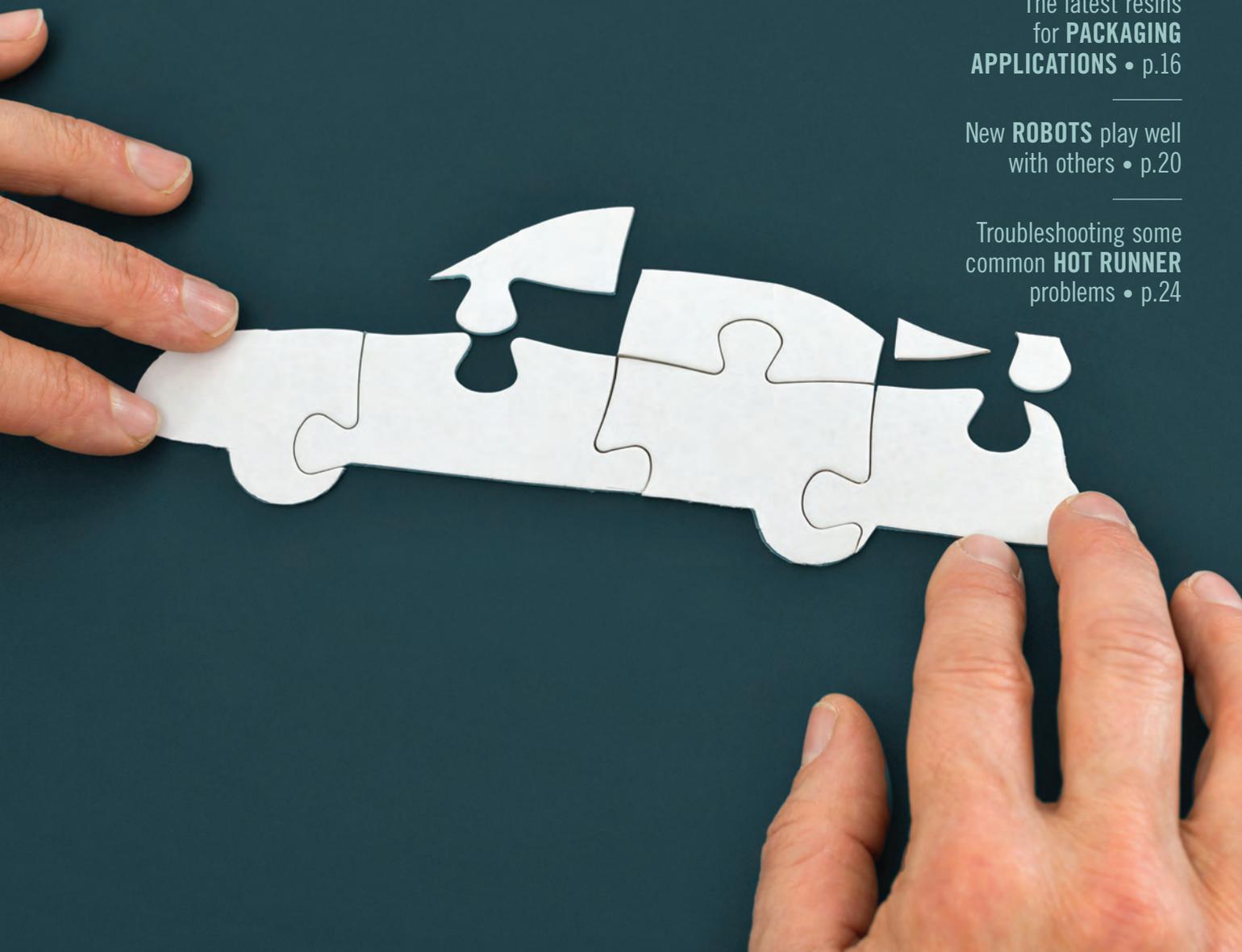
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## FROM THE ARCHIVES

The February 1962 issue of *Canadian Plastics* was our self-described “Statistical Issue”, and was packed with the most up-to-date information available. Key takeaways included the fact that Canada used 363 million lbs of plastic in 1961, a new high and up almost nine per cent over the previous year. “This equalled 20 lbs per capita,” our story noted. Exports fared even better that year, rising 14 per cent to 76 million lbs, while imports were static. “Production of thermoplastics increased 17 per cent, while thermoset resins added only five per cent in volume,” we said. Also, there were at least 17 new plants and 900 employees added to the nation’s plastics industry in 1961.

**Number of the month:**  
**62.5%\***

\* The present regional value content requirement for light-duty automobiles according to NAFTA. (See pg. 13)

Cover: Getty Images



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# Is Canada open for business?

As the U.S. tries to get its economic house in order by peeling away layers of regulations that stifle new and small businesses, Canada seems headed in the opposite direction. More and more, it seems, Canada is simply not open for business.



For a recent example, look no further than the decision in July by Malaysian energy giant Petronas to abandon its plans to develop a \$36 billion liquefied natural gas (LNG) export facility on B.C.'s Pacific Coast. The plant should have been a no-brainer: British Columbia has massive supplies of untapped natural gas, which is a relatively low-carbon alternative to heavier fuels that are in use across Asia; and LNG is in high demand across the Pacific region.

But the project unravelled in large part because of government mishandling. The province's new NDP-Green government kept jacking up its demands to Petronas, including higher carbon taxes and — as outlined in B.C. Premier John Horgan's mandate letter to the new energy minister, Michelle Mungall — protection for "our air, land, and water including living up to our climate change commitments."

Once Petronas deep-sixed the project, the province tried to deflect blame by attributing the company's decision to poor global LNG market conditions. But similar LNG development projects in America and Australia are moving forward or already online and making money under the exactly the same global market conditions. An editorial in the *National Post* summed up the situation succinctly: "Petronas was ready to build years ago. Canada couldn't get its act together. The Americans and Australians could."

Dennis McConaghy, a former senior executive at energy company TransCanada Corp., called the Petronas decision "a tragedy for Canada... a real condemnation of this country and the utterly unproductive entities in it that

simply make any development virtually impossible." He hit the nail squarely on the head by alluding to the bigger problem: Our governments have badly eroded Canada's appeal as an attractive place to invest. As many observers have noted, companies face different regulatory requirements in each province and there are regulations at provincial and federal levels that duplicate each other, adding nothing but red tape. "Environmental assessments drag on nearly indefinitely," the *Post's* editorial said. "Government's consultation obligations with First Nations are often uncertain, creating risks of litigation and delay. And, of course, various levels of government bicker incessantly about exactly how much upside, and how little downside, their particular jurisdiction wants out of the deal."

To be fair, the mismanagement cuts across political party lines. Former Prime Minister Stephen Harper meant well and talked a good game but was not able to complete nearly as many projects as his supporters would have liked. Two big mistakes came when his government failed to assert federal authority by handing provinces like B.C. and Quebec control of the political agenda; and when the Conservatives allowed environmental groups to seize the public relations initiative.

Canada's energy reserves are plentiful but, in an era where fracking has unlocked fossil fuel reserves in every corner of the globe, we are unique in missing out on the benefits of this magnificent new industry. There's a classic Business 101 lesson to be learned here: Investment capital is mobile. Companies like Petronas, or oil companies considering investment in Alberta's oil sands, are under no obligation to invest in Canada, and can and will go elsewhere. Which means we need less, not more, government costs and regulations. It's about time Canada's political class understood this fact.

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Canadian Plastics magazine reports on and interprets developments in plastics markets and technologies worldwide for plastics processors, moldmakers and end-users based in Canada.

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# Antibiotic-releasing polymer could eradicate joint implant infection



Getty Images

Investigators from Massachusetts General Hospital (MGH) in Boston have developed an antibiotic-releasing polymer that could reduce infection rates caused by prosthetic joints and turn a two-stage surgical procedure into a less-dangerous single step.

As explained in a July 2017 paper published in *Nature Biomedical Engineering* magazine, implants made from ultra-high molecular weight polyethylene embedded with antibiotic clusters successfully eliminated two types of

prosthetic infection in animal models.

“Currently, most infections involving total joint replacement prostheses require a two-stage surgery, in which the patient’s daily activities are largely compromised for four to six months,” said Dr. Orhun Muratoglu, director of the Harris Orthopaedics Laboratory in the MGH Department of Orthopaedic Surgery and a coauthor of the report. “Our finding that polyethylene, the most commonly used weight-bearing surface in total joint surgery, can be made to safely and effectively release antibiotics implies that fully weight-bearing implants made with this material could be used to treat infection in a single procedure, reducing both the inconvenience and the risk of complications for patients.”

The standard treatment for prosthetic joint infection, which affects tens of thousands of people every year, involves removal of the implant and adjacent infected tissues and placement of a temporary spacer made from antibiotic-releasing bone cement that remains within the joint space for at least six weeks and sometimes for as long as six months. And in a second surgery, a new prosthesis is implanted, using antibiotic-releasing bone cement. But patients still can be at risk for recurrent infection, which may lead to the need for permanent joint fusion or amputation — not to mention a mortality rate of up to 15 per cent.

The material MGH researchers developed contains irregularly shaped antibiotic clusters that can release

effective drug doses over extended periods of time without compromising the strength of the material. Implants made from this polymer were tested in animal models of prosthetic joint infection produced either by injecting a solution containing staphylococcus aureus bacteria into the prosthesis or implanting a titanium rod covered with a staphylococcus aureus biofilm. In both situations, the antibiotic-releasing polymer successfully eliminated the infection, while implantation of a drug-release bone cement spacer was not effective.

In addition to speeding the recovery of patients and reducing the chance of complications, the elimination of a second surgical procedure should reduce overall costs, Muratoglu said.

The researchers are now working with the FDA and other regulatory agencies to pursue approvals and develop the material into clinical products.

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## New book chronicles Canada's plastics industry from 1950 to 2000

Waiting for a sequel can be torture. It took 35 years for Hollywood to film *The Black Bird*, a follow-up to the 1941 classic *The Maltese Falcon*, for example. Veteran members of Canada's plastics industry can relate: they've had an even longer wait for a book to augment *Pioneering in Plastics — Canadian Inventors and Innovators 1885 to 1950*, a history of the industry's earliest days written by chemist Donald W. Emmerson in 1978. Now, after almost 40 years, that follow-up volume is finally available.

Entitled *Canadian Plastics Pioneers 1950-2000*, the new book picks up where Emmerson left off, chronicling Canada's plastics industry through the experimental decade of the 1950s, the steady growth of the 1960s and the heyday of the 1970s, to the rise of new competition and image concerns in the 1980s and 1990s. Written by Toronto-based business journalist Kara Kurylłowicz, *Canadian Plastics Pioneers 1950-2000* is a labour of love for the Canadian Plastics Pioneers (CPP) — a 160-member-strong organization made up of industry veterans with at least 25 years of industry experience.

The book was made possible by the CPP's perseverance and fundraising activities — which is a tale almost as eventful as the story told between the covers. "The idea for this volume goes back almost 30 years," said Ralph Zarboni, the head of the CPP's Book Committee. "The CPP began assembling information for it in the early 1990s, and there were several unsuccessful tries at finding a writer before we found Kara about eight years ago. She wrote the majority of the manuscript, but then the funding dried up and the project fell into limbo for several years. CPP chairman Doug Winter always believed in the project, however, and after his death in 2015 I took over the job of fundraising and was able to get



Ralph Zarboni shows off the finished volume.

enough money from our members to allow Kara to finish the job."

### TRUSTWORTHY TESTIMONIALS

In writing the book, Kurylłowicz drew from microfiches of old magazines and other written records, but relied primarily on the personal testimonials and anecdotes of many of the pioneers themselves. With help from a number of CPP members — including Zarboni, the late Doug Winter, and others — she was able to interview such seminal industry figures as Robert

Schad, Mike Schmidt, Bob Beamish, Lloyd Leadbeater, Ralph Noble, Chuck Hantho, Lorne Berggren, Jack Reid, Tom Thomas, Clay Elliott, and Karl Pieper. In addition to their recollections, the book features bios of other important men and women of the industry, including Paul Szasz, Marta Farrago, Bryan Carter, Jim Horn, Murray Spencer, Eric Salmond, Ron Evason, Jim Edward, Bob Davies, Vic De Zen, Gunter Weiss, Frank Maine, and Marion Axmith; and short histories of important companies such as Danson Corporation, Mold-Masters Ltd., International Tool, Shawinigan Chemicals, ABC Group, Husky Injection Molding Systems, Brampton Engineering, Magna International, Royal Plastics Group, and The Woodbridge Group.

