



2019  
PREVIEW

# GREEN TO THE CORE

Material suppliers  
are doubling  
down on  
sustainability

Injection molding  
gets smarter with  
INDUSTRY 4.0  
technologies



**COMMON  
HOT RUNNER  
PROBLEMS**  
(and how to  
avoid them)

Straw maker  
**STONE STRAW**  
goes biopolymer





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## FROM THE ARCHIVES

The February 1991 issue of *Canadian Plastics* reported on a new technology for exterior automotive strip materials developed by Co-Ex-Tec Industries, part of the Decoma division of Magna International Inc. The product was made on a 130-meter line, and consisted of polyvinyl chloride and EPDM thermoset rubber coextruded onto the same metal strip substrate. The strip was used to seal car windows, providing insulation and damping the sound of wind rushing by. Aurora, Ont.-based Magna was seeking patents on the product and on the technology used to produce it, our story noted.

Number of the month:  
**300\***

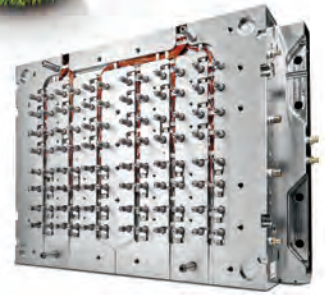
\* Number of acres secured by West Coast Olefins Ltd. for a proposed \$5.6 billion petrochemicals site in Prince George, B.C. (See pg. 6)



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Cover Photo: Getty Images



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Industry 4.0 is everywhere these days, and nowhere more so than in injection molding, where machine suppliers continue to build out their platforms of smart machines, smart processes, and smart services. And the upcoming K 2019 show is where the latest offerings in digitalization and connectivity get unveiled.

## features

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By improving part quality, enhancing operational efficiencies, reducing scrap, and saving money, hot runners have revolutionized injection molding processing capabilities. But they're complex and not exactly low maintenance. The good news is, you can overcome these challenges by addressing a few key issues.

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Industry veteran Pat Zaffino and his team are back in business with a game-changing conformal cooling technology for injection molds.



# Sobeys joins the war on plastic

Having lived for years on a shoestring budget as a student in Halifax way back when, I owe a debt to the Sobeys grocery chain, which always seemed to offer the least expensive staple foods around. So as much as I dislike knocking the Nova Scotia-based company, I was saddened to see it enter the growing war on plastics by announcing, in early August, that it will become the first Canadian grocer to end the use of plastic bags by January 2020.



Sobeys said the move will take 225 million plastic bags out of circulation each year at their 255 Canadian locations, and according to the president of the company that owns Sobeys, is due to consumer demand to “use less plastic.”

Along with almost everybody else in the world today, those of us who work in the plastics industry worry about plastic pollution and acknowledge that plastic waste is a real environmental problem. But we also know what many others don't seem to realize — that, considered against the alternatives, banning plastic bags doesn't make sense, for several reasons.

First, paper takes up more room in landfills and doesn't exactly disintegrate rapidly: As figures from the UN Environment Programme's International Environmental Technology Centre make clear, paper bags take up nine times more room than plastic and break down at about the same rate.

Second, plastic bags actually produce less stress on the environment than paper or cotton bags — they use less water, require fewer chemicals, and produce less greenhouse gas than the other two options. A 2018 study by the Danish Ministry of Environment and Food found that an organic cotton shopping bag must be reused 20,000 times before it will have less environmental damage than a plastic bag. So while it may be counterintuitive to think that plastic could be less harmful than

something natural, like cotton, it is.

Third, reusable bags aren't sanitary. A 2010 study by Loma Linda University tested reusable bags and found that large numbers of bacteria — including *E. coli* and several opportunistic pathogens — were found in almost all bags and coliform bacteria in half. And the problem only gets worse during warmer months, especially if reusable bags are being used in the grocery store, when bacteria could spread not only to your food, but to shopping carts and check-out counters, where it could also affect others' food.

And even if, disregarding this evidence, you still want to ban plastic bags, Canada is not the place to do it. In a recent article for *The Globe and Mail*, Bjorn Lomborg — president of the Copenhagen Consensus Center and often called the “skeptical environmentalist” — points out that most of the world's plastic pollution problems aren't coming from developed countries such as Canada. In fact, he noted, less than five per cent of land-based plastic waste in the ocean comes from Organisation for Economic Co-operation and Development (OECD) countries; instead, half of the world's plastic waste comes from just four countries: China, Indonesia, the Philippines, and Vietnam. Canada on average contributes less than 0.01 MT (millions of metric tonnes) of mismanaged plastic waste, which is four times less than countries like England, Spain, Italy, Portugal, and France. The only European nations on par with Canada are the significantly smaller Sweden, Norway, and Finland.

In short, the evidence doesn't suggest that Canada is actually a significant contributor for mismanaged plastic. So if the definition of a good policy is that it should address a real problem and make a meaningful impact on the said problem, Sobeys' feel-good gesture fails on both counts.

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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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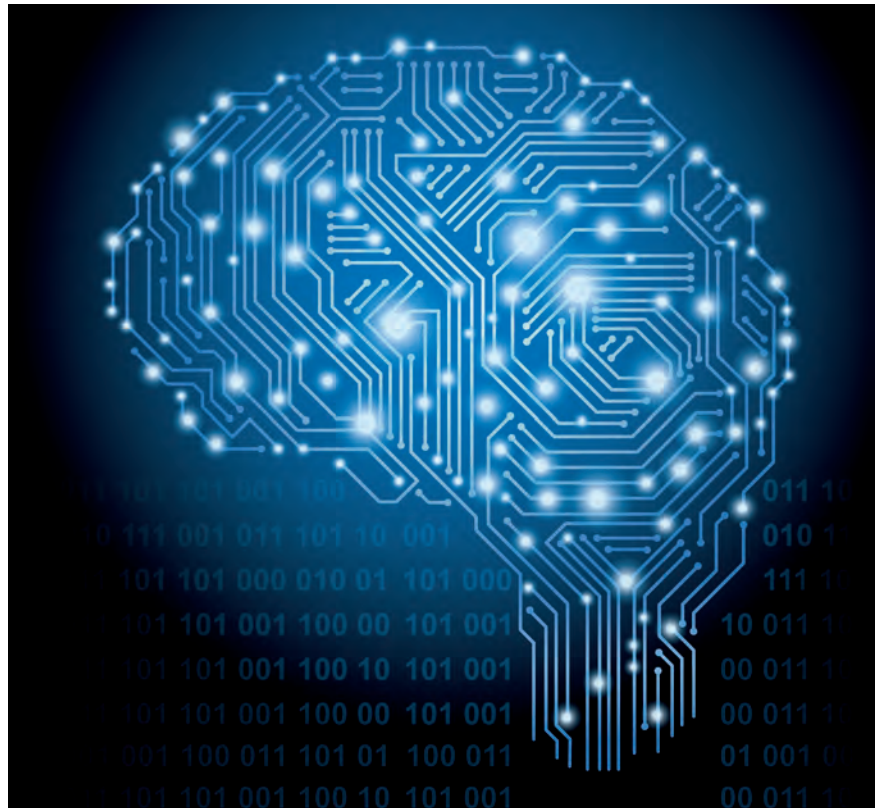
# Machine learning solutions boost CRM software

In this age of texting and tweeting, acronyms are everywhere, and most of them are unimportant. For example, does anyone really care what BFF, OMG or LMFAO stands for?

But for savvy plastics manufacturers, two acronyms that definitely matter are AI (Artificial Intelligence) and CRM (Customer Relationship Management software). Defined as human intelligence exhibited by machines, the idea behind AI in an industrial setting is the ability for machines to think for us, whether they're projecting sales forecasts or directing a factory assembly line. CRM software, meanwhile, helps businesses build strong relationships with their customers by processing and categorizing customers according to their expectations, boost conversations, make use of disconnected data to depict opportunities, create sales funnels, and carry out loyalty campaigns.

Bringing the two technologies together is the goal of a new initiative by Montreal-based product development firm AxiPolymer Inc., and it builds on a modular, highly customized machine learning system to help plastics processors to implement AI that was developed by the company last year. AxiPolymer's newest product offering takes its AI system a step further to boost the effectiveness of CRM software. "Standard CRM software offers many benefits, but it's not the complete answer," said AxiPolymer's founder and president Dr. Ata Zad. "Its limitation is that it provides you with data, but not with any insights about that data. If you're a processor using CRM, you still have to analyze your behaviour with every single customer, find the hidden and complex patterns in each of these business relationships, and then formulate the best way to interact with each of these clients, and most companies don't have the time or resources to do this."

Which is where the benefits of AI come in. "Humans and software only



see the input and output layers, whereas AI uses algorithms to find hidden patterns in data," Zad said. "These algorithms are iterative, and will learn continually and seek optimized outcomes; they also iterate in milliseconds, which lets manufacturers find optimized outcomes in minutes instead of months."