"This second volume provides a record of our industry's people, activities, companies, and products, and their effect on Canadian society from 1950 to 2000, through five chapters covering each decade," Zarboni said. "Our approach was to target applications and indicate how they enhanced our lives, and also to look forward to possible innovations of the 21<sup>st</sup> century."

The 320-page book sells for \$45. For more information, contact Zarboni at 416-884-7513 or rzarboni@gmail.com; or Bob Davies at 416-200-8093 or bdrodac@gmail.com.

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## Extrusion industry veteran Jim Ley passes away

Jim Ley, a well-known extrusion industry veteran based out of Southern Ontario, passed away on August 14 at the age of 65.

Ley's involvement in Canada's plastics extrusion sector spanned over 40 years in manufacturing, project engineering, commercial development, and machinery sales. Along the way he worked for such firms as Atlantic Packaging, Leaver Brothers, Sherman Treaters, Leco Plastics, Plastics Machinery Inc., Future Design Inc., Hamilton Avtec,

and Stephen Sales Group.

Since 2011 he was the director of sales for Canada and the western U.S. for Woodbridge, Ont.-based Alpha Marathon Film Extrusion Technologies Inc.

"Spending countless hours with Jim on the floors at trade shows was interesting and informative; his knowledge of people, applications, and processes made every interaction productive," Michael Taylor, Alpha Marathon's director of sales and technical support for the U.S., told *Canadian Plastics*. "His wit and his ability to cut to the chase is what I will miss most about Jim."

CPL

## Canadian plastics pioneer Ralph Noble dies



**R**alph Noble, a pioneering member of Canada's plastics industry who became the first non-American president of the Society of Plastics Engineers (SPE), died

on August 6 at the age of 89.

Noble graduated from the University of Toronto in 1950 with a degree in chemical engineering, and then worked in sales positions for B.F. Goodrich and then CIL, the Canadian subsidiary of Britain's Imperial

Chemical Industries. In 1958, Noble partnered with Wilf Jonah and Creighton Gillis to form Carlew Chemicals, which produced plastics compounds for the packaging and wire and cable industries from its headquarters in Mississauga, Ont. During his time at Carlew, Noble became a pioneer in plasticizers in flexible compounds. Carlew was eventually renamed as Synergistics Industries Ltd., and Noble became its president and CEO in 1983. In 1988, he oversaw the acquisition of Synergistics by material supplier PolyOne Inc.

Noble had a long involvement in the SPE. He was named as the SPE's first president from outside the U.S. in 1970, was awarded the SPE's Businessman of the Year Award in 1991, and was granted a Lifetime Achievement Award by the SPE's Canadian division in 1996. Noble was also active in SPI Canada — the forerunner of the Canadian Plastics Industry Association — where he won the CanPlast Award in 1971 and a Lifetime Achievement Award in 1996.

Capping his career, Noble was inducted into the Plastics Hall of Fame in 2009. **CPL**

## Maguire Canada turns 10

**T**ime flies when you're having fun. Which might be why it feels like just yesterday that plastics auxiliary equipment supplier Maguire Products Canada Inc. was founded — even though the Vaughan, Ont.-based firm actually celebrated 10 years in business in August.

"We officially began operating on August 1, 2007, with a staff of five people," said Maguire Canada general manager Brian Davis. "Our goal was to supply the Canadian market with the entire range of equipment from U.S. equipment makers Maguire Products and Novatec Inc. and provide engineering service."

The impetus for the company came from Aston, Pa.-based Maguire Products. "Maguire Products had previously been represented in Canada by an Ontario sales agency, but they saw an opportunity to better support the Canadian plastics auxiliary market by establishing a subsidiary company," Davis said. "Maguire Products' founder and president Steve Maguire appreciated the importance of the Canadian market, which isn't always true of other American companies."

From the very start, key members of the Maguire Canada staff included industry veterans Davis, Robert Hodge as senior technical sales manager, and Wayne Travell as service manager. The trio were already well-known in Canada's plastics auxiliary equipment sector. "By 2007, we had about 120 years of combined experience between the three of us, much of that relating specifically to resin storage, resin conveying, and resin conditioning," Davis said.

No sooner was Maguire Canada up and running in its 10,000-square-foot service centre and warehouse than it received an added boost from an aggressive advertising campaign funded by Maguire Products. "We definitely

got off to a great start," Davis said. At which point the Great Recession slowed everything down for everyone. It could have spelled an early end for the new company, but didn't. "Our people really shone during the recession," Davis said. "We aggressively went after whatever business we could find, from selling couplings and single lengths of pipe to moving silos. We established and then nurtured good relationships and it paid off: Post-recession, our growth curve has been from 15 to 25 per cent annually."

Davis credits Maguire Canada's success to more than just hard work, however. "We're also very fortunate to represent two well-known and respected auxiliary brands in Maguire Products and Novatec," he said. "We believe we have the number one resin blender in the industry with the WSB gravimetric batch blender, which revolutionized the blending world when it came out in 1989, and it remains one of our primary calling cards. The same is true of the Novatec resin dryers we sell — we can knock on the door of any plastics processor in Canada and they know the Novatec brand name."

Maguire Canada currently has eight employees, which keeps things tight-knit and hands-on, Robert Hodge said. "We have a smaller staff size than some of our competitors, but we have great chemistry between us," he said. "We have two on-staff service technicians, but every member of our staff knows our product portfolio inside out and can handle regular service issues."

And even as the firm celebrates a decade of doing business, Hodge said, it definitely doesn't *feel* like a decade. "We enjoy what we do, which has made the past 10 years seem to go by very fast," he said. "It's been a real privilege to serve our customers for the past 10 years and we look forward to doing so for many more years to come." **CPL**

## Big sales, training courses for Toshiba in Ontario

Japanese injection press maker Toshiba Machine Co. Ltd. has been riding a sales wave in Ontario lately, and the firm's Canadian sales representatives are working hard to keep it going.

Injection Depot, headquartered in Barrie, Ont., and Industrial Solutions, headquartered in Goodwood, Ont., which partner to rep Toshiba nationwide, held two separate four-hour training courses in Markham, Ont. in July, drawing a total of 40 people from 15 different injection molding shops from across the province. "The course dealt primarily with controller training for Toshiba all-electric units, and the instructor was Adam Petersen, who is the technical support manager for Toshiba Machine Co. of America," said Chris Butcher, Injection Depot's sales manager. "Some of the course attendees were dedicated Toshiba customers and others were not; for both groups, the goal of the course was to instruct them on how to maximize the benefits of Toshiba's all-electric machines."

The courses were held at Toshiba Machine Co. of Canada's facility in Markham, and Butcher, his colleagues at Injection Depot, and Industrial Solutions head Spaso Crnjarov invested considerable time and resources into getting the space ready for the attendees. "We brought in an 85 ton and a 250 ton Toshiba all-



At the training course in July.

Photo Credit: Injection Depot

electric machine, and repainted and remodelled the spare parts area to turn it into a demonstration space," Butcher said. "Toshiba supported us completely during the redesign of the area and in putting together this training course."

Injection Depot and Industrial Solutions plan another round of courses six months from now, Butcher said. "In the meantime, we'll follow up these general courses by offering our customers more detailed scientific molding courses from Toshiba technicians and from training solutions providers like Paulson Plastics Academy," he added.

The July training courses came in

the midst of a hot streak for Injection Depot and Industrial Solutions. "We just sold a 2,000 ton all-electric machine in Ontario, which we're very excited about," Butcher said. The two firms have also staged a series of Toshiba machine trials at the Markham facility. "We have held 11 machine trials for some of our customers over the past few months — pitting our Toshiba machines against some of the other injection units they have in their facilities — and have sold 9 other machines as a result," Butcher said. "Given the relatively small size of the Canadian market compared to the U.S., it's an amazing level of success." **CPL**

## Quebec-based PVC compounder Reinier Plastics bought by U.S. firm

In May, Marieville, Que.-based PVC compounder Reinier Plastics Inc. was acquired by Aurora Plastics LLC, a supplier of PVC compounds headquartered in Streetsboro, Ohio, for an undisclosed price.

The acquisition expands the combined company's supply chain and manufacturing footprint, said Aurora Plastics' CEO Darrell Hughes, adding to its ability to quickly and efficiently supply customers with the

products they need. "The combined company operates three PVC compound production facilities in North America: in Marieville, Streetsboro, and Welcome, N.C.," Hughes said.

Founded in 1992, Reinier manufactures PVC compounds and alloys and also offers advanced blending and pelletizing lines. The company received ISO 9001 certification in 2000. **CPL**

## PEOPLE



Marko Koorneef



Peter Hammer



Stefan Kruppa



Oliver Murphy



Kally Peters



Gerry Sposato

## Shred-Tech opening new office in Raleigh, N.C.

Cambridge, Ont.-based shredding and recycling equipment maker Shred-Tech is expanding to a new factory location in Raleigh, N.C. to meet increasing customer demands.

The new 20,000-square-foot facility supports the company's strategic plan to centralize its business in Raleigh while consolidating the existing parts and service business currently based in Apex, N.C.

"This expansion will give us the capacity and resources needed to achieve our growth objectives while improving customer service in the region," the firm said in a statement.

In addition to its Ontario headquarters and its two North Carolina facilities, Shred-Tech also has locations in Bedford, England, and Thailand, as well as distributors in the U.K., Australia, and Japan. **CPL**

## SUPPLIER NEWS

- York, Pa.-based injection molding machine maker **Engel North America** has appointed **Auxiplast Inc.**, headquartered in Ste-Julie, Que., as its sales representative in Quebec, Nova Scotia, and New Brunswick.
- Mold component and hot runner component supplier **PCS Company**, headquartered in Fraser, Mich., is expanding its North American distribution network by adding facilities in Windsor, Ont., and Torrance, Calif. Both facilities are expected to be opened by October 2017.
- Markham, Ont.-based equipment sales firm **Plastics Machinery Inc.** has been appointed as the Canadian sales agent for South Korean injection molding machine maker **LS Mtron**, and also as the Canadian sales agent for **Zerma** size reduction equipment.

- McPherson, Kan.-based extrusion equipment maker **battenfeld-cincinnati USA** has named **Marko Koorneef** as its director of sales, and **Peter Hammer** as vice president of special projects for North America for construction applications.
- Munich, Germany-based processing machinery and automation maker **KraussMaffei Group** has appointed **Stefan Kruppa** as its new head of machine technology.
- Houston, Tex.-based purging compound maker **Neutrex Inc.** has appointed **Oliver Murphy** as its technical director.
- Cambridge, Ont.-based masterbatch supplier **Ampacet Canada** has named **Kally Peters** as its account executive responsible for sales in Ontario.
- Pawcatuck, Conn.-based extrusion equipment maker **Davis-Standard LLC** has named **Gerry Sposato** as senior sales engineer for its sheet and foam group.



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# How to counsel subordinates

By Richard Martin, Alcera Consulting Inc.



A current management fad says that we only truly improve by building on our strengths. It's a trend that started way back in the 1950s, and has become increasingly popular lately due to the writings and speeches of famous motivational speakers like Marcus Buckingham.

Building on strengths is indeed the best way to improve performance and the key to success, whether in business or in life. With that said, however, there are many times when people need help — counselling, if you will — to ensure that they're performing according to expectations and to their full potential.

For many, the term “counselling” has a bit of a bad rap due to its equation to psychiatric therapy. But don't be fooled: Counselling — as in reporting on and critiquing progress — isn't a bad thing, and all leaders and managers should be adept at it. There are two basic paradigmatic approaches, one focused on providing essentially positive feedback and the other on providing essentially negative feedback. Here's how they work.

## GOOD POINTS FIRST

In the first approach — called the “sandwich” — the aim is to provide a subordinate with feedback on his/her performance. This method gets its name from the fact that the corrective feedback is sandwiched between the positive feedback. (I learned this technique as an officer in the Army, and, believe me, it definitely works.) Here's how to do it: When counselling someone, you give them their strong points first. (The military method, usually used on leadership courses, is to give the person at least three positive points — it's important that these be based on observed behaviour and not inferred from motivation or intent.) The advantage of starting with strong points is that the person being counselled almost

immediately drops their guard; they feel appreciated for their strengths.

Only after toting up the person's most salient strengths do you introduce some corrective feedback or, if you prefer, points to improve. A tip: It's usually prudent to frame these as building on the person's strengths. If handled properly, the next step will be a joint discussion on the best means of improving the performance of the person being counselled; you can then get the subordinate to agree to a basic plan of action, with objectives, and how you and the organization will support them.

The final layer of the sandwich is to recap the counselled person's strong points. This closes the loop and provides the individual with additional positive reinforcement. Also, reviewing the plan of action to build on those strengths will provide additional reinforcement and show how both parts of the discussion are tied together. In doing this, it's critical to focus on observable and observed behaviour, and to discuss objectives which can be measured or assessed, whether quantitatively or qualitatively.

## BAD POINTS FIRST

The second approach, used for more difficult counselling, sounds a little like an extreme skiing stunt: the “reverse sandwich”. This involves starting with the “meat” of the discussion and counselling the individual first on his/her weak points or areas needing corrective action. A tip: It's best to focus on only one area that needs improvement, since the person being counselled may take the news hard — in which case, launching into a list of weaknesses will only make them more defensive.

As with the sandwich, it's important to keep criticism to observed behaviour and performance. It may be necessary to look at motivation and intent, but this usually follows in the next

phase of the discussion, which tends to be more diagnostic, focusing on finding the reasons for the person's poor behaviour or performance. In the third phase, enumerate some of the areas where the individual has been performing well, just so they don't feel like a hopeless case. And don't be afraid to involve the individual in the diagnostic; asking the person to explain their performance can unearth some surprising and useful facts. It may be possible that the individual is intentionally malicious; more likely, though, the problem stems from either inadequate qualifications or from miscommunication.

In the final layer of the reverse sandwich, reiterate the original corrective feedback and relate it to the need to improve on the strengths identified earlier. At this point, it's also critical to create a plan of action so the subordinate knows exactly what's expected of them, as well as how you and the organization will help them.

As managers and leaders, you have an obligation to your organization to make sure your employees are performing to their peak potential. Providing corrective feedback is always harder for a supervisor than telling an employee how great he/she is. But if you have to speak critically to an employee, both the “sandwich” and “reverse sandwich” approaches offer you ready-made blueprints for helping them build on their strengths and mitigate their most egregious weaknesses. **GPI**

*Richard Martin is the founder and president of Montreal-based Alcera Consulting Inc. He consults for both public and private sector organizations. He also speaks, teaches, and writes on a variety of topics such as crisis management, leadership, planning, adaptability, resilience, and performance. Visit [www.alcera.ca](http://www.alcera.ca) for more information.*

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If you don't think Canada's automotive sector has a massive stake in the renegotiation of NAFTA, you can go back to sleep. The U.S., Canada, and Mexico are preparing to make decisions that could significantly change the rules underlying the North American vehicle production system and the trajectory of future investment and supplier decisions.

**S**ome topics are just naturally divisive. For 50 years now, for example, ageing hippies have been hashing it out over which was the better band, the Beatles or the Rolling Stones. A slightly more consequential argument centres on the North American Trade Agreement (NAFTA). When it was implemented in 1994, the trilateral treaty ignited fierce passions and rhetoric among millions of proponents and opponents in the U.S., Canada, and Mexico, and the controversy has raged ever since. Most manufacturers and exporters like the pact for eliminating barriers to trade, while organizations like the Canadian union Unifor, which represents 23,500 people in the automotive sector, have always considered the deal to be a job killer that's also responsible for tripling Canada's automotive trade deficit with Mexico. ➡

# A REWORK IN PROGRESS



By Mark Stephen, editor

And NAFTA has never been more front and centre than right now. Changes to NAFTA have been anticipated since the moment of President Trump's election. Trump, who called NAFTA "the worst trade deal in the history" of the U.S., made the threat to rip up the alliance a centrepiece of his campaign; so there was little surprise when the U.S. officially served notice in May 2017 of its intention to renegotiate the agreement, triggering a 90-day consultation window before starting talks late this summer with Canada and Mexico, with potentially huge ramifications for the automotive industry.

The last part of that statement might seem at odds with the written evidence, given that the auto sector is barely mentioned in the published list of U.S. objectives for the renegotiation of NAFTA. But some believe the auto industry is actually at the root of American demands for changes to the NAFTA and will be the key to the success — or failure — of negotiations to revamp the deal. This belief is supported by the fact that 12 of the 14 auto-producing states in the U.S. delivered their electoral college votes to Trump in the 2016 election.

## HOW WE GOT HERE

The auto industry was at the vanguard of the NAFTA integration, which brought Mexico fully into the North American auto production system for the first time. And no one denies that the auto sector has been massively transformed by NAFTA from day one. "Prior to the agreement, NAFTA countries levied tariffs on automobiles and automobile parts," Gina Falaschi, an associate with Washington, D.C.-based law firm Haynes Boone LLP, wrote in a recent policy paper. "For example, Mexico levied tariffs of 20 per cent on automobiles and light trucks, and 10 to 20 per cent auto parts from the U.S. and Canada."

NAFTA eliminated barriers to trade provided that the vehicles and parts met the so-called rules of origin requirements. "Under NAFTA, a certain percentage of the materials within a good must be made within a NAFTA country to qualify," Falaschi wrote. "The required North American content for automobiles, light trucks, engines, and transmissions began at 50 per cent and increased to 62.5 per cent over an eight year period from 1994 to 2002. The required North American content for other vehicles and automotive parts began at 50 per cent and increased to 60 per cent over the same period. In calculating this percentage, NAFTA requires that manufacturers and producers track the regional value content of major automotive components and subassemblies."

In short, NAFTA's tariff elimination changed how the auto industry in North America manufactured its products, with the result that automotive trade has expanded exponentially among the three NAFTA countries. All of which stands to change during the negotiations, where the rules of origin provisions are certain to be an important topic.

## FOLLOW THE RULES?

The rules of origin provide the basis for customs officials to make determinations about which goods are entitled to preferential tariff treatment under NAFTA-wide content requirements. And while the U.S. list of objectives for NAFTA negotiations doesn't mention the auto sector specifically, it does call for stiffer rules of origin — which would have a direct bearing on the auto industry. And it's here that some of the old disagreements about NAFTA become apparent again. Longtime NAFTA critic Unifor, for one, wants to see the rules of origin strengthened for a modern era. "Rules of origin have not kept pace with changes in technology, meaning that major elements of today's vehicles are not adequately captured by the standard," the union wrote in a July 2017 policy paper. "Additionally, the ability to roll-up partial North American content in auto parts to count as fully North American in other auto parts allows vehicles with content far below the required 62.5 per cent to cross borders duty-free. The standard needs to be raised above 70 per cent for both finished vehicles and parts, modernized, and the loopholes closed." The Toronto-based Automotive Parts Manufacturers' Association (APMA) agrees. As APMA president Flavio Volpe explained in a May 2017 *Windsor Star* article, NAFTA's rules of origin don't include many of the components that exist in automobiles today, such as GPS and advanced driver-assistance systems. "Not including those components skews the percentage of components coming from a particular country," Volpe said.

Many of North America's automakers, however, are wary of raising the minimum content requirement, which they claim is already the highest of any trade agreement in the world. "Any changes to the duty-free access and content rules will disrupt the highly integrated supply chains and reduce the massive benefits, undermining the global competitiveness of the integrated automotive industry," Mark Nantais, president of the Canadian Vehicle Manufacturers' Association, told the House of Commons trade committee in May 2017. And at least some government leaders agree. Also in May, Mexican Economy Minister Ildefonso Guajardo warned an audience of auto industry executives in Mexico City that the three NAFTA countries could "shoot ourselves in the foot" if they make drastic rule of origin changes that will drive investment elsewhere.

According to Eric Miller, president of Washington, D.C.-based Rideau Potomac Strategy Group, the "mildest scenario" seems to be that the Trump Administration would significantly raise the level of North American content required for a vehicle to be considered "originating." "At present, the regional value content requirement for light-duty automobiles is 62.5 per cent," Miller said. "If this were to be raised to, say, 75 or 80 per cent, one would expect fewer inputs from Asia and higher component and

finished vehicle costs. This would place pressure on the profit margins of both OEMs and suppliers.”

**CONTENT AND COMPLIANCE**

Another potential issue is the way that regional content is calculated. “The lists that determine whether a good is subject to tracing are likely to be expanded,” Gina Falaschi wrote. “Many parts used in automobiles today, especially

electronic components that were not in existence or widely available when these lists were contemplated, are excluded from the tracing requirement.” Many of these components come from non-NAFTA countries, she continued, but because they are not included in the tracing lists, they are considered “originating.” “These components help the completed part or automobile achieve the requisite originating content threshold,” Falaschi continued. “In renegotiation, these lists will likely be greatly expanded and, as a result, it will be much more difficult for manufacturers to meet the originating content requirements that allow their goods to pass through NAFTA countries duty-free.”

Yet another potential trouble spot is compliance. “The original NAFTA had rigorous tracing rules that were designed to provide visibility to the automotive supply chain,” Eric Miller said. “Many auto companies had hoped these requirements would be relaxed. Given the Trump Administration’s narrative about foreign countries ‘cheating’ on trade, the compliance complexity is only likely to grow.”

Finally, there is the possibility that the U.S. may seek to split NAFTA from a single trilateral agreement into three separate bilateral treaties: U.S.-Canada, U.S.-Mexico, and Canada-Mexico. Some suggest that bilateralism would have the benefit of allowing Canada and Mexico to pursue distinct solutions on particular issues with the U.S. The downside? “If the Trump Administration converts NAFTA into three bilateral agreements, would the rules of origin be entirely separate and unconnected?” Eric Miller asked. “If so, each agreement would have separate value content requirements, raising the risk of necessitating companies to shift production in order to continue to qualify. And a full decoupling of the Canada and Mexico agreements would have profound supply chain implications.”

**NAFTA RENEGOTIATIONS:  
A TIMELINE**

**May 2017** → Formal consultations were well underway in Mexico, and began in the U.S. The Canadian government began meetings with industry and labour groups.

**May 19** → The Trump Administration formally gave notice to U.S. Congress that they will be renegotiating NAFTA.

**June 2017** → Canada began its formal consultations, and the federal government began accepting submissions from Canadians.

**June 27** → The U.S. held a public hearing in Washington, D.C.

**July 17** → The U.S. published a detailed summary of its objectives for the renegotiations.

**Aug. 16** → Official beginning of the renegotiations, marking the end of the 90-day consultation period required by U.S. law.

**Aug. 20** → The three countries concluded their first round of negotiations.

**Fall 2017** → The Mexican presidential primaries will begin.

**Winter 2017-18** → Both the Mexican and U.S. governments have said they want negotiations completed by the first quarter of 2018.

**June 30, 2018** → The current U.S. fast-track law expires. This law is considered crucial for concluding any trade deal with the U.S. Under this legislation, American lawmakers forgo their constitutional right to amend a treaty, and agree to pass or reject it with a simple majority vote.

**July 1, 2018** → Mexico will hold its presidential election.

**Nov. 6, 2018** → The U.S. will hold its midterm elections, with all of the House of Representative seats, one-third of Senate seats, and state-level positions on the line. Governing activity from Washington usually slows down leading up to this period.

**Dec. 1, 2018** → Inauguration Day for Mexico’s new president. If a deal hasn’t been reached under the previous government, NAFTA talks could resume under the new government as of late 2018 or early 2019.