But there's a limitation to standard AI solutions as well. "Not all AI algorithms work best for plastics manufacturing in general, or for the specifics of one particular plastics processor's business," Zad said. "To get the real value of an AI solution, it has to be company-specific and policy-specific, which means it has to have customized deep features and customized AI algorithms."

## CUSTOMIZED ENHANCEMENTS

Each of AxiPolymer's machine learning solutions is customized to enhance a particular company's CRM software, so no two solutions will be the same — which makes sense, Zad said, because no two plastics processors

have the same business patterns. "To optimize a customer's CRM, we start by talking with company management to understand their short- and long-term goals," he said. "Then we evaluate the company's CRM database. According to those priorities and in-place CRM, we customize AI algorithms and start the initial implementation."

By leveraging their CRM software with AxiPolymer's AI technology, processors will be able to convert huge loads of customer data from multiple sources — phone calls, website visits, social interactions, emails, quotes and purchase orders, and more — into actionable insights that can improve relationships with those customers, Zad said. "The benefits include predictive customer service, creating more accurate sales forecasts, more effective customer categorization, and assessing your customers from the best to the less desirable so that you can prioritize and devote attention to prospective buyers," he said.

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## Canadian startup wants to build \$5.6 billion petrochemical plant in B.C.

Calgary-based West Coast Olefins Ltd. (WCO) has announced plans to build a \$5.6 billion petrochemicals site in Prince George, B.C. that would include PE resin.

In a statement, WCO said it has secured a 300-acre site in the BCR Industrial Park of Prince George for the project. The firm is about to begin formal regulatory approval and is targeting a final investment decision by the end of 2020.

The statement also said that the site would include a world-scale ethylene plant. Most of the PE resin made at the site would be shipped to Asia, it added.

If approved, the facility will create up to 1,000 permanent highly skilled jobs, while several thousand workers will be required to support the construction effort over a three-year period.

According to WCO — which was formed last year to develop natural gas projects in B.C. — the overall project will include a natural gas liquids recovery plant to recover ethane, propane, butane, and natural gas condensate from Enbridge's West Coast Pipeline; an ethylene plant to produce one million tonnes per year of polymer-grade ethylene; a PE plant to consume most of the ethylene produced; and associated off-site facilities and infrastructure.

Company officials also say there is a possibility of a mono-ethylene glycol plant being constructed on-site to utilize the balance of the ethylene produced.

Addressing possible environmental concerns, WCO said that it is "aware of the local sensitivity to airshed concerns in the 'bowl area' of Prince George," especially particulate matter and odour

issues. "The plant uses a low-carbon, clean burning mixture of methane and hydrogen as its main fuel source for fired equipment that has no soot or odour and minimizes GHG [greenhouse gas] emissions," the company said. "We believe that this makes a strong case for how this project fits with the provincial climate action plan."

WCO also said that it has had "several meetings with First Nations, local leaders, and construction companies over the past six months" to discuss potential concerns.

"Council strongly encourages businesses to invest in our community," Prince George Mayor Lyn Hall said in the statement. "We think this project has great potential and promises to have a major, positive economic impact for Prince George, the region, and the whole province." **CPL**

## New president and CEO for Plastics Industry Association



Tony Radoszewski

The Washington, D.C.-based Plastics Industry Association has named Tony Radoszewski, formerly the president of the Plastics Pipe Institute (PPI), as its new president and CEO.

Radoszewski takes over from Patty Long, who served as interim president following the death of the association's leader Bill

Carteaux in December 2018.

Radoszewski is a plastics industry veteran with nearly 40 years of experience in the field, beginning as a polyolefins sales representative with Phillips Chemical Co. in 1980. Since then, he has held various positions at companies including Phillips Driscopipe (now Performance Pipe), Phillips Sumika Polypropylene Co., Advanced Drainage Systems Inc., and Wentworth Group International. He then headed PPI for 13 years. **CPL**

## Woodbridge Foam investing \$100 million on upgrades, research centre in Ontario

Automotive foam technology supplier Woodbridge Foam Corp. is investing up to \$100 million to modernize two manufacturing sites in Ontario.

In a statement, Mississauga, Ont.-based Woodbridge said that the Canadian government will contribute up to \$20 million to the project through its Strategic Innovation Fund, which supports business investments in Canada's business and manufacturing sectors.

The modernization of the two plants in the Ontario towns of Woodbridge and Blenheim will also create an estimated 110 jobs and maintain over 700 additional jobs, the company said.

Woodbridge will also establish a Centre of Excellence in Woodbridge, where it will invest and centralize its global research into advanced materials and product design of molded foam products, such as car seats and armrests. "This will allow for more intellectual property to be developed and retained in Canada and expand our collaboration with high schools and post-secondary institutions," the statement said.

"With the support of the Canadian government, this significant investment will result in world-class manufacturing capabilities and accelerating innovation in our technology advantage," Charles Daly, Woodbridge's president and CEO, said in the statement. "We view this as an investment in our global competitiveness, supporting our purpose to create and sustain rewarding jobs, as we prepare for the future of the global automotive industry."

Founded in 1978, Woodbridge operates more than 60 facilities around the world. The company specializes in manufacturing foam polymers and molding for the automotive industry. **CPL**



## Macro Engineering founder Mirek Planeta retires



Photo Credit: Macro Engineering & Technology Inc.

Planeta and his CPIA Lifetime Achievement Award in 2016.

Well-known Canadian plastic industry veteran Mirek Planeta, the founder of Mississauga, Ont.-based blown film and sheet extrusion machinery supplier Macro Engineering & Technology Inc., has retired.

Armed with an engineering degree in plastic and rubber processing from the University of Prague, Czech Republic, Planeta moved to Canada in 1974, and began his career working as an engineer with Bonar Packaging Films in Burlington, Ont. He founded Macro in 1978, and the initial focus of the company was improving air ring design, leading to the invention of the dual lip air ring.

Under his guidance, Macro won an award for excellence in exports from the Canadian government in 1995. Planeta filed more than 30 patents for machinery and extrusion processes

over the years.

Planeta, now 72, resigned as Macro's president in 2016 to concentrate on research and development, and was given a Lifetime Achievement Award from the Canadian Plastics Industry Association later that year.

"Mirek was always leading the company through growth, improvements, and tremendous change which made it possible for us to expand from a component supplier to offering complete extrusion systems, and in the process became a global industry leader in high-barrier and specialty film processing technology, with equipment installed and operating in over 40 countries worldwide," said Macro president and CEO Jim Stobie. "While we'll miss him and his leadership, we wish him the best of luck in his retirement and his new ventures." **CPL**

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## Magna building new seating plant in Ohio

In an event attended by U.S. Vice President Mike Pence, Canadian automotive parts maker Magna International Inc. broke ground on a new 150,000-square-foot seat structure plant in Lancaster, Ohio on July 30.

The facility represents an initial investment by Magna of approximately US\$60 million, and is part of the

Aurora, Ont.-based firm's efforts to expand its seating business; it will be Magna's first dedicated seat structure plant in the U.S. and will feature robotic laser and MIG welding capabilities.

The new seating plant — Magna's fifth location in the state — is expected to be operational in the first quarter of 2020 and employ 300 people by 2021. **CPL**

## Primex Technologies sold to Oldcastle Infrastructure

Primex Technologies Inc., a Langley, B.C.-based manufacturer of engineered plastic enclosures for the communications market, has been acquired by Oldcastle Infrastructure, a division of Irish building materials group CRH plc, for an undisclosed amount.

In a statement, Primex officials said the acquisition will allow them to invest in new products and ways to serve mutual customers.

Founded in 1971, Primex manufactures enclosures for communications customers across North America and has topped one million installations. The company's products include media distribution enclosures made of ABS to manage cable routing, and it also sells outside enclosures for copper, coax and fibre, and data and voice modules. **CPL**

Photo Credit: Magna International Inc.



U.S. Vice President Mike Pence (fifth from right) and Magna CEO Don Walker (fifth from left) lead the groundbreaking at Magna's new seat structure plant in Lancaster, Ohio.

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## GN Thermoforming makes top management changes

Packaging equipment manufacturer GN Thermoforming Equipment, headquartered in Chester, N.S., has a new president.

The company has named longtime employee Jerome Romkey to the position, and also announced the appointment of Paul Phillips as its new sales and marketing manager.

Romkey started his career with GN in 1980 when the company was founded with just six employees. He has worked in many senior leadership roles over the years, including technical manager, engineering manager, business development manager, and vice president of sales and marketing. Phillips, meanwhile, has over 15 years of



Jerome Romkey



Paul Phillips

sales management experience in various leadership roles with companies in the marine, ocean sciences, defense, and medical device fields.

GN manufactures roll-fed thermoformers for the production of high-quality plastic packaging, and has installed more than 1,500 thermoformers in total.

CPL

## Pretium Packaging buys Toronto's Starplex Scientific

Pretium Packaging LLC is acquiring Toronto-based medical device maker Starplex Scientific Inc. for an undisclosed amount.