**Oct. 21, 2019** → Canada’s next federal election.

**Ratification** → Once a deal is reached, it must pass a vote in all three parliaments.

**PROCEED WITH CAUTION**

In the end, just about the only thing all sides agree on is that NAFTA is due for an overhaul. “We see this as a great opportunity,” said Flavio Volpe. Automotive parts supplier Magna International Inc. concurs. The Aurora, Ont.-based company — which employs 74,000 workers in Canada, the U.S., and Mexico — supports updating the treaty, but suggests that the negotiators proceed with caution. “A change to one element could have a cascading effect that may result in unintended consequences,” Magna CEO Don Walker wrote in the company’s recent submission to the federal government. Which means the negotiators will have to resist the urge to race to finalize a deal before political obstacles — like Mexico’s upcoming presidential campaign — start popping up, causing potential delays.

With millions of North American jobs on the line, both inside and outside the auto industry, the consequences of the NAFTA renegotiation will be — as Trump is wont to say — “yuge”. Compared to which the Beatles/Stones rivalry doesn’t add up to a proverbial hill of beans.

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# MATERIAL ADVANCES

Now more than ever, resins are helping packages stay secure and intact throughout the distribution chain. Here's a look at some of the latest polymers on offer.

By Mark Stephen, editor

It's amazing the difference you can get by changing what's inside something. We all know, for example, how Peter Parker benefitted from some radioactive spider venom in his bloodstream. If you're looking for a more consumer-friendly — and real-world — equivalent, consider what happens when you beef up the caliber of resin going into a plastic application. Plastic packaging is a natural candidate, since plastic is custom-made for packaging in the first place. Just two lbs of plastic can deliver 10 gallons of a beverage; you'd need three lbs of aluminum, eight lbs of steel, or over 40 lbs of glass to bring home the same amount. And now more than ever polymer packaging resins are helping packages stay secure and intact throughout the distribution chain. Here's a look at some of the latest materials and applications on offer.

## FOAM IT IN

German chemical producer **BASF** is expanding its range of high-performance foam products with its Ecovio EA particle foam material, said to be the first expandable, closed-cell foam material that's also bio-based and certified compostable. The material consists of the biodegradable BASF polymer Ecoflex and polylactic acid (PLA), which is derived from corn or other sugar-generating plants like manioc. "The main areas of use for Ecovio are plastic films such as organic waste bags, dual-use bags (first for shopping, then for organic waste) or agricultural films," BASF said. "Furthermore, compostable packaging solutions such as paper-coating, shrink films, foam packaging, and injec-

tion molding products can be produced with Ecovio." The particle foam's properties are said to make it particularly well-suited for transport packaging for high-value or delicate goods where a high level of impact resistance and robustness is vital. "The product properties — similar to those of EPS — boast exceptional energy absorption and very good resilience even when subjected to multiple impact loads," BASF said. "The high bio-based content and the certified compostability make Ecovio EA particularly



Photo Credit: BASF

BASF's Ecovio EA is said to be the first expandable, closed-cell foam material which is bio-based and certified compostable, and is designed for transport packaging for high-value or delicate goods where a high level of impact resistance and robustness is vital.

attractive wherever a fossil packaging solution no longer meets customers' requirements for a bio-based and biodegradable transport solution." The particle foam is available in brown, and is delivered to customers in an octabin where it can be stored in appropriate storage facilities for at least six months without any decline in quality. "Compared to EPS, Ecovio EA has lower rigidity, and when it comes to its energy absorbing capacity it falls between EPS and EPP," BASF said. "These properties also make this material perfect for use in the electrical and electronics, in particular for heavy and delicate packaged goods such as washing machines or televisions, which need to remain unscathed right along the transport chain even if they are subjected to multiple, heavy impacts." BASF plans to offer Ecovio EA with approval for use with food in the near future.

**Braskem** has developed high-melt-strength polypropylene (PP) that can be used to produce high-performance foams for specialty packaging applications. Called HMS-PP, the material takes advantage of PP's inherent chemical resistance and high service temperatures, thereby becoming a particularly good choice for extruding foams via direct-injection processes, processes using chemical foaming agents, and other specialty foam processes. In some pro-

cesses, foam densities as low as 40 kg/m<sup>3</sup> with high stiffness have been achieved, Braskem said. "In other applications, foams with extraordinarily high-closed cell content and surface quality have been demonstrated," said Alexandre Elias, vice president of PP for Braskem America. "Low density foams made with Braskem's HMS-PP offer superior recyclability, making it an ideal replacement in foam applications currently dominated by cross-linked PE, PVC, and PUR." The materials offers a more sustainable solution and an alternative to some less environmentally-friendly foam products, Elias said. Braskem also sees its HMS-PP material as having possibilities in many solid compounded or deep-draw thermoforming applications where melt strength can expand the window of PP process performance. "Our new HMS-PP offers a unique balance of foam process performance and mechanical properties, including very high stiffness and heat resistance," Elias said. To support the development and demonstration of HMS-PP technology, Braskem has installed a pilot-scale engineered foam line at its Innovation and Technology Center in Pittsburgh, Pa.

### A LEAP FORWARD FOR POLYETHYLENE

In July, **Dow Specialty Plastics** introduced tenter frame

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## packaging

biaxially oriented polyethylene (TF-BOPE), an addition to its Innate Precision Packaging resin line. Compared to the traditional PE film, Dow said, TF-BOPE film has higher mechanical properties and material rigidity and better optical and printing performance. “TF-BOPE can achieve up to 80 per cent less haze, twice the impact strength, twice the tensile modulus, three times the puncture resistance, and three times the tensile strength,” said Wu Chang, Dow Packaging’s Asia Pacific director for technical services and development. “TF-BOPE material has excellent flex cracking resistance, which sustains great tenacity even under low temperature. All of these qualities represent a big leap from the performance of more traditional PE products.” The new material has superior mechanical properties which can reduce film thickness by replacing biaxially oriented polyamide (BOPA) and other polymers in abuse layers for packaging, Chang continued. “With the excellent optical performance and print ability, the TF-BOPE film can be used directly as the printed layer of the packaging,” Chang said. “By combining it with other PE functional layers, TF-BOPE can make the packaging more convenient for recycling and increase the sustainability quotient.” The TF-BOPE film is also easy to tear, Chang added, which is an important requirement for

Nova Chemicals says it has developed an easily recyclable, oxygen barrier film structure design.

packaging products. Dow’s goal is to have TF-BOPE film replace BOPA as the interlayers of packaging applications, reducing the packaging material used and strengthening the mechanical performance of packaging bags. Dow is also cooperating with other market players to promote the use of TF-BOPE film for rice bags, pet food bags, heavy bags, and other packaging requirements.

### FROSTED AND FUNCTIONAL

**DuPont Performance Materials** recently introduced an innovative use of its Surlyn ionomer resins to attain a one-step frosted effect for cosmetics caps, bottles, and jars — an effect achieved straight from the mold to enable fine



Photo Credit: Nova Chemicals Corporation



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details, superior tactile quality, and consistency without a need for a secondary process. “The unique properties of Surlyn enable it to copy fine, intricate details of a mold to achieve a high-gloss design with an entirely, or partially, frosted appearance,” said Jennifer Li, DuPont’s marketing leader for industrial and consumer products. “By applying this frosted effect in the mold, Surlyn offers increased production efficiency and lower cost for manufacturers.” Surlyn achieves the transparency of glass without the fragility, Li continued, and also can be faceted or finished to obtain special effects, or coloured to create translucency. “Surlyn allows the use of many different decorative techniques for cosmetics, including metallization, hot stamping, and lacquering,” Li said. “Some unique effects that can be created with Surlyn are marbling, bubbling, glittering, and suspended animations. Its warm and silky touch is coupled with functional benefits such as toughness, superior impact resistance, abrasion resistance, and excellent chemical resistance.”

**Nova Chemicals Corporation** has developed a flexible film structure that provides an oxygen barrier and yet can still be easily recycled. According to Nova, the new film structure could replace other structures that provide oxygen barrier in packaging meat, cheese, nuts, and a host of other foods. Nova claims that films with the new structure can be recycled with other high-density polyethylene (HDPE) films such as those used for retail bags. Both base recipes are certified to carry the “In store drop-off” package label from “How2Recycle”, which is a rapidly growing program that helps consumers understand end-of-life recycling options. In addition, the designs are compatible with the #2 HDPE recycling stream. The new structure design can be used in a wide variety of package formats, Nova said, including stand-up pouches, pillow pouches, and flow wrappers. In addition, packages can be customized for single-serve or multi-use through addition of zippers or fitments. “Customers can work with Nova’s experts at our Centre for Performance Applications in Calgary to collaborate on film structures for their specific applications,” Nova said. “The Centre recently completed installation of its new Effytec horizontal form fill seal pouch maker, which will allow creation of prototype packages that can then be tested on-site.”

In the end, it all sounds a lot more useful than spinning fake spider webs and swinging around Manhattan in red-and-blue tights.

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#### RESOURCE LIST

**BASF Canada** (Mississauga, Ont.); [www.basf.ca](http://www.basf.ca); 866-485-2273

**Braskem America** (Philadelphia, Pa.); [www.braskem.com](http://www.braskem.com); 215-841-3100

**Dow Packaging & Specialty Plastics** (Midland, Mich.); [www.dow.com/performanceplastics](http://www.dow.com/performanceplastics); 989-636-1000

**DuPont Performance Materials/DuPont Canada** (Mississauga, Ont.); [www.dupont.com](http://www.dupont.com); 905-816-3059

**Nova Chemicals Corporation** (Calgary, Alta.); [www.novachemicals.com](http://www.novachemicals.com); 403-750-3600




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# PLAYS WELL WITH OTHERS

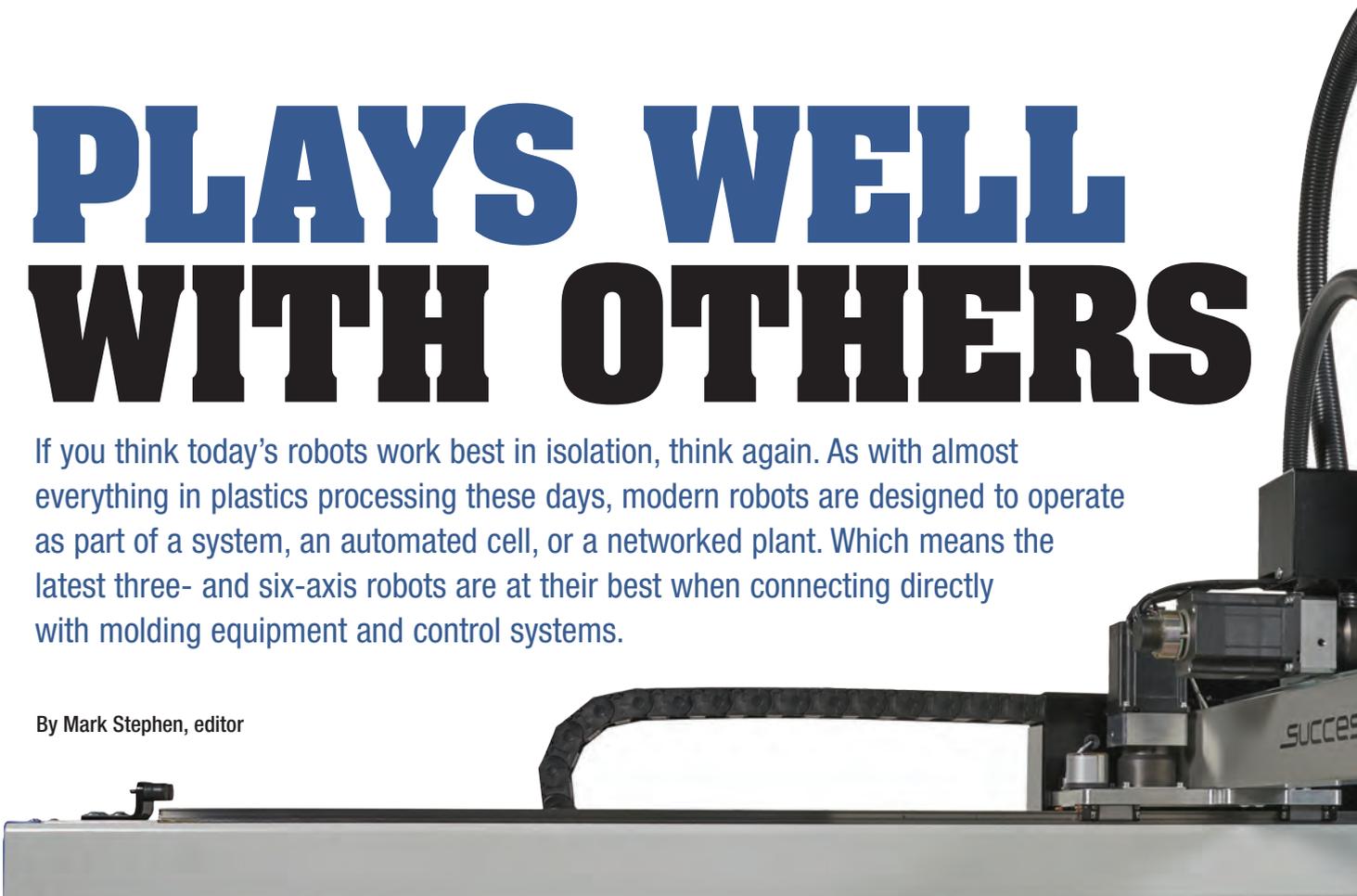
If you think today's robots work best in isolation, think again. As with almost everything in plastics processing these days, modern robots are designed to operate as part of a system, an automated cell, or a networked plant. Which means the latest three- and six-axis robots are at their best when connecting directly with molding equipment and control systems.