Starplex, which had been owned by generic drug maker Apotex Corp., makes sterilized containers, biological sampling swabs, and pharmaceutical grade containers and closures in Toronto and Cleveland, Tenn. for clinics, laboratories, and drug manufacturing.

Starplex has a total of about 200,000 square feet for manufacturing at the two locations.

Products include specimen containers, transport vials, collectors, swab tips and shafts, O-ring containers, buckets, and tissue cassettes.

Existing employees and the Starplex brand will be retained, Chesterfield, Mo.-based Pretium said in a statement.

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Photo Credits: GN Thermoforming Equipment



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## PEOPLE



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Morris



Phani  
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Sundaram  
Nagarajan



Marc  
Delplace



John  
Stong

- Specialty colour and additive concentrate supplier **Chroma Color Corp.**, of McHenry, Ill., has appointed **Gerald Baillargeon** as its new chief financial officer.
- **The American Chemistry Council (ACC)**, headquartered in Washington, D.C., has named **Christopher Jahn** as its new president and CEO. Jahn succeeds outgoing ACC head Cal Dooley.
- Netherlands-based chemical supplier **LyondellBasell Industries** has named **Kenneth Lane** as executive vice president of its global olefins and polyolefins division.
- Montreal-based flexible packaging supplier **TC Transcontinental Packaging** has named **Thomas Morin** as its new president.
- Mold tooling supplier **Chiron Group**, headquartered in Tuttlingen, Germany, has appointed **Steve Morris** as president and CEO of its Chiron America division, which has locations in Charlotte, N.C. and Plymouth, Mich.
- Parsippany, N.J.-based **Sun Plastech Inc.**, which manufactures and distributes AsaClean purging compounds, has named **Phani Nagaraj** as its new vice president.
- Westlake, Ohio-based dispensing equipment maker **Nordson Corp.** has appointed **Sundaram Nagarajan** as its new president and CEO; and **Marc Delplace** as its regional sales manager for plasticating and melt delivery components for Ontario, Quebec, New Brunswick, and Nova Scotia.
- North Shores, Mich.-based conveying system supplier **Dynamic Conveyor Corp.** has named **John Stong** as its new sales manager.

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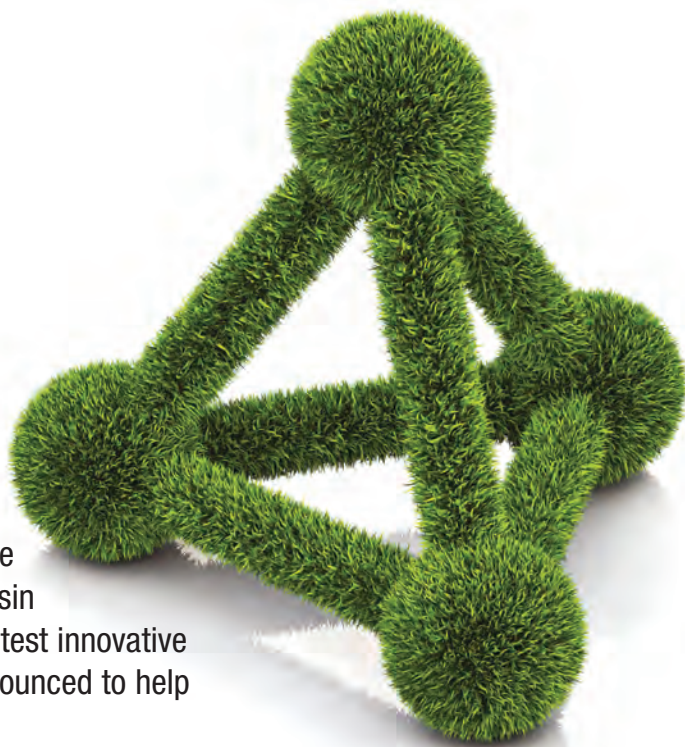
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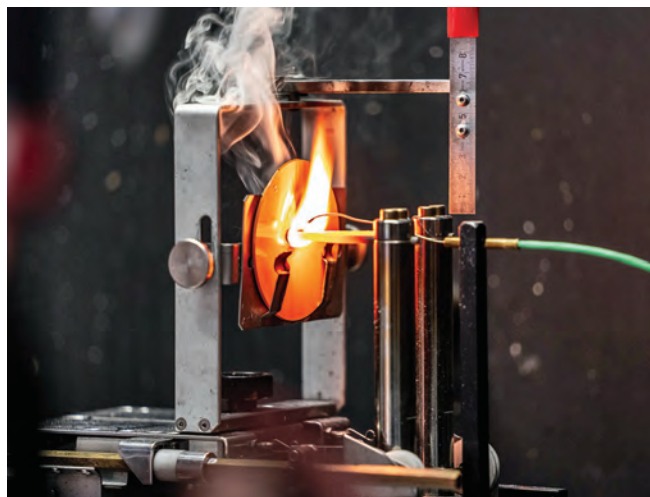


Sustainability is now an inevitable part of the plastics industry conversation, and it got talked about a lot at the recent K 2019 Preview in Germany, especially by the resin suppliers that were there to offer an early look at their latest innovative materials in advance of the show. Here's what they announced to help further circular solutions and reduce plastics waste.

By Mark Stephen, editor

You might remember, back in the 1970s, Kermit the Frog lamenting that it wasn't easy being green. For anyone involved in the plastics industry in 2019, the opposite is true: it's not easy *not* being green. Sustainability has become an unavoidable part of the industry conversation, a fact proven at the K 2019 Preview held in Düsseldorf, Germany in early July.

Staged for journalists from 30 countries across the globe, the Preview is designed not only to build anticipation for the plastics industry's largest trade show, but also to set the tone for the event 100 days out. And it was clear from the start that environmental sustainability would be omnipresent at the press event, and are destined to be buzz words at K 2019 in Düsseldorf from Oct. 16 to 24.



Lanxess AG's new Durethan BKV45FN04 nylon 6 exhibits high stiffness and strength and is very flame retardant.

Photo Credit: Lanxess AG

The majority of companies presenting at the K 2019 Preview — as well as at related events in Linz, Austria and Antwerp, Belgium in late June — were material suppliers. Here are the announcements they made that are designed to respond to the sustainability challenge.

## SHOW OF SUSTAINABILITY

Representatives of Ascend Performance Materials, said to be the world's largest fully integrated producer of nylon 6,6, touted sustainability efforts, which included the company's plan to reduce its environmental footprint. "We're in advanced discussions to implement co-generation units at our Decatur, Ala. plant, and we've expanded our recycled-content product portfolio," said Scott Rook, senior vice president of Ascend's commercial divisions. In addition to long-chain polyamides, an inherently antimicrobial polymer for fibre production, and additional flame retardant grades of its Vidyne nylon 6,6, Ascend will unveil expanded recycled content offerings at K 2019, Rook said.

Designed to help avoid food waste through intelligent packaging of fruit and vegetables, ecovio M 2351 from BASF is a certified soil-biodegradable plastic for mulch films, consisting of the biodegradable copolyester polybutylene adipate terephthalate (PBAT) ecoflex and other biodegradable polymers made from renewable raw materials. Films made from ecovio M 2351 can be left in the soil after harvesting, rather than being laboriously removed and recycled, since naturally occurring microorganisms in the soil recognize the structure of the film as food that they can metabolize. The remaining end products after biodegradation by microorganisms are CO<sub>2</sub>, water, and biomass.

Borealis AG used the pre-K event to announce the intro-

duction of a new plastics recycling technology called Borcycle, which transforms polyolefin-based waste streams into recyclate material such as pellets. This evolving technology will be used to produce high-quality compounds made of recycled polyolefins (rPO) such as the newly-launched Borcycle MF1981SY, a 10 per cent talc-filled rPO with over 80 per cent recycled content said to be especially suited for use in visible black parts, for example in small appliances. Borealis also announced a series of significant material improvements to existing recyclates in the established Purpolen brand portfolio, including Purpolen PP Y40, a recycled PP that now has higher and improved flowability; and Purpolen PE FF, a fine-filtered PE regranulate that now comes with finer melt filtration.

Dr. Markus Steilemann, CEO of Covestro AG, outlined some of the material supplier's efforts to promote a circular economy. "Together with partners such as Germany's RWTH Aachen University and various textile manufacturers, Covestro has succeeded in producing elastic textile fibres from TPU with CO<sub>2</sub>, and as a result partially replaced crude oil as the raw material," Steilemann said. The process uses a technique called melt spinning, Steilemann said, in which the TPU is melted, pressed into very fine threads, and finally processed into a yarn of endless fibres; unlike dry spinning, which is used to produce conventional elastic synthetic fibres such as Elastane or Spandex, melt spinning eliminates the need for environmentally harmful solvents. "The starting point is an intermediate product called cardyon, which is already used for the soft foam found in mattresses and the base layers of sports fields," Steilemann said.