By Mark Stephen, editor

There's a good reason why solitary confinement is considered the worst of all punishments: Generally speaking, people — and other intelligent organisms — suffer in isolation. So why shouldn't the same be true of intelligent machinery? Take industrial robots. The days of robots labouring on their own, separated from other production equipment, are becoming as dead as disco, as manufacturers discover the advantages of making them part of a system, an automated cell, or a networked plant. Some of the newest robotic technologies for plastics processing are cases in point.

## STACKS OF INNOVATION

ABB Robotics recently made the SafeMove2 monitoring and control software available for its IRB 1200 six-axis industrial robot, making it the smallest ABB robot to feature the program. SafeMove2 is designed to enable people to work safely alongside ABB robots with payloads ranging from 6 to 800 kg without compromising productivity. It also provides an optimum level of collaboration and flexibility to higher speed and throughput applications which typically require more insular, intrusive levels of safety.



The Success 5, the newest and smallest in Sepro Group's range of general-purpose Cartesian robots for injection molding.

"SafeMove2 allows robots and operators to work more collaboratively and closer together by restricting robot motion to precisely what is needed for a specific application," said Hui Zhang, head of product management at ABB Robotics. "Additionally, SafeMove2 simplifies production scenarios and provides tools that speed the commissioning workflow for faster set-up and validation." The software option also integrates safety fieldbus connectivity into ABB's IRC5 robot controller family, as well as the IRC5 Single, Compact, and Paint controllers. First introduced in 2014, the IRB 1200 comes in two variants for a wide range of applications: the 700 mm reach variant can handle payloads of up to 7 kg, and the longer reach 900 mm variant for payloads up to 5 kg.

New stacking robots from Italy's Amut-Comi SpA are available in two models, each designed to be used with the company's ACF line of thermoforming machines. The first, the ER2X, consists of a vertical axis to pick up and discharge formed parts and a horizontal axis to take the parts from the picking station to the stacking unit. The second, the ER3X, is furnished with a third axis that can rotate from 0° to 180°, allowing it to turn parts for A-B

stacking or other purposes. The units are controlled by Amut-Comi's Easy software, which is designed to harmonize the robot with the thermoforming machine. The robots operate at speeds of up to 40 cycles per minute. "A specific page has been added to the machine control panel to give operators flexibility in setting all the cycle parameters of the robot," the company said. According to Amut-Comi, the interface is user-friendly and intuitive.

**Engel Austria** recently expanded its robot line. One new entry is an addition to the Easix line, which currently consists of six-axis articulated-arm robots; while for pick-and-place, stacking, and palletizing applications, a new four-axis SCARA version offers much higher speed at lower cost. Based on Staubli technology,

the SCARA robots can be fully integrated into the CC300 injection machine controller, Engel said. The second entry is a new servo sprue picker based on the technology of the E-pic pick-and-place model introduced at Fakuma 2014 and shown at NPE2015, but with one fewer axis.

"For maximum speed, compactness, and energy efficiency, the new picker combines a linear vertical axis with a vertical swivel arm," Engel said. "Unlike the earlier E-pic, it has no horizontal linear axis; instead it can rotate up to 110° on its pedestal." And also like the E-pic, the swivel arm is made of lightweight composite. The new picker can handle payloads up to 2.2 lbs, the company said, and is designed for presses of 60 to 220 metric tons. It uses the same R16 control as the E-pic, or can be integrated into the CC300 machine control. The standard control interface is compatible with any injection molding machine on the market, Engel said.

## A MATTER OF CONTROL

The new R-30iB Plus robot controller from **Fanuc** features an iPendant with an enhanced screen resolution and processing capability. The user interface, iHMI, has an icon-based screen which is designed to provide a familiar and

easy-to-use experience with intuitive guides for setup and programming. It also includes tutorials from the main homepage which has a design common to Fanuc CNCs, enabling easier use of three- and six-axis robots. Processing performance for both hardware and software has been improved in the R-30iB Plus, Fanuc said, and the signal processing cycle has been shortened. "Compared to past controllers, signal output timing has been enhanced, expanding possible applications to systems which require a high level of positioning precision, such as laser applications," the company continued. The vision function of R-30iB Plus has a new camera interface which increases four times the speed for transmitting images from the camera, together with a simplified cable configuration. "With improvements in the user interface, the setup of the vision system can be handled much more efficiently," Fanuc said.

A smaller range of compact, servo-driven linear robots has been added to the LRX line from **KraussMaffei Automation**. The new LRX 50, 100, and 150 have payload capacities of 5, 10, and 15 kg (11, 22, and 33 lbs) respectively, and are suited to injection presses of 35 to 650 metric tons. They compliment the LRX 250, 500, and 1000 models that carry 25 to 100 kg (55 to 220 lbs). "The new models have rack-and-pinion drives instead of toothed belts, providing a high level of speed and precision," KraussMaffei said. Air/vacuum lines and electronics are protected on the Y-axis by quick-change covers, the firm continued, and a central air/vacuum portal facilitates fast gripper changing. The new axis design is said to ensure free access to the machine hopper and barrel. "Fully integrated into the MC6 press controls, a new digital vacuum monitoring system with integrated air-saving function can reduce compressed air requirements by up to 90 per cent," KraussMaffei said. "Also, leakage monitoring detects malfunctions that require maintenance." Finally, the servo-driven wrist axes were redesigned for minimal opening stroke and greater load capacity; their smaller drives reduce both weight and energy consumption, the company said.

**Kuka Robotics** has introduced a new focus on "solutions rather than components" with a series of custom package concepts at various levels of integration. These "Ready2" solutions can include preconfigured software and hardware for specific functions or complete turnkey cells. Kuka works with partners such as robot integrator FPT Robotik GmbH in Germany. Among other things, FPT can program a Kuka robot with a Fanuc-style operator screen for users who are already familiar with Fanuc equipment and software. The Ready2 packages include "Ready2 grip", a pre-configured gripper package based on the KR AGILUS; "Ready2 spray", for painting tasks; "Ready2 powerlink", for integrating Kuka robots into third-party controller systems; and "Ready2 pilot", a package for the easy control of a robot with no training requirements.



Photo Credit: Sepro Group

### ALL THE RIGHT MOVES

The Success 5, the newest and smallest in **Sepro Group's** range of general-purpose Cartesian robots for injection molding, is designed to deliver precise, three-axis servo performance in simple pick-and-place and stacking applications. First announced in late 2016, the Success 5 is now available to equip injection molding machines up to 80 tons. The device is equipped with a standard R1 pneumatic (0° to 90°) rotation, but offers an optional R3 rotation (0° to 90° or 0° to 180°). "The standard Success 5 can be configured with horizontal strokes of 1,000 or 1,500 mm, a 400 mm demolding stroke, a 1,000 mm vertical stroke, and a 3 kg maximum payload," said Jim Healy, vice president of sales and marketing at Sepro America. Other standard features, normally available only on more expensive robots, include simultaneous motion on all three axes; a "Y-free" function that makes it easier to program ejection tracking and saves on gripper costs because of its simple design; multiple vacuum and pressure circuits that allow degating, selective part placement, and other functions; and quick disconnects for fast end-of-arm tooling changeovers. Standard equipment for the Success 5 also includes Sepro's Touch 2 control, which features a touchscreen and simple, icon-driven instructions that



Photo Credit: Wittmann Battenfeld

Wittmann Battenfeld's servo B-C-axis (above) and servo C-axis (opposite page) wrist axes.

allow even inexperienced operators to create basic pick-and-place robot cycles. "The Success 5 comes standard with the Touch 2 control, but can be upgraded to Sepro's Visual 2 controller, which gives the processor the ability to tie into the downstream automation," Healy said.

**Staubli's** new TX2 line of collaborative robots are six-axis machines designed to operate in high-volume manufacturing, Industry 4.0 applications, and man-robot collaboration under all production conditions. The new TX2 line is offered in six model series — TX2-40, TX2-60, TX2-60L, TX2-90, TX2-90L, and TX2-90XL — and is capable of handling loads between 2 to 15 kg, with a reach between 515 and 1,450 mm. They also have a separate safe digital encoder for each axis, and an integrated safety board. All safety features comply with the stringent requirements of the highest safety category, SIL3/PLe. Every movement of the robot is monitored by sensors, Staubli said, and all the coordinates of the robot, as well as its speed and acceleration, are recorded in real-time. "The TX2 series also feature configurable, safe input/output modules, and real-time Ethernet field-bus systems," Staubli said. "They are also IP65 and IP67-certified, which allow them to be used in clean-room and hygiene conditions."

Cartesian servo robots for injection presses of between 150 and 400 tons have received several upgrades from **Wittmann Battenfeld** to allow them to operate more smoothly as part of a system. W821 and W831 robots now carry payloads from 10 to 15 kg (22 to 33 lbs) and handle demolding strokes up to 800 mm (31.2 inches). In addition, Wittmann has completely overhauled the optional servo wrist axes for these models. (A pneumatic swivel axis is standard.) "The updated servo rotational C-axis does not affect the payload capacity," Wittmann

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said. “The servo rotational B-axis (rotating the gripper around the vertical axis) does reduce the payload to 10 kg.” These features offer the user a choice of a servo B-C-axis or a servo B-axis combined with a pneumatic C-axis.

According to Wittmann, a special feature of the new wrist axes is that they do not change the acceleration/deceleration profile of the robot axes, while other robots reportedly require adjustment of the movement profiles to accommodate supplementary equipment.

So if you still think robots belong in solitary confinement, it's about time you liberate yourself to a new era of automated opportunities. **CPL**

**RESOURCE LIST**

- ABB Inc.** (Brampton, Ont.); [www.abb.ca](http://www.abb.ca); 905-460-3000
- Amut-Comi SpA/Amut North America** (Vaughan, Ont.); [www.amutgroup.com/northamerica](http://www.amutgroup.com/northamerica); 905-761-9400
- Engel Canada** (Waterloo, Ont.); [www.engelglobal.com/na](http://www.engelglobal.com/na); 519-725-8488
- Fanuc Canada Ltd.** (Mississauga, Ont.); [www.fanucrobotics.com](http://www.fanucrobotics.com); 905-812-2300
- KraussMaffei Corporation** (Florence, Ky.); [www.kraussmaffei.com](http://www.kraussmaffei.com); 859-283-0200
- Kuka Robotics Canada Ltd.** (Malton, Ont.); [www.kuka-robotics.com/canada](http://www.kuka-robotics.com/canada); 905-670-8600
- Sepro Canada** (Montreal); [www.sepro-group.ca](http://www.sepro-group.ca); 514-515-9349
- Staubli Corporation** (Duncan, S.C.); [www.staubli.com](http://www.staubli.com); 864-486-5421
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# 5 WAYS TO MAXIMIZE PERFORMANCE

Hot runners help injection molders deliver parts of uniform density, and free from all runners, flash, and gate stubs. But they can seem more complicated than the NAFTA renegotiation. Here's how to overcome some of the most common problems.

By Mark Stephen, editor

**H**ot runners are a classic double-edged sword. They can provide an array of benefits, including reduced material use, faster cycles, and allowing the mold to open and close the valve gates independently for optimal cavity filling and locating of weld lines. But they also add complexity to the mold and are prone to a ton of challenges in terms of maximizing their performance. Add to that the fact that they have a lot of moving parts — systems usually include a heated manifold, a number of heated nozzles, and a temperature control system — and it's no surprise that more than a few processors struggle with their hot runners. That's why we asked some of the experts for tips on solving some common problems.

## 1 MAINTAIN A FLAT THERMAL PROFILE

In some hot runner systems, it can be difficult to keep temperatures uniform in the nozzles and tips, since these are areas where evenly distributed heat is needed to prevent flow-channel hot spots.

“With many hot runner systems, and with certain resins, you may need to lower the temperature of the material right at the gate to prevent drooling, stringing, or other part quality issues,” a technical paper by DME Company said. “Sometimes, the cause is related to a less-than-optimal match between standard heaters and the nozzles and other components of the system. Special heaters — particularly flexible heaters — that are designed specifically for compatibility with a given system will achieve better distribution of heat.” On the heater head, a material that reduces the

heat thermal transfer between components, such as titanium, will also help prevent heat dissipation. “Titanium is beneficial for the same reason in the nozzles and tips,” DME said.

Sometimes, the cause is related to start-up. “Too often, processors start with a non-flat hot runner temperature profile,” said Bill Rousseau, director of applications and technical services with Synventive Molding Solutions. “The goal is to treat the hot runner as an extension of the machine nozzle: Whatever the expected melt temperature is is what the hot runner temperature should be. The starting point should be flat, and adjustments should only be made if necessary. Too many times processors carry over working conditions from one job to another tool.”

## 2 MINIMIZE RESIN LEAKAGE

In some cases, the root cause of material leaks is a process temperature that exceeds the levels for which a hot runner system was designed. “When excessive thermal expansion exerts pressure on the system, components can shift position, leaving room for a leak,” DME said. “In this case, use of compression nozzles versus threaded nozzles can be an advantage because they leave





Photo Credit: Ewikon Molding Technologies

room for absorption of the expansion without placing stress on the components. This helps avoid leaks and lessen the risks of component failure over time.”

It’s also possible that the problem is rooted in the hot runner design. “Hot runner nozzles that screw into the manifold can be less prone to leak because the hot runner is a one-piece assembly that drops into the mold,” Bill Rousseau said.

Whatever the cause, detecting a hidden hot runner leak in the early stages can save substantial downtime and repair costs.

### 3 | PREVENT DROOLING

When a mold opens, resin can “drool” out due to pressure in the system. The result is lost material, which can be costly over time. “A common cause of drooling is when the mold opens prior to complete gate solidification,” DME said.

Drooling can also occur when a processor switches from molding with a cold runner to molding with a hot runner. “With a cold runner, the machine nozzle has to disengage on every cycle from the mold and the cold runner is pulled away, and to prevent drool at the machine nozzle interface the processor will use a machine nozzle with a small orifice,” said Neil Dewar, technical director with Mold-Masters Ltd./Milacron. “If the processor proceeds to run that with a hot runner system without changing the tip in the machine nozzle to a larger nozzle orifice size, the pressure inside the hot runner system will not be relieved within an adequate cycle time. Therefore, when the mold opens, the gate drools. It’s one of the most common problems we encounter.”

In the case of unused material drooling out of a hot nozzle tip, decompression of the injection cylinder may be necessary. “This involves decreasing the pressure on the screw, which creates a vacuum that sucks any unused material back out of the nozzle until the next cycle,” DME said. An important caveat: Too much backpressure can cause air pockets to form.

But it may be a mistake to blame your hot runner for material drool, the experts say. “It might be the case that the

molding machine isn’t set to the material manufacturer’s recommended temperatures, causing the resin to overheat,” DME said. In addition to keeping your system at proper temperatures, maintaining a flat thermal profile, as discussed at the beginning, is key to avoiding this issue.

### 4 | DON’T BURN

Hot runners add an additional layer of complexity to the tool and increased residence time for the molten plastic, which can lead to material burning in the hot runner system. For whatever reason, burning is one of the most misdiagnosed hot runner problems, the experts say, which means that a little extra time spent up front to understand the issue can lead to a quick solution. “Degradation of material in a hot runner system is typically caused by excessive thermal history, hot spots, stagnation points, venting, or a combination of the four,” said Bill Rousseau.

First, understand the complete heat history of the material being molded. “Many polymers are time/temperature sensitive, which means they can only withstand elevated temperatures for a limited amount of time,” Rousseau said. “The higher the temperature, the less time until degradation begins. However, even time spent at lower temperatures adds to the heat history of the material and can contribute to degradation down the road.”

Second, an obvious cause of burns in a hot runner system is any area of the hot runner with a steel temperature over setpoint. “Any hot runner zones overshooting the temperature control setpoint are obviously a potential issue,” Rousseau said. “But just because the temperature controller shows all the zones to be at setpoint doesn’t mean they really are. The only way to be sure is to remove the top clamp plate and check the hot runner steel with a pyrometer while the system is at setpoint.”

Stagnation points are spots in the hot runner where material becomes trapped, rather than flowing through. “The most common stagnation point is at the interface between the machine nozzle and hot runner inlet,” Rousseau said. “The inlet commonly has an orifice smaller than the inlet flow bore, to reduce the amount of material that drools out of the inlet when the hot runner is heated and the machine nozzle is pulled away from the inlet. The molder should size the orifice of the machine nozzle to match that of the hot runner inlet.”

Finally, venting issues occur when air becomes trapped at the delayed hot runner gates. The result is a burn that looks as though it’s coming from the hot runner gate, but is actually a gas trap at the hot runner nozzle tip. “A simple test when dealing with a burn at a hot runner gate on a sequentially-filled part is to take a shot with all the gates opening at the same time to see if the burn goes away,” Rousseau said. “If the burn immediately goes away, then you can be sure it is a venting issue and then focus on adjusting the sequence instead of treating the problem as a burn coming from the hot runner.”

## 5 | START YOUR SYSTEM PROPERLY

As noted above, a poor startup can result in a non-flat thermal profile. But that might be just the beginning of your problems. Many hot runner systems are damaged when injection pressure is allowed to go to the maximum the machine is capable of, trying to push unmelted plastic through the hot runner. Having a mold startup procedure in place, and sticking to it, can save costly downtime due to problems that can arise when trying to start the system prematurely, the experts say.

And that procedure is a lot easier to follow by using a specialized startup program. "Some of the more complex hot runners require a system for heating up the components so that certain expansions happen before others," said Neil Dewar. "For these difficult systems, we have user-friendly programs available with our temperature controllers that will sequence the startup properly."

Another potential startup problem involves sensitive nozzle tips. "In a new system, nozzle tips are among the smallest and most vulnerable components when subjected to injection pressure," said Yoven Noyadoo, president of Stec Industrial Solutions Inc. "For this reason, backfilling the system with plastic before the first cycle is a good idea,

since the surrounding plastic will reinforce the tips and help protect them from fracturing."

And it might be the case that material sticks to a mold at the beginning of the day, which is usually caused by material having been left in the hot runner system after shut-down the night before. This oversight can be particularly problematic when working with heat-sensitive material such as nylon. "To fix this problem, heat the nozzles up to compensate for loss of heat soak and then reduce the temperature back to normal process temperature after a few minutes to avoid overheating the material," DME said.

As we stated at the beginning, hot runners are a double-edged sword. Follow these tips and you might not fall on it.

CPL

### RESOURCE LIST

**DME of Canada Ltd.** (Mississauga, Ont.);  
www.dme.net; 905-677-6370

**Mold-Masters Ltd./Milacron** (Georgetown, Ont.);  
www.milacron.com/mold-masters; 905-877-0185

**Stec Industrial Solutions Inc.** (Windsor, Ont.);  
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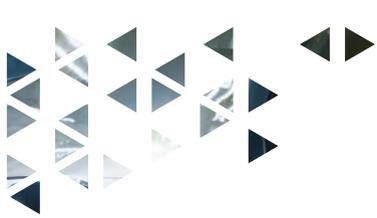


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# REVERE PLASTICS SYSTEMS IS REBORN IN BRAMPTON

The Brampton, Ontario plant of this U.S.-based injection molding firm has just embarked on an ambitious four-year growth plan. And it has the strategy and the resources to make it happen.

By Mark Stephen, editor



Doug Drummond (left) and Gus Shaar checking finished parts.

## HOLDING PATTERN

Revere Plastics should probably be better known than it is. With estimated sales of US\$215 million, Revere Plastics has four plants — in Clyde; Poplar Bluff, Mo.; Jeffersonville, Ind.; and Brampton — and 275 presses, ranging from 25 to 1,880 tons. Adept in a wide variety of molding processes — including stack, two-shot, and overmolding, as well as a long list of secondary operations — the firm employs about 1,000 workers in total, and has customers in appliances, automotive, housewares, outdoor power equipment, medical, and electronics. “We’ve always been a major player in injection molding, particularly in appliances — our plant in Clyde is just down the street from a major Whirlpool plant, for example,” said Doug Drummond, Revere Plastics’ director of business development and marketing. “Whirlpool and General Electric are our biggest appliance customers, and we also have big customers in the outdoor power equipment sector.”

But as happens sometimes, the firm fell into a rut over time. Founded in 2005 as the plastics division of Revere Industries LLC, an Indianapolis, Ind.-based company that also had metal operations, Revere Plastics was taken over in 2009 by Tennenbaum Capital Partners LLC, an investment firm

A famous ad jingle claimed that “Good things grow in Ontario.” Revere Plastics Systems LLC is hoping to steal some of that karma by growing the business at its manufacturing plant in the Southern Ontario city of Brampton.

Known primarily for making products for the appliance sector, the Clyde, Ohio-based injection molder is in the

midst of a major push into other end markets as part of an ambitious strategy to double its revenue over the next four years. The diversification plan — which also includes investing in more large tonnage injection molding machines, automation, and other technology — has already been enacted at Revere Plastics’ three plants in the U.S., and the Brampton facility is next in line.

headquartered in Santa Monica, Calif. “Sales remained consistent under the new owner, but the company lacked unity and an overall focus, with the four plants operating almost independently of each other,” Drummond said. “We definitely weren’t maximizing our synergies.” And it didn’t help that the appliance market was changing rapidly. “For years now, offshore companies like Samsung and LG have been taking a bigger and bigger share of the North American market,” Drummond said.

### RISE UP

In 2013, Tennenbaum Capital finally started making changes, including fresh capital investment and a push to diversify the customer base. “Our plant in Jeffersonville, in particular, had too much open capacity and required serious attention, and that was the new management’s focus for the first three

years; I was recruited from an automotive supplier company during this time to help oversee that project,” Drummond said. “The Brampton plant was profitable and had a few key customers that it kept happy, but it was basically in a holding pattern from a business development perspective until we turned our attention to it last year.”

In one of Revere Plastics’ main initiatives for 2017, the 60,000-square-foot Brampton plant has been targeted for aggressive business growth and an internal overhaul. A first step was to bring in a new general manager, Gus Shaar. “We also hired a new salesman with the specific goal of growing the sales in the Southern Ontario region,” Drummond said.

One of Shaar’s first jobs, in turn, was to implement a lean manufacturing program, beginning with a redesign of the Brampton plant’s shop floor. “We

began by cleaning up the aisles; empty skids used to be all over the floor, and we’ve now stacked them neatly in designated areas,” Shaar said. “We also painted coloured lines and symbols on the floors to indicate aisles, work areas, and storage areas: blue lines indicate raw material storage, white is where the employees work, yellow designates safe areas where forklifts cannot cross, and green indicates areas for finished goods. It’s all part of creating a strict lean manufacturing process that allows us to work faster and smarter, not harder, and we’ve improved our productivity by six per cent as a result.”