### GREEN BENEFITS OF 3D PRINTING

Global chemical company Huntsman Corp. is putting a focus on 3D printing and the emerging needs of this relatively young branch of industry, said Stephane Peysson, global business development manager at Huntsman Polyurethanes. The company has developed a new range of 3D printing materials which will be officially launched at the show and marketed under the brand name Iroprint. The new additive manufacturing platform is "technology agnostic," Peysson said, and contains three different kinds of urethane-based materials (resins, powders, and filaments), which can be 3D printed using a variety of additive manufacturing methods including stereolithography, high-speed sintering, and fused filament fabrication. While it might not be instantly apparent, Peysson said, 3D printing is by definition a sustainable process. "It avoids overproduction of a particular product, material waste during manufacturing, and the energy consumption of moldmaking," he said.

Speciality chemicals firm Lanxess AG will be presenting a wide range of new products relating to electric mobility at K, including orange, heat-stabilised compounds for high-voltage applications; materials that prevent electrical corrosion upon contact with live metal parts; and halogen-free, flame retardant materials for components such as battery cell holders and cover plates. In order to establish closed-loop



Photo Credit: Wacker AGw

Wacker AG's Nexipal material consists of a silicone film coated with electrically conductive material and laminated in several layers.

material cycles in the manufacture and application of these and other new materials, the company is currently working with customers and their own buyers, said Michael Zobel, head of Lanxess' high performance materials business unit. "Setting up material cycles that conserve resources in this way will work only if all partners in the value chain work together," he said.

Canada's Nova Chemicals Corp. announced a new long-term sustainability commitment intended to boost the plastics circular economy and to reduce marine pollution. Key components of the strategy include reducing food waste through packaging that more effectively preserves perishable foods; creating more easily recyclable packaging and products; incorporating recyclate into film structures and rigid products traditionally made with 100 per cent virgin resins; formulating virgin resins for recyclability into higher value applications; and reducing the amount of plastic needed to deliver required performance properties.

### MATERIAL ADVANCES

Plasticizers are critical to flexible PVC, and polyol supplier Perstorp is launching a new renewable polyester plasticizer called Pevalen Pro that's designed to make flexible PVC even more attractive based on a significantly lower carbon footprint compared to competing materials and technologies. According to Jenny Klevas, Perstorp's global marketing and product manager for the polyol ester plasticizer platform, Pevalen Pro is a direct replacement for the company's Pevalen non-phthalate plasticizer, which was launched in 2014. "The renewable grades are made under the Mass Balance concept and backed by third-party ISCC certification, which guarantees that the bio-based input is sustainably sourced and lives up to the requirements set for a more liveable future," she said. "Future Pevalen Pro grades will offer even higher levels of renewable content with the long-term goal of helping Perstorp customers to transform to 100 per cent renewable grades."

South Korea's Songwon Industrial Co. Ltd. previewed a new family of flame retardant synergists based on a propri-



etary technology designed to combine superior performance with safety and sustainability. According to Songwon board member Dieter Morath, the new products can be used with halogenated systems to reduce the quantity of antimony synergist required, with other types of flame retardant, or alone. Morath also drew attention to another of Songwon's sustainability successes: becoming one of the first chemical companies in the world to package its products in 20 kg PE bags made with 50 per cent recycled PE sourced from its customers. "The bags are designed for up to four cycles of usage," he said.

Finally, Wacker Chemie AG previewed its new Nexipal technology, which the company described as a world-first novel silicone laminate with electroactive properties. The material is based on Wacker's Elastosil silicone film and consists of several ultra-thin silicone rubber precision films coated with an electrically conductive material prior to lamination. When voltage is applied, the positive and negative charge carriers of the electrodes attract one another, forcing the silicone film in between to change its shape; as a result, the film flattens and at the same time elongates horizontally, proportionate to the compression force. When discharged, the highly elastic silicone film allows the laminate to return to its original shape. Nexipal's contribution to the world of

sustainability comes from what Wacker called "one of the most outstanding advantages" of electroactive silicone laminates compared to existing solenoid technology: the fact that electric power is only applied during the short period of switching between "on" and "off" status, not for holding it. "This results in significantly less energy consumption," the company said.

Being green seems to be getting easier all the time. **CPL**

#### RESOURCE LIST

- Ascend Performance Materials** (Houston, Tex.);  
www.ascendmaterials.com; 713-315-5700
- BASF Canada Inc.** (Mississauga, Ont.); www.basf.ca; 289-360-1300
- Borealis Compounds LLC** (Port Murray, N.J.);  
www.borealisgroup.com; 908-850-6200
- Covestro** (Baytown, Tex.); www.covestro.com; 281-383-6000
- Huntsman Polyurethanes** (Mississauga, Ont.);  
www.huntsman.com; 905-678-9150
- Lanxess Canada** (Elmira, Ont.); www.lanxess.ca; 519-669-1671
- Nova Chemicals Corp.** (Calgary, Alta.);  
www.novachemicals.com; 403-750-3600
- Perstorp** (Malmö, Sweden); www.perstorp.com
- Songwon International Americas** (Friendswood, Tex.);  
www.songwon.com; 281-648-1585
- Wacker Chemical Corp.** (Allentown, Pa.);  
www.wacker.com; 610-336-2700

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# INJECTION MOLDING GETS

# SMARTER



By Mark Stephen, editor

Industry 4.0 is everywhere these days, and nowhere more so than in injection molding, where machine suppliers continue to build out their platforms of smart machines, smart processes, and smart services. And the upcoming K 2019 show is where the latest offerings in digitalization and connectivity get unveiled.

Smart technology complements injection molding like Lennon's songwriting skills complemented McCartney's. And the results can be just as harmonious, albeit in a different way: By enabling the injection molding machinery with sensors and intelligent software for a deeper integration of information technology and manufacturing, machines can collect data about their own and other machines' performance independently, which means the system can start to work together to make the whole process more cost-effective and efficient.

Intelligent injection molding isn't exactly new — Arburg GmbH presented a fully automated production system as early as the K trade fair in 1986, long before Industry 4.0 became a thing — but it's now gained unstoppable momentum. As 2020 approaches, if your processing machines aren't connected together, collecting performance data and communicating it with the operators, you risk becoming a dinosaur. And now as then, Germany's K trade fair is the place where new connected injection molding technology gets unveiled. Here's just some of the smart machines, smart processes, and smart services that will be on display at K 2019.

## PREDICTING PROCESSES

Arburg is introducing its new plasticising assistant technology, with functions that include predictive maintenance of screw wear. Smarter production takes advantage of the new Arburg turnkey control module (ACTM), a SCADA (supervisory control and data acquisition) system for complex turnkey cells. It visualizes the complete process, captures all relevant data, and transmits job-specific data sets to an evaluation system for archiving or analysis. The company will also be making its arburgXworld customer portal, already available in Germany, available internationally as of K 2019 with new, fee-based functions including the self-service dashboard for machine status, the control system simulator, collection of process data, and details of the machine design.

Engel has offered the iQ series of machine control systems for awhile now, but will extend the range at K 2019 with new functionalities. "The new iQ process observer goes beyond monitoring and analysis of individual molding operations to offer a comprehensive overview of the processes used to deliver a given product batch," said Paul Kapeller, product manager for digital solutions at Engel. In total, Kapeller said, the iQ

process observer continuously analyzes several hundred process parameters across each of the four key phases of injection molding — plasticising, injection, cooling, and demolding. "The system compares and contrasts machine performance with previous results to determine if there's an ongoing issue," he said. "Machine operators can be alerted by text message if a machine falls out of a given performance range." The results of the analysis are immediately available on the molding machine's CC300 control unit and the Engel e-connect customer portal, Kapeller added.

## INTEGRATING IT

Haitian International, which sells a good share of its machines in China's very price-sensitive market, takes what it calls a more cost-conscious spin on Industry 4.0. "We work with system partners and customers to find a sensible approach to Industry 4.0, because not every individual plastics processor needs the latest marked-up connected technology," said Glenn Frohring, one of the owners of Absolute Haitian, which distributes Absolute Haitian and Zhafir presses in Canada and the U.S. K 2019 will see the continuation of Haitian's recent partnership with French robot maker Sepro Group that makes Sepro three-axis, five-axis, and six-axis robots available worldwide as options on new Haitian units. Under this arrangement, the robots have a user interface based on Sepro's Visual robot control that's fully integrated and accessible from the Haitian or Zhafir



injection molding machine operator interface. “This integrated offering gets to the heart of the benefits customers will experience with Industry 4.0,” Frohring said. “It allows customers to select products in a way that makes sense for them, rather than being boxed into single-supplier solutions.”

KraussMaffei will showcase a new technology that allows processors to align older equipment with Industry 4.0-style connectivity through a simple retrofit. Available through the company’s new digital and service solutions business unit, options of the retrofit program include monitoring for predictive maintenance and what KraussMaffei calls “data analysis as a service.” This second offering is a function of KraussMaffei’s new Social Production app,

Engel is extending the range of its iQ series of machine control systems with new functionalities.