The look of the shop floor has changed in other ways, too. “We purchased several new injection molding machines in the last 12 months, giving us a total of 42 presses in Brampton, with 600 as our largest tonnage,” Drummond said. “We have the ability

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to produce not just a plastic part, but a complete assembly, which is why over 80 per cent of our overall sales as a company involves us adding value to a product, for example through welding — we can do six different types of welding — or decorating,” Drummond said. “This is the kind of new business we want, as opposed to simply molding a part. If we can grow the amount of complex, value-added products we manufacture, our sales in Brampton will increase while also bringing more value to our customers.”

**REACHING OUT**

The company’s plan to double its revenue over the next four years is as carefully crafted as its shop floor make-over. “The three major industries we are focusing on are automotive, appliance, and outdoor power equipment,” Drummond said. “We’ve done our

research and know who to call on in Southern Ontario to build new relationships; and we’ve also joined industry associations such as the Automotive Parts Manufacturers’ Association and the Outdoor Power Equipment Institute, which will help raise our profile and put us in touch with an even wider range of potential new customers.”

The message that Revere Plastics is trying to put out, Drummond continued, is that the company’s technologies help separate it from its competitors. “We have more to offer than just a price for a part — we can supply a complete assembly,” he said. “We have expertise in design optimization, tooling, screw types, and automation.



Above and opposite page: Scenes from the Revere Plastics shop floor.

In addition, we have low overhead, meaning we can provide cost advantages for our customers. And we’re very good at problem solving.”

Another strength, Drummond added, is that the Brampton plant can

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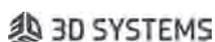
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ment in from the other plants if necessary. We have complete buy-in from management: If we find the right customers and the right opportunities, the company will back us up all the way.”

The results of the company’s push into new markets are already beginning to show. “We implemented the growth strategy in Brampton one year ago, and we are already seeing a rise in RFQ packages from customers, and are getting more and more customers that want to tour

it comes to hiring skilled workers. “We’ve automated wherever possible to make our workers’ jobs easier and to free them to do more cognitive work,” Gus Shaar said. “But there are some jobs we can’t automate: We’re always on the lookout for new setup workers, for example, and are in touch with local universities and technical colleges to find students that we can bring into our team and provide additional training for. We invest a lot of money in training.”

In the end, there are worse problems to have than needing new workers to keep up with new business. “Revere Plastics has been around for a while, but we’re not the same company we were a few years ago,” Drummond said. “We have an ambitious growth plan, and the resources to achieve it.”

It’s one more good thing that’s growing in Ontario.

CPL

tap into resources from Revere Plastics’ three U.S. facilities. “Revere Plastics has over 30 engineers across its plants in Clyde, Poplar Bluff, and Jeffersonville, and their expertise is available to us,” he said. “We can even bring equip-

our facility,” Drummond said. “These are the things that lead to more sales.”

Perhaps the only fly in the ointment is that, like many plastics processors in an expansion mode, Revere Plastics’ Brampton plant faces challenges when

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The control display supports 16 languages, making it possible for users to select whichever language they prefer for programming, operation, data collection, and reporting, or to see help information from the control. The language can be easily changed at any time, even from minute-to-minute as different employees interact with the system.

**Conair Group (Cranberry Township, Pa.);**

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**Dier International Plastics Inc. (Unionville, Ont.);**

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**Industries Laferriere (Mascouche, Que.);**

[www.industrieslaferriere.ca](http://www.industrieslaferriere.ca); 450-477-8880

**Turner Group Inc. (Seattle, Wash.);**

[www.turnergroup.net](http://www.turnergroup.net); 206-769-3707



molding machine to another, the unit operates with low energy consumption and is equipped with sound insulation for the cutting chamber, which greatly reduces the overall noise level. It is powered by an IE2 motor for superior energy efficiency. With the G-Max 23, a granulating throughput of 80 kg per hour is possible.

In common with other models of the G-Max series, the G-Max 23 has a remote control that replaces the fixed electrical control panel usually used on granulators, allowing for standard functions that are not available with traditional granulator design. There are two different positions of the control on the granulator to choose from, making it much easier for the operator to supervise the grinding process. The control's connecting cable to the granulator has a length of three meters, which allows the control of the granulator from outside a protective housing.

The G-Max 23 is also equipped with a hybrid rotor (open and staggered) consisting of 3 x 2 knives with open spaces between the rotating knives and the centre of the shaft. This provides unrestricted air flow through the large 310 x 235 mm cutting chamber, to cool hot materials. Consequently the G-Max is ideal for granulating heat-sensitive resins or feedstock that is still warm from processing. (For the grinding of even hotter materials, the granulator can be retrofitted with a special cooling water circuit.)

**Wittmann Canada Inc. (Richmond Hill, Ont.);**

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## INJECTION MOLDING

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ness of its contact pressure. To improve clamping precision, linear guides come standard for clamping slides, which contribute to prevent molding defects such as flash, and prolong the service life of the mold and clamping unit. Combining it with the “precision metering” function, which maintains the consistency of metering density and injection volume, it materializes highly-stable precision molding with high repeatability. In addition, the wear-resistant toggle and linear guides reduce inconvenient greasing work, making it even cleaner. It possesses superior capability in meeting the needs of cleanroom applications for container and medical industries.

**Nissei Plastic Industrial Co./En-Plas Inc. (Toronto);**  
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## EXTRUSION

### Redesigned unit offers improved handling and ease of cleaning

**Coperion** has equipped its *STS Mc11* twin-screw extruder with new features designed to significantly improve the sys-

tem's handling and ease of cleaning.

The *STS Mc11* now has a new manifold with coaxial solenoid valves in order to increase operational reliability. To make it even simpler to work at the machine, Coperion has revised the heat insulating hood in a way that enables easy access to the process section, and easier cleaning as well. Quick connections ensure that the hopper can be replaced conveniently.

To prevent vibrations during operation, the *STS Mc11* series now has an innovative, torsion-resistant base frame similar to the one in the *ZSK* series. It delivers smooth operation and increases operational reliability, therefore extending the extrusion system's service life.

The *STS Mc11* features a specific torque of 11.3 Nm/cm<sup>3</sup>, and screw speeds of up to 900 rpm. Additionally, the unit offers an extremely appealing price/performance ratio.

**Coperion (Seawell, N.J.);**  
[www.coperion.com](http://www.coperion.com); 856-589-0500



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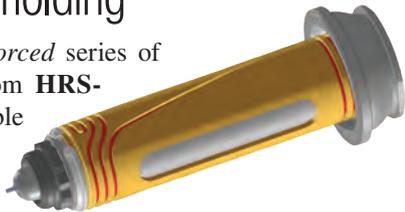
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## HOT RUNNERS

### New series for large-scale injection molding

The new *Reinforced* series of hot runners from **HRS-flow** are suitable for the large-scale production of injection



molded products wherever short cycle times and high surface quality are specified, for example in medical applications, cosmetic articles, caps and closures, and packaging.

The hot runner nozzles of the Reinforced range are designed for high injection pressures, and are suitable for thin and thick-walled applications. Furthermore, they are noted for the very high wear resistance of the nozzle tips.

They are available in three specifications: Reinforced-T, Reinforced-M, and Reinforced-S. Reinforced-T has been developed specifically for the injection molding of thin-walled articles. These nozzles are also suitable for decorative injection molding using the IML process. Because of their shape and homogenous temperature profile, very high injection speeds, and thus short cycle times, are possible. This prevents overheating and thus damage or discolouration of the IML label, and therefore ensures high process stability.

The Reinforced-M nozzle is well-suited for processing polyesters into thick-walled parts with a high-gloss surface, for example cosmetic packs, household articles, and products for medical technology. Here, wall thicknesses of 20 mm and more can be produced without difficulty.

And the Reinforced-S nozzle has also been developed for thick-walled injection molded parts with a wall thickness of up to 20 mm. This nozzle has been designed specifically for the injection molding of Surlyn, a highly transparent packaging material from DuPont.

**HRS Hot Runner Systems NA Inc. (Windsor, Ont.);**  
[www.hrsflow.com](http://www.hrsflow.com); 519-973-0212

## SOFTWARE

### Easy-to-use injection molding program

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## SINK IN GLASS REINFORCED NYLON

Sink is the absence of material. Often ribs are used in parts made from glass reinforced nylon. The following will also apply to glass reinforced polypropylene. Science has proved that a molding from glass reinforced nylon having a rib thicker than 40% of the wall it is attached to will yield a sink or a witness on the surface. A wall thickness of 0.100 inches should not have a rib greater than 0.04 inches thick.

If the designer elected to go greater than 40%, then the solution is to texture the show surface to hide the sink. Often this still results in a "sink" mark.

Often tool makers make molds with sprue orifices, runner diameters, and gate orifice that are too small. I believe the rationale is that if they are small then the scrap produced is less and or they believe that the thickness will affect the cycle time in an adverse way. If you can't make a good part then the diameter of the sprue doesn't make a difference. Very often when I consult on glass reinforced nylon projects the "plumbing" is too small. Here I don't mean "the mold cooling system," I mean the plumbing of the plastic route into the part. Let's say a molding is produced and upon part ejection the sprue distorts. Who cares? We aren't keeping the sprue, as long as the sprue comes out of the mold.

Glass reinforced nylon 6 parts benefit from a mold with a cooling temperature above 170°F. Glass reinforced nylon 6,6 parts benefit from a mold with a cooling temperature above 190°F. Surface finishes not dissimilar to unreinforced nylon can be obtained when producing parts from glass reinforced nylon 6 such as NYLENIUM® 2030G (30% glass reinforced nylon 6) with cooling temperatures of greater than 170°F. Similar resin-rich surfaces are obtained when cooling molds producing parts made from NYLENIUM® 1030G (30% glass reinforced nylon 6,6) with mold temperatures exceeding 190°F.

Unreinforced Nylon 6,6 is a solid at 497-498°F. At 509°F it flows very well. This is a characteristic of a semi-crystalline polymer. Semi-crystalline polymers have very narrow melting ranges.

Glass reinforced nylon 6 buries glass better than glass reinforced nylon 6,6. It is easier to obtain a resin-rich surface using nylon 6 glass reinforced such as NYLENIUM® 2030G versus glass reinforced nylon 6,6 such as NYLENIUM® 1030G.

The mold temperatures suggested will assist in lessening sink.

The temperatures recommended above are the surface temperatures of the mold. Water may be able to be used to obtain these surface temperatures. Most likely an oil Thermolator should be used. I reiterate: The mold temperature is the temperature of the mold and not what the Thermolator is set at. A handheld pyrometer fitted with a surface probe when the mold is up and running is recommended for checking the steel temperature. Note that steel is a poor conductor of heat relative to other metals. An oil Thermolator has braided hoses allowing for higher temperature versus a water Thermolator.

Caution: A water system running at 170°F has the potential to come loose (a hose developing a leak, for example). A person in the vicinity of in the event of a hose rupture may get sprayed by very hot water and suffer burns. Please invest in the proper equipment. You require high heat hoses if you elect to use water. Please use oil at these temperatures.

It is recommended that if the mold doesn't have slides that a Thermolator be used on the stationary half of the mold and another used on the moveable half of the mold. Yes, two Thermolators. The stationary half generally has a greater surface area than the moveable half due to the moveable half (generally) having the knock-out system. The knock-out creates an open space; in effect an insulator. This means the moveable half is hotter than the stationary half of the mold.

The recommended mold temperatures will allow the "melt" to flow more easily into the mold. The more easily the melt flows the better the pack...more material into the cavity...less sink.

A recent technical service call where the Customer had an issue with sink utilizing NYLENIUM® 2035G (nylon 6 with 35% glass reinforcement) resulted in a process where the mold temperature was set to yield a surface temperature of 205°F using an oil Thermolator. The sink was eliminated. The parts produced had excellent surface aesthetics and they performed very well in post-molding physical testing. Part performance is also affected in a positive way with the proper mold temperature in that we altered the crystallinity of the NYLENIUM® 2035G in the mold. We also increase the orifice opening of the sprue. This was a direct sprue part. This mold alteration allowed the use of a nozzle tip with a larger orifice opening. We also added radii to the sprue part intersection, thereby creating an easier flow into the mold.