Photo Credit: Engel

which the company says uses the advantages of social media for a completely new type of production monitoring. This patent-pending function identifies process disturbances autonomously, based on underlying data, without any user configuration, and provides tips on possible solutions. According to KraussMaffei, Social Production makes it possible to detect

and prevent or solve problems at an early stage, and is compatible with all brands of injection machines. “Its industrial messenger function is intended to replace messaging programs such as WhatsApp or WeChat as a means to simplify and accelerate communication and collaboration in manufacturing,” said KraussMaffei CEO Frank Stieler.

### EXPANDED DATA ACQUISITION

Milacron will highlight its M-Powered web portal and suite of data analytics with capabilities such as “MES-like functionality,” OEE (overall equipment efficiency) monitoring, intuitive dashboards, and predictive maintenance — all designed to harness observational and analytical data to give molders a competitive advantage through insight. “M-Powered provides unique intelligence on a molder’s cur-

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rent operations and future needs, sharpens manufacturing quality and productivity, and optimizes uptime,” Milacron’s chief marketing officer Giovanni Spitale said. “M-Powered also includes full API integration as a standard setup in addition to applicable hardware such as our Red/Green Boxes and dedicated network security.”

Sumitomo (SHI) Demag Plastics Machinery will release its myConnect customer portal at K, a secure web-based software solution designed to provide customers with a central platform to access a wide range of fully-connected support services. “The myConnect service package comprises several modules,” said Andreas Holzer, the company’s director of customer service. “mySupport’ can request expert assistance; ‘myDocumentation’ allows you to connect directly to the central service department, where the system automatically checks and issues the

most recently updated documentation. Additionally, the service package includes a ‘myConnectApp’, allowing customers to track production from any location. And for increased traceability, a record of all key events is recorded in ‘myLifeCycleLog.’”

Wittmann Battenfeld will be demonstrating its HiQ intelligent software packages, including the newest, HiQ-Metering, which is designed to ensure positive closing of the check valve prior to injection. Another new element of the Wittmann 4.0 program is the electronic mold data sheet, which stores settings for both the injection machine and Wittmann auxiliaries to permit setup of an entire cell with a single keystroke. Additionally, the company will demonstrate its condition monitoring system for predictive maintenance, as well as a product of its recent joint venture with Italian MES software supplier Ice-Flex: TEMI+ is described as a

simple, entry-level data collection system that’s integrated with the injection machine’s Unilog B8 controls. **CPL**

### RESOURCE LIST

**Absolute Haitian Corp.** (Worcester, Mass.); [www.absolutehaitian.com](http://www.absolutehaitian.com); 508-459-5372

**Barway Plastic Equipment Inc.** (Vaudreuil-Dorion, Que.); [www.barway.ca](http://www.barway.ca); 450-455-1396

**Shadow Automation Inc.** (Uxbridge, Ont.); [www.shadowauto.ca](http://www.shadowauto.ca); 416-464-2070

**Arburg Inc.** (Newington, Conn.); [www.arburg.com](http://www.arburg.com); 860-667-6500

**DCube** (Montreal); [www.dcube.ca](http://www.dcube.ca); 514-272-0500

**Engel Canada** (Waterloo, Ont.); [www.engelglobal.com/na](http://www.engelglobal.com/na); 519-725-8488

**KraussMaffei Corp.** (Florence, Ky.); [www.kraussmaffei.com](http://www.kraussmaffei.com); 859-283-0200

**Milacron Canada Corp.** (Burlington, Ont.); [www.milacron.com](http://www.milacron.com); 888-254-1919

**Sumitomo (SHI) Demag** (Strongsville, Ohio); [www.sumitomo-shi-demag.eu](http://www.sumitomo-shi-demag.eu); 440-876-8960

**Wittmann Battenfeld Canada Inc.** (Richmond Hill, Ont.); [www.wittmann-group.com](http://www.wittmann-group.com); 905-887-5355



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# AVOIDING A HOT MESS

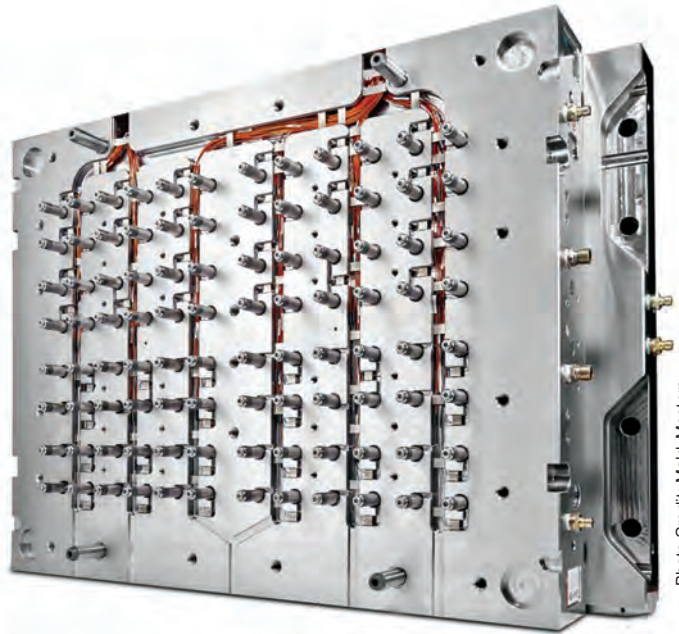


Photo Credit: Mold-Masters

By improving part quality, enhancing operational efficiencies, reducing scrap, and saving money, hot runners have revolutionized injection molding processing capabilities. But they're complex and not exactly low maintenance. The good news is, you can overcome these challenges by addressing a few key issues.

By Mark Stephen, editor

Few things in life are total win-win situations. Even winning the lottery can complicate your life as new "friends" and long-lost family members come out of the woodwork to help share in your good fortune.

Hot runners are another case in point. A known technology for more than 50 years, with commercial systems being available for more than 40 years, hot runner systems have undeniable advantages, including faster cycle times, balanced melt flow, the ability to sequence the gates, and the elimination of wasteful runners that can be up to half the total shot weight.

On the other hand, it's hard to deny that hot runners also add a layer of complexity that may seem daunting, especially to processors that cut their teeth on simpler cold runner systems. But it doesn't have to be this way. By following a few simple rules, keeping their eyes open for some common problems, and following a preventative maintenance schedule, processors can

avoid the downsides and reap the benefits of optimal part quality.

## START AT THE BEGINNING

Hot runner problems can begin at the beginning if proper procedures aren't followed. "A processor has to follow the appropriate start-up procedure recommended for a specific hot runner system with consideration of the material being used," said Brian Finkel, U.S. service and repair manager for Mold-Masters' MasterCARE service centre. Part of a good start-up, Finkel continued, involves soak time. "This is required to allow the system to heat and expand, which is important for two reasons: thermal load through the system and the reheating of the material in the melt channels," he said. Knowing the material and the hot runner system allows the processor to determine what the soak time requirements are for each mold. "Heat-sensitive materials may degrade if left to sit at a normal processing setpoint for an

extended period of time," Finkel said. "On the other hand, an insufficient soak time may not allow hot runner components to properly seal — resulting in leakage — or in the material not being ready to be injected, which can damage the components."

This is an area where mistakes can occur, and they can be costly. "Just because the manifold reaches the right temperature doesn't mean it's fully expanded, but processors don't always want to wait the additional 15-20 minutes it takes for full expansion," said Steve Johnson, president of MoldTrax Maintenance Solutions. "Without full expansion on the components, a small leak can be created, and this turns into a larger leak that slowly encapsulates the entire manifold and related wiring. Removing this plastic shell is time-consuming and expensive, and there's a limited choice of cleaning methods available."

The good news is that modern hot runner temperature controllers have

enhanced features for safe, faster start-up. “Husky updated its Altanium hot runner temperature controllers for faster start-up last year, as well as quicker display screen responses,” said Chris Rocheleau, service manager for Husky Hot Runners and Controllers in the Americas. “In addition, our new Altanium valve gate sequencer adds hydraulic and pneumatic valve gate control, combined with temperature control, to the product line.”

And on the subject of hot runner control, the SVG+ hot runner system from Synventive Molding Solutions is designed to save time by providing monitoring and diagnostic tools from outside of the molding machine, resulting in less downtime, less scrap, and increased reliability. “The SVG+ systems are equipped with a new modular actuator design and SynCool3 technology, which provides cooling of the actuators without the need for separate cooling lines,” said Bill Rousseau, Synventive’s director of applications and technical services. “These systems are delivered ready to connect to a valve monitoring interface — or VMI — for monitoring, diagnostics, and troubleshooting from outside the molding machine. VMI provides measured individual pin movement data and allows operators to check whether the valve pins are moving as intended.”

### TOO HOT

Once the hot runner system is up and running, processors can also be plagued by leaks from a different source: a process temperature that exceeds the levels for which the system was designed. This is actually the root cause of the vast majority of material leaks, the hot runner suppliers say, and occurs when excessive thermal expansion exerts pressure on the system, causing components to shift position and create room for a leak.

It’s also important to ensure the appropriate mold cooling is active anytime the hot runner system has heat in it, even during shutdown. “Residual



Synventive’s SVG+ hot runner system is designed to save time by providing monitoring and diagnostic tools from outside of the molding machine.

heat can damage components like actuator seals and O-rings and reduce their effective lifespan, which leads to more frequent maintenance and/or downtime,” Brian Finkel said. “If these are allowed to get to a point of failure, either by premature wear or excessive heat, they’ll leak air or the hydraulic oil used to actuate the valve pins.” To ensure proper cooling of all areas of a mold, the processor should have a water circuit for each individual cavity. “I’ve seen many systems over the years where a single water circuit was feeding water jumpers to cool multiple cavities, and the results usually aren’t good,” Steve Johnson said.

### THE TROUBLE WITH THERMOCOUPLES

Overshooting setpoints can be a hot runner problem, and is one of the most commonly misdiagnosed because the root cause isn’t always clear. “Too often the wrong components are replaced blindly in hopes of solving the issue, when in fact thermocouples are the most common culprit,” Bill Rous-

seau said. “The chief cause of a problem with a thermocouple is wires becoming pinched if they’re trapped between mold plates or part of the hot runner and a mold plate during assembly.”

A variation of an overshooting zone issue is when one zone is overshooting while another zone is lagging behind. “This is typically caused when the thermocouples and heaters of two zones have been swapped so that the thermocouple of one zone is controlling the heater of the other and vice versa,” Rousseau said. “This is usually the result of a wiring mistake in the hot runner itself, but it can also be caused by bad cables.”

A bad thermocouple can also result in zones not reaching setpoint, although a failed heater or a cable/connector issue might also be the culprit. “For this problem, check the easiest things first,” Rousseau said. “Inspect the connector pins in the controller for any that are bent or have pushed into the connector, breaking the electrical circuit; check for continuity of the heater zones; and do a visual inspection for plastic leakage or signs of a water leak. If none of these are the cause, replace the thermocouple.”

Along with the additional layer of complexity, hot runners create increased residence time for the molten plastic, which can lead to material burning in the hot runner system, especially with polymers that are time/temperature sensitive. “The higher the temperature, the less time until degradation begins,” Rousseau said. “However, even time spent at lower temperatures adds to the heat history of the material and can contribute to degradation down the road.”

Additionally, burns in a hot runner system can be caused by areas with a steel temperature over setpoint; or by stagnation points in the hot runner where material becomes trapped, rather than flowing through. The bad news in this second instance is that even in a perfectly constructed hot runner sys-



tem, there are a couple of common stagnation points, most commonly at the interface between the machine nozzle and hot runner inlet. According to the hot runner suppliers, steps that can eliminate burning include reducing screw speed and backpressure to cool down the melt; and slowing down the filling, since the melt can also pick up a significant amount of heat from shear as it flows through the hot runner system.

### YOU PAY FOR WHAT YOU GET

With more than 40 hot runner systems manufacturers operating today, it's safe to say that not all systems are created equal. "In addition to built-in wiring problems, poor watt-to-mass ratio could cause hard to solve issues for the processor," said Tim Bruin, customer service manager of North America for HRSflow-INGlass USA Inc. "Also, some manufacturers use cheaper steels

for making manifolds, and some don't have a thorough understanding of the application of the mold or the part being produced." But this is a problem you can avoid by selecting an experienced, reputable hot runner supplier and building a good relationship with them. "You always get what you pay for, and processors looking to buy hot runners have lots of choices and should consider these aspects," Bruin said.

### MAINTENANCE IS KEY

What every hot runner brand, good or bad, has in common is the need for preventative maintenance. The challenge? It's tedious work that requires focus, patience, and a deft hand when removing and handling tooling. "It takes discipline to stop and investigate if you feel excessive resistance when removing or installing valve pins, heaters, manifolds, and related

tooling," Steve Johnson said. "Applying the wrong amount of force can lead to catastrophic results, so knowing what excessive resistance feels like is a crucial skill that separates an apprentice from a journeyman." But it's worth it: Hot runner maintenance can save up to 40 per cent compared to the cost of a new hot runner system, the suppliers say.

As a general rule, the less hot runner systems are taken apart and the seals are broken, the better. Most hot runner suppliers recommend maintenance on the system once every six months, involving everything from heater resistance and connectivity checks and replacement; to disassembling and cleaning valve gates; to inspecting and verifying tooling conditions; and to removing, cleaning, and reinstalling fixed gate tips. And since thermocouple failure is unpredictable,

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## hot runners

some hot runner suppliers recommend replacing the old with the new when performing maintenance on the hot runner system.

But whatever you do, don't dive blindly into a manifold teardown unless you've been trained to perform maintenance on that particular brand of hot runner system. If you haven't, contact the hot runner manufacturer's service department and ask them to walk you through the procedure. "Many of the technicians in today's shops lack exposure to hot runners — they've never seen what a manifold looks like and don't really understand how it works," Tim Bruin said. "Training from the hot runner supplier is key because it gives you an understanding of the system — you'll be able to visualize the material in the manifold — and of the importance of documenting the maintenance process." This last step is hard to over-

emphasize. "Every manifold has its own quirks and procedures or sequence of events, and these should be documented in the maintenance manual and followed diligently by all repair technicians," said Steve Johnson.

Since working on hot runner manifolds and components is such a delicate job, some shops might be reluctant to undertake their own in-house manifold maintenance and repair. For these, many hot runner suppliers offer maintenance and refurbishment programs. "Husky's refurbishment process includes both major and minor hot runner maintenance items," said Chris Rocheleau. "We can get rid of contamination in the melt stream, and use a scope to make sure there are no restrictions in the melt flow. In some cases we don't refurbish the whole system, perhaps only the manifold or tip assembly, although

if the customer wants it restored to new we can do that too."

Although there will be an ongoing need for cold runner molds, the advantages of using hot runner systems are so great that they will increasingly be the runner technology of choice for molds used in molding thermoplastics. Which is why mastering the nuances of processing with hot runners might just be one of life's genuine win-wins. **CPL**

### RESOURCE LIST

**HRSflow-INGlass USA Inc.** (Byron Center, Mich.); [www.hrsflow.com](http://www.hrsflow.com); 616-228-6900

**Husky Injection Molding Systems Ltd.** (Bolton, Ont.); [www.husky.co](http://www.husky.co); 905-951-5000

**Mold-Masters** (Georgetown, Ont.); [www.moldmasters.com](http://www.moldmasters.com); 905-877-0185

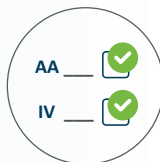
**MoldTrax Maintenance Solutions** (Ashland, Ohio); [www.moldtrax.com](http://www.moldtrax.com); 419-281-0790

**Synventive Molding Solutions Canada Inc.** (Toronto); [www.synventive.com](http://www.synventive.com); 416-428-4693

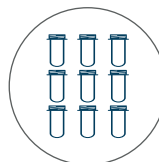


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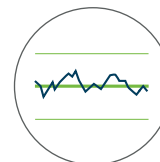
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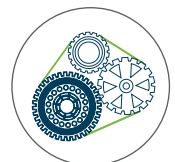
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# STONE STRAW

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Traditional plastic straws are now on the endangered species list, which is why this well-known Brantford, Ont.-based extruder is making the move to an eco-friendly plant-based alternative.

By Mark Stephen, editor

**A**lmost 70 million years ago, a mass extinction wiped out three-quarters of the plant and animal species on Earth, the dinosaurs famously among them. Only a few species that could adapt were able to survive, including the ancestors of modern birds, turtles, and crocodiles.

Fast forward to today and another extinction seems to be taking place: plastic straws. The major focus of recent environmental campaigns, single-use plastic straws have gone, almost overnight, from ubiquitous to endangered, with more and more cities, restaurant chains, movie theatres, sports facilities, and even airlines phasing them out. And we can now add entire nations to the list, with the recent announcement that Canada plans to ban all single-use plastic items —

which will definitely include straws — by as early as 2021.

But human behaviour is difficult to change. People still prefer straws — some people with disabilities need them — and while metal, paper, and silicone straws have received some attention, none have caught on. Stone Straw, a straw manufacturer since 1888, saw an opportunity to adapt and not only survive, but thrive. A long-time extruder of traditional plastic straws, the Brantford, Ont.-based company is going plant-based with its new Back to Earth compostable plastic straws.

### THE ORIGINAL STRAW MAKER

Stone Straw is practically synonymous with straws. The company's founder, Marvin Stone, invented the original paper straw almost 140 years ago, and

his invention was the go-to choice until plastic varieties became the standard in the 1970s. Today, Stone Straw and its parent company Wentworth Technologies manufactures about 300 types of plastic straws, stirrers, plastic cups, and lids — which puts it at Ground Zero in the war against single-use plastic. “Our industry is under enormous pressure from consumers and the food service and hospitality industry, and we were definitely feeling it too, and it was beginning to affect our customer base,” said Abe Looy, the company's regional operations manager. “Our straws have traditionally been made with polypropylene, and orders for them were beginning to drop. So we got proactive: Rather than waiting until the bans on single-use plastics take effect, we got ahead of the bans by moving from PP into biopolymers early on, on our own, and we're encouraging our customers to get ahead of them as well.”