**For additional information on Polycarbonate processing please don't hesitate to contact Richard Pounds.  
rpounds@poundsofplastic.com or 905-286-9894, ext. 22.**





simple and practical program that is so easy to use that technicians of all experience levels can consistently keep a

process on template.

The CoPilot observes actual machine settings and offers instructions to bring a process back into set parameters. Real-time notifications tell the molder when a process is out of match, allowing them to address the problem sooner and limit the number of bad parts produced. The CoPilot is able to walk processors through a step-by-step order that is driven by Scientific Molding principles by prioritizing the most important out-of-specification variables.

The CoPilot also records change log data, which shows what process was changed, when it changed, and the person that fixed the issue. This provides management with a better picture of what is happening on the shop floor and documentation that a process has remained within limits. If a process does go out of limits, any non-conforming parts are automatically contained, eliminating the need to sort through them by hand.

In addition, the CoPilot performs automatic process audits in real-time, 24/7.

**RJG Inc. (Traverse City, Mich.);**  
**www.rjginc.com; 231-947-3111**

## MATERIALS

### Compounds for demanding metal-replacement applications

A new family of compounds from **Teknor Apex Company** is designed to raise the processability and physical properties of glass fibre-reinforced polyamides to a new level,

enabling injection molders to take on more demanding metal-replacement applications or replace alternative thermoplastic materials for greater versatility in processing.

New *Creamid* compounds exhibit higher tensile strength and better flow properties compared with standard glass-filled polyamide counterparts, as well as greater dimensional stability, lower water absorption, improved chemical resistance, and enhanced surface aesthetics.



Featured grades include Creamid-A3H7G8.2S (40 per cent glass loading), Creamid-A3H7G10.2S (50 per cent glass loading), and Creamid-A3H7G12.2S (60 per cent glass loading). These compounds have been successfully used in Europe for automotive air vents, spoilers, fan blades, spring adapters, and key fobs.

The processing advantages of Creamid compounds can introduce dramatic improvements for injection molders in comparison with standard glass-filled polyamides. When compared with a standard 43 per cent glass-filled polyamide, a 40 per cent glass-filled Creamid compound shows a 68 per cent improvement in spiral flow tests, reaches a 41 per cent lower peak injection pressure, and requires 43 per cent less clamp force. Longer flow length and lower injection pressure translate into a wider processing window, more efficient filling of complex or thin-walled cavities, reduced part warpage, and a possible reduction in the number of gates or knit lines. A lower clamp force also opens the possibility of increasing the number of cavities or running parts in a smaller, less costly molding press.

**Teknor Apex Company (Pawtucket, R.I.);**  
**www.teknorapex.com; 800-556-3864**

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## Polypropylene waxes can enhance processing throughput

**GreenMantra Technologies** has developed a new line of synthetic polypropylene waxes designed to provide a unique range of technical properties previously not available in the market.



The new *Cer-anovus* polypropylene waxes, produced from post-industrial plastic waste and post-consumer recycled plastics such as yogurt containers and bottle caps, can be tai-

lored to specific end-use applications. In plastics processing and colour masterbatch, the waxes can improve throughput, reduce breaks in product forming, and enhance dispersion of additives within a plastic.

Cer-anovus A series polypropylene waxes are designed for applications that are not colour-specific, while Cer-anovus G series polypropylene waxes are for applications that are colour-sensitive. They complement GreenMantra's existing range of polyethylene waxes that also are produced from waste plastics.

Cer-anovus waxes are made with 100 percent recycled materials, providing a sustainable raw material that helps drive the circular economy of plastic while still delivering a high level of performance in finished products. They also have received third-party certification for recycled content. This provides customers with transparent documentation and added support in qualifying for environmental product standards and green building requirements such as U.S.

Green Building Council's LEED certification.  
**GreenMantra Technologies (Brantford, Ont.);**  
[www.greenmantra.ca](http://www.greenmantra.ca); 888-519-2015

## PURGING COMPOUNDS

### Single-dose compounds for all processes

New from **iD Additives Inc.**, and available in Canada from exclusive distributor CCC Plastics, the *QuickShots* line of single-dose purging compounds come in individual pack-



ets, and allow operators to purge their machinery by simply dropping the packets into the feed throat/hopper of their machine.

The packets work with all resin types on all plastics machinery processes, including injection molding, extrusion, and blow molding.

Typical dosage is one ounce per one-inch of screw diameter. No soaking or temperature adjustments are necessary.

The compounds are FDA-compliant and environmentally safe; work with any resin, with no need for multiple grades; reduce the amount of resin required to purge; and minimize process equipment downtime.

QuickShots purge compounds are available in one ounce packets (boxes of 50) and three ounce packets (boxes of 24). Free samples are available upon request.

**iD Additives Inc./CCC Plastics (Mississauga, Ont.);**  
[www.iDAdditives.com](http://www.iDAdditives.com); 888-427-8536

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# The importance of pellet size and shape (part 2)

By John Bozzelli, Injection Molding Solutions



There are hundreds of details in the injection molding process, and in evaluating them I can get rather “picky.” In this article I’m picking on pellets. Regardless of the resin type or manufacturer, molders want their pellets to be uniform in size and shape to allow for uniform melting at the proper temperature. If your pellets range in size and geometry, this won’t happen, since non-uniformly melted resin will not yield uniformly good or identical parts, period.

In last issue's column, I discussed the melting process in the hopper and feed throat; this time around, let's look at the feed section of the screw. As the

screw rotates, it picks up the granules from the feed throat and augers them through the feed section of the screw. On a general-purpose screw, the feed section accounts for a whopping 50 per cent of the flight length. The purpose of the feed section is to compact the pellets and prepare them for the transition section. Here is where the flights of the screw pick up the granules, and they have to fit into the flight chamber. Pellets falling into the flight are no problem, unless they are either very large or very small.

If the pellet is so large that it stands taller than the flight, it may or may not be sheared between the flight and sharp edge of the bottom of the feed throat. This can actually force the screw back, not allowing the flight to fill completely with granules — the screw just augers backward and you will not have a full shot of plastic in front of the screw. This is common with small-diameter screws and/or use of low backpressures. The result is that the next shot has splay, bubbles, shorts, or unmelt.

Fines pose a different type of problem, as they melt much faster and earlier than normal size pellets, reducing the friction needed to melt the normal pellets. Results are unmelt and black and white specks in your parts.

As the granules move through the feed zone, they begin to pick up heat of the rear zone, along with some compaction. This is where Murphy’s Law can kick in. First, you have worry about where the air between the pellets is going as the pellets compact. If the melting process starts too early, air gets trapped and pushed through to the nozzle; the air shows up in your part as splay, which you may mistake for moisture. Running the feed throat hot and rear zone at the proper temperature allows the air to vent out of the feed throat, perhaps taking along some

moisture and other volatiles.

With compaction comes some pressure, but the high pressure (thousands of psi) develops within the transition zone. The transition section of the screw is where the root diameter tapers thicker to the metering diameter of the screw; this taper compresses the plastic against the barrel wall. The ratio of the volume of a feed flight to the volume of a metering flight is known as the “compression ratio”.

Here is where the size and geometry of the pellets become driving factors on how and when a pellet or granule melts. Any variation in geometry or size will cause different degrees of friction, and this in turn provides non-uniformity within the polymer melt.

My bet is that variation in pellet size and geometry influences so-called “solid bed” breakup, which is a disruption of uniform conversion of the “solid bed” of compacted pellets into a melt pool within the screw flights, which is the source of partially melted pellets in your parts. My guess is that nearly 70 per cent of your parts have this problem.

Different coefficients of friction will generate different melting patterns as the pellets travel down the screw. And when Murphy is feeling particularly mischievous, you can get completely unmelted granules in parts.

The bottom line? Non-uniformity in pellet size and geometry can negatively impact the melting process, and is a source of cosmetic, physical, chemical, and performance problems. **CPL**

*John Bozzelli is the founder of Injection Molding Solutions in Midland, Mich., a provider of training and consulting services to injection molders, including LIMS and other specialties. He can be reached at [john@scientificmolding.com](mailto:john@scientificmolding.com) or visit [www.scientificmolding.com](http://www.scientificmolding.com).*

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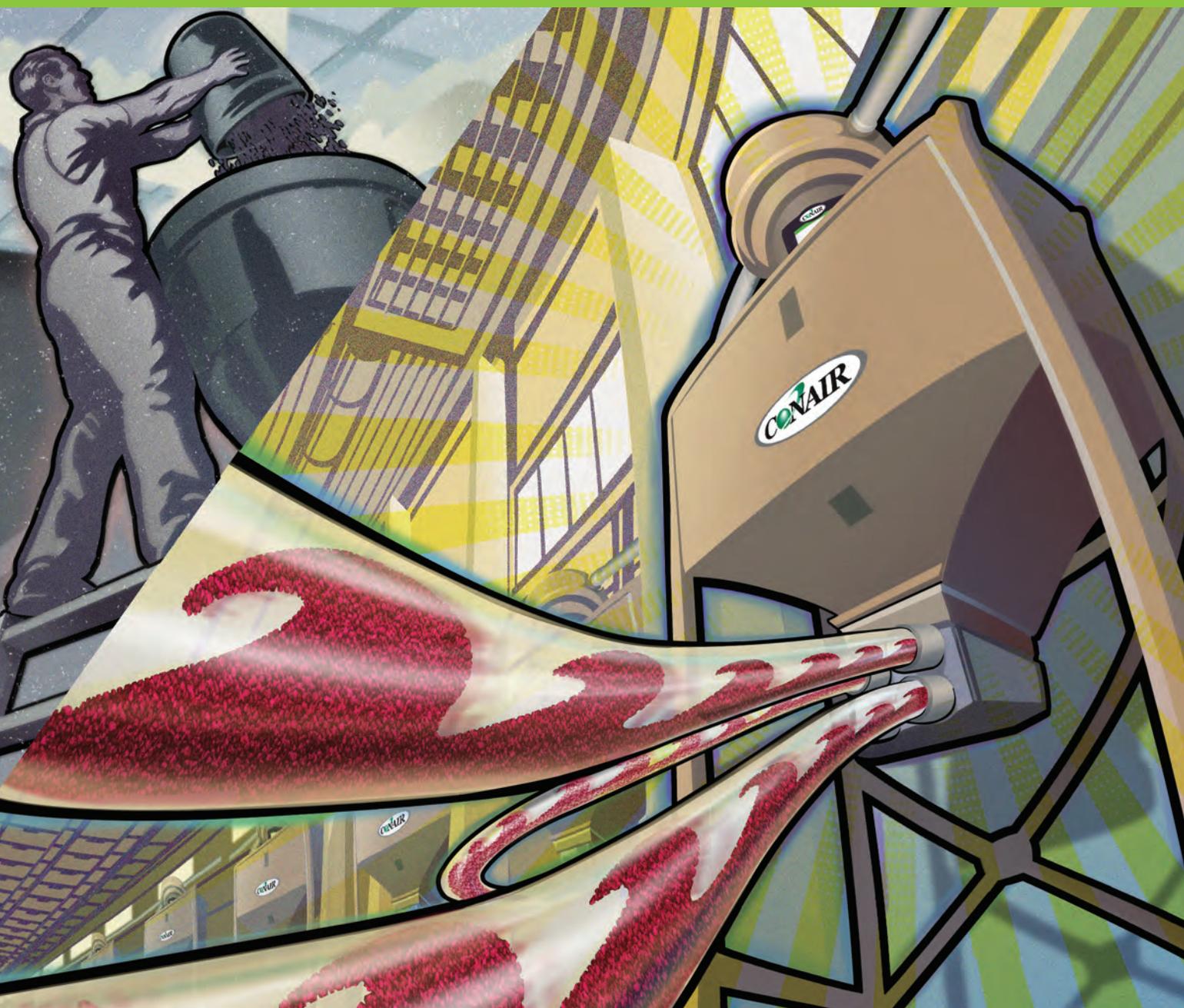


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