Introduced to the market a few months ago, Stone Straw's Back to Earth straws are made with a compostable biopolymer. “We worked with

a major chemical supplier to develop a material that's compostable and also robust enough for our profile extrusion," Looy said. "The supplier developed something that looks, feels, and performs like PP but can be certified as industrially compostable."

And that last part is key. Back to Earth straws have been approved by the Biodegradable Plastics Institute, which ensures the material is consumed by microbes, which allows the straws to contribute to the circular economy by creating valuable compost; and also meets ASTM D6400 and/or D6868 standards, which means that in 180 days or less the straws will decompose to 90 per cent CO<sub>2</sub> and 10 per cent biomass in an industrial or municipal composter. "Having this certification is important because Stone Straw is the only supplier that most of our customers has ever had, and when we ask them to make the switch from PP to compostable straws, they have to be able to trust us," Looy said.

One of Stone Straw's biggest customers is Booster Juice, which is now transitioning to Back to Earth straws in all of its Canadian stores. Known for their signature smoothies, Booster Juice has a unique product that cannot be easily consumed without a straw, so it was particularly receptive to the new compostable straws. "We worked closely with Booster Juice to develop the right straw for its product,

fine-tuning every detail, including the packaging and developing a bright purple colour," Looy said. "The straws can now be easily recognized by customers and come in one size, which can be used in all of Booster Juice's beverages." Other quick-service restaurants are also interested in the straws, Looy said.

So how cutting-edge are the Back to Earth straws? "We're the first company in North America to extrude this type of biopolymer for straws," Looy said. "Several companies in Southeast Asia are making these straws and importing them into Canada, and a few companies in the U.S. are currently testing this material for straws, but that's the extent of it."

### OVERCOMING THE CHALLENGES

But this newness wasn't without its own set of challenges, beginning with the material itself. "More traditional, neat PLA is brittle and can shatter, whereas straws have to be able to bend," Looy said. "So we had to work with our chemical supplier to develop a proprietary, functionalized variation to the standard PLA that's offered in the market today."

Stone Straw also had to make some changes to the machinery on its shop floor. "To a certain extent extrusion is extrusion, but once the product leaves the die, differences in material properties come into play, and this biopolymer is a much different material than PP," Looy said. "We had to custom-build some of our profile extruders to process a compostable resin, and also had to miniaturize a silo to store the material properly because it has to be kept absolutely dry." In a nutshell, Looy said, processing this compostable polymer requires customized speeds, lower temperatures, and much more accurate controls compared to PP. "Without that combination, you'll have product failure — we know, because we had plenty of product failure during our trials," he said.

Finally, there was a learning curve for all of Stone Straw's 65 employees. "All of our workers had to understand this material and its quirks, from the engineering department to maintenance to machine operators," Looy said. "Now that we've all got a handle on it, it seems easy, but it was difficult at the time because we had only ever run PP. The motivation was, if we want to still be in business five years from now we had to make this transition, and everybody understood."

As innovative as it is, the Back to Earth straw still isn't the final word on sustainability. "We're working on a successor product right now — a plastic straw that decomposes in the marine environment, which means the effective end of straws polluting oceans and waterways," Looy said. "It'll also be certifiable for landfill, not just industrial composters, which means that it will be certifiable for everywhere that a post-consumer straw could conceivably end up, 100 per cent of the time. My colleagues and I jokingly call it the Holy Grail of straws, but once we get the chemistry worked out, it's definitely doable."

Which means that, despite the considerable pressures, plastic straws don't have to go the way of the dinosaurs. **CPL**

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# COOL COMEBACK

Industry veteran Pat Zaffino and his team are back in business with a game-changing conformal cooling technology for injection molds.

By Mark Stephen, editor

Everyone appreciates a comeback story, and Pat Zaffino's is shaping up to be a good one. A 36-year industry veteran, Zaffino has returned to the moldmaking industry with hard-wire deposition technology that creates 3D metal objects on an existing 3D injection mold surface. "With this capability, we can now create conformal cooling channels on injection molds by means of a proprietary additive manufacturing technology," Zaffino said.

Zaffino was formerly the owner of specialty welding company Tool-Tec Welding Inc., in Oldcastle, Ont. In 2005, he and his team at Tool-Tec began developing an additive manufacturing technology for welding engineering changes on molds and dies. "The mold industry has been around for a very long time, and tungsten inert gas — or TIG — tool steel welding on molds has been a part of moldmaking for just as long," Zaffino said. "By early 2008 our team of welding experts and electrical and software engineers had developed a technology to create 3D water lines on contoured mold surfaces. The process involved machining a slot or slots into a block of tool steel, and testing on how to best bridge across the channel by applying the additive process to deposit weld beads placed in a precise sequence to minimize distortion of the channel and mold surface."

According to Zaffino, multilayer robotic deposition technology has documented repeatability and traceability that surpasses manual TIG welding. "The tool steel materials that are applied to the mold surface with the combination of pre-heat, welding wire, and post-stress relief provides a class A welding surface that's very comparable to the parent metal," he said. "Automating the hard-wire deposition process eliminates imperfections and any possible safety concerns." The technology lets the customer implement conformal cooling on a range of part sizes such as an entire bumper, dashboard or wheel liner, as well non-automotive tooling. "We can produce conformal cooling

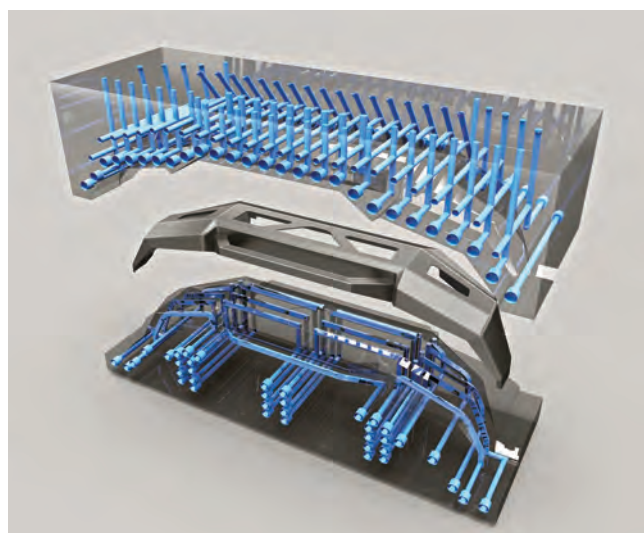


Photo Credits: Conformal Cooling Solutions

A conventional mold with gun-drilled cooling passages (top), and a mold core with Conformal Cooling Solutions' conformal cooling passages (bottom).

circuits around contour surfaces at a fraction of the cost of other additive manufacturing processes," Zaffino said. "The technology gives moldmakers options they never had before — by utilizing a combination of conformal cooling channels and conventional baffle water line systems, the mold surface can cool more uniformly and create more room on the tool to assist engineers and toolmakers in the design process."

As part of the testing process, an OEM implemented conformal cooling channels in various tools for testing and found the results to be very promising. "One of the tests conducted on a bumper tool, using solely conformal cooling channels, resulted in improved mold cooling efficiency and cycle time reduction from 54 to 41 seconds, which is a 24 per cent cycle time improvement," Zaffino said. "In other applications and testing, the combination of conformal lines and baffles showed similar outcomes."

But a short time later the Great Recession arrived and Tool-Tec, like many smaller shops, shut down. Zaffino retained the patent applications for the additive/conformal cooling technology, but use of the patents was brought to a halt due to an intellectual property dispute between Zaffino and the afore-mentioned OEM, resulting in a United States Patent Office proceeding that involved three

spots,” Zaffino said. “Creating conformal cooling channels that follow the shape of the cavity and core promotes temperature uniformity in the plastic materials being molded, and molders that use this technology are seeing striking results: shortened cycle times, improved plastic part quality, and — above all — cost reductions.”

Conformal cooling is definitely a game-changer, Zaffino said. “Tool and

multilayer robotic welding is all hard-wire deposition in the form of TIG, laser, and plasma. “Powder-metal laser sintering is a fairly new process compared to hard-wire deposition,” he said. “Automating the hard-wire deposition process eliminates imperfections and has minimal residual stress on tooling.”

The process developed and patented by Zaffino begins at the tooling design stage, where software such as MoldFlow analysis determines and calculates the best placement of conformal channels. “The channels are then machined into the part molding surface using the data during the block roughing stage,” Zaffino said. “The proprietary software reads the data of the paths, determines the correct offsets and buildup required, and then communicates this data to the robotic cell.” Next, Zaffino said, the tool is placed on a multi-axis table with pre-heating ability and brought to 205°C or 400°F. “The robot will then orientate and pick up vertices on the tool and place itself in relation to the mold, whereby the system starts to apply the hard-wire deposition in a layer sequence to minimize distortion of the channel and mold surface,” he said. The mold is then heat-treat normalized and sent to the mold company for finishing.

Equipped with 11 patents, CCS is now on the lookout for tool and mold companies and injection molders that are open to the idea of a 25 to 40 per cent reduction in cycle time as well as decreased part distortion. “By reducing hot spots in tooling and improving cycle times, our conformal cooling technology is a good fit for automotive parts molders, and also adds value for consumer goods, aerospace, defense, and medical parts production,” Zaffino said. “Our tooling and molding industries have lost a lot of business to overseas competition over the past 15 years, and we’re hoping this technology will help bring more tooling programs back to be built in North America.”

Which would be the ultimate comeback. **CPL**



**We can produce conformal cooling circuits around contour surfaces at a fraction of the cost of other processes.**



U.S. patent judges. After reviewing documents from both parties, they decided the patents could remain with Zaffino.

**A BETTER BUILD**

Fast forward to April 2019 and Zaffino launched his new company, Conformal Cooling Solutions Inc. (CCS), where he serves as operations manager. The goal of CCS, which is in Oldcastle, is to service the growing numbers of injection molders that have discovered the advantages of using conformal cooling channels. “The shape of some tooling parts has complicated areas where it may be difficult to place water in the conventional way of baffles, and this can cause hot

mold companies can now build lifters, slides, and tooling inserts for their molds, but instead of straight water lines we can now machine channels that follow the molding surface,” he explained. “Laser sintering is a great additive manufacturing process that can create conformal cooling lines in the 3D printed insert to a customer’s specification, allowing for the insertion of cooling in geometric designs that were previously not attainable — but laser sintering has size limitations. The technology developed by our team has no size limitations; it can be used with small tooling for the medical industry and larger tooling for the automotive industry.”

Additionally, Zaffino explained,



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If you doubt the plastics industry has gone truly global, look no further than the triennial K trade fair. The last K in 2016 recorded 3,293 exhibitors from 61 countries and attracted 232,053 trade visitors, including 71 per cent from outside Germany. K 2019, which runs from Oct. 16 to 24, promises to be as least as big, with more than 3,200 exhibitors. If you can't attend, we get it: it's far away, expensive, crowded, and difficult to get around and be understood in Düsseldorf. But the processing equipment, auxiliary equipment, and other technologies introduced over there will be available for purchase here, either immediately or shortly thereafter — which means you should know about them. Here's a small sample of what will be unveiled.

## AUXILIARY EQUIPMENT

### Rebranded vacuum dryers offer big energy savings



**Maguire Products Inc.** is rebranding its VDB vacuum resin dryers as the *Ultra* series, reflecting its ability to pay for itself by saving in energy costs.

In a typical material drying example for a process running at 220 lbs per hour for 6,000 operation hours per year, an average desiccant dryer might run at 60 watts per lb of material, versus the *Ultra* low energy dryer that would run at 19 watts per lb. Each system uses the same amount of energy but the energy used to dry is dramatically different: a comparable desiccant dryer would use almost 45 watts to dry

the material so it can be processed, whereas to the same level the *Ultra* would only use four watts.

Additionally, the use of data provided by the load cells allows the dryer to achieve many functions automatically — such as automatic starts and stops — and also makes possible automatic adaptive drying, so that only the material that's required for a process is dried.

*Ultra* dryers are available for throughputs of 150, 300, 600, and 1,000 lbs per hour.

**Maguire Products Canada Inc. (Vaughan, Ont.);**  
[www.maguireproducts.com](http://www.maguireproducts.com); 905-879-1100

## INJECTION MOLDING

### Optimized hydraulic oil promises energy savings

**Dr. Boy GmbH & Co. KG** is now optionally equipping its servo-hydraulic injection machines with the new *EconFluid*

optimized high-performance hydraulic oil, which can save up to 10 per cent or more in energy consumption due to its viscosity profile.

Extensive tests with *EconFluid* showed a significantly lower power consumption of the injection molding machines in comparison with the commonly used hydraulic oils. For example, power consumption dropped from 1,950 watts to just 1,765 watts during a sample cycle. The *Boy 35 E* unit, for example, consumes up to 10 per cent less electrical energy with this new oil.

*EconFluid* — which can be used for up to five years with appropriate care — also provides consistently lower oil temperatures, which means a significant reduction of the energy required for oil cooling and longer oil-replacement intervals.

**Boy Machines Inc. (Exton, Pa.);**  
[www.boy machines.com](http://www.boy machines.com); 610-363-9121



### Adjustment plates boost injection molding process

**Hasco's** new Z555, Z556, and Z557 pressure and adjustment plates are designed to permit uniform adjustment of the pressure distribution in the mold parting surfaces and allow height differences to be readily offset, thereby helping to achieve a high reliability throughout the injection molding process.



Through the defined pressure distribution, they offer precise mold parting surfaces, which prevents any deflection of the cavity plates. Adjustment plate Z557, with lubrication grooves, can additionally be used as a sliding plate where there are inclined height differences in the parting line.

Available in 70 new sizes, the Hasco adjustment plates in 1.2842, hardened to 58 HRC, come in round and rectangular versions, are ready to mount with recessed fixing holes, and are available from stock.

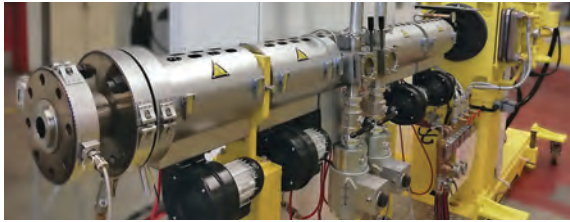
**Hasco Canada Inc. (Toronto);**  
[www.hasco.com](http://www.hasco.com); 416-293-5044

## EXTRUSION

### High-speed sheet extruder

**Kuhne Maschinenbau GmbH**, part of the Kuhne Group, is introducing the *KHS90EE-39D* extruder, an addition to its family of high-speed Smart Sheets extruders with a 90-mm screw diameter and a 39:1 L:D ratio that's designed to offer greater output and the ability to produce wider sheet than the company's 70-mm and 60-mm versions.

Like the other KHS extruders, the 90-mm machine fea-



tures a direct-torque drive and water cooling, and has no gearbox or belt. These design characteristics save energy and also reduce noise and the need for spare parts and maintenance.

With a relatively small footprint, the KHS90EE-39D extruder is equipped with a 664-hp drive and can extrude 5,730 lbs per hour of PS sheet or 4,850 lbs per hour of PP sheet. It also can process ABS.

And with its direct-torque drive, the KHS90EE-39D carries a lower price while offering output comparable to the Kuhne K180 extruder, which has a conventional, significantly more expensive drive.

In addition, colour and material changes are faster because the screw turns more quickly than on conventional models.

**Kuhne Group USA (Charlotte, N.C.);**  
[www.kuhne-group.com](http://www.kuhne-group.com); 980-417-2722

## BLOWN FILM

### Phase 2 of intensive cooling technology

**Addex Inc.** will launch *Phase 2* of its intensive cooling technology at K, an innovative approach to cooling the bubble that can offer dramatic increases in stability and output.



Phase 1's intensive cooling research and development focused on adapting the technology to run a range of both high- and low-melt materials; now in Phase 2, Addex is taking a fresh look at the design of other components within the blown film cooling process, with an eye toward optimizing total system performance in combination with intensive cooling to support fast changeovers and enhanced bubble stability, even at higher output rates, yielding an even broader range of processing parameters such as BUR (blow up ratio), thickness, and melt strength.

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The new system optimizes performance for both high- and low-melt strength processes; the most popular configuration replaces the conventional dual flow's low-velocity, diffused flow lower lip with a very high-velocity, upwardly directed, and focused air stream, which is mounted flat to the die to create an entirely new lock point, about 25 mm above the die lip.

When combined with Addex's patented auto profile external gauge control, Phase 2 technology can offer significant improvements in thickness variation; and is also fully compatible with Addex's digital internal bubble cooling (IBC) control when installed with special IBC hardware.

**Addex Inc. (Newark, N.J.);**  
**www.addexinc.com; 315-331-7700**

## PELLETIZING

### Improved strand pelletizers for optimized pellet quality

**Coperion Pelletizing Technology GmbH** is introducing improved dual bearing strand pelletizers which have been re-engineered to offer easy, rapid handling and optimized

pellet quality.

The *SP140*, *SP240*, and *SP340* models in the SP series have been equipped with a variety of enhanced features, beginning with a new proprietary technology for cutting gap adjustment designed to offer faster and more comfortable adjustment. Fine adjustment is also simpler and more precise, as it can be done by hand without tools. Likewise, the integrated spring pre-tensioning eliminates the screws' free clearance, markedly reducing machine setup times.

Along with the more compact design and integration of the operation panel into the machine, the reworking of the interior space counts first and foremost among further new developments. The robust cutting tools have been installed closer to one another, thus enabling a shorter, unguided strand length in the pelletizer and the best possible cutting results, especially with soft materials. This new construction results in less dead space in the interior which, together with optimized edges and fewer free surfaces, provides improved cleanability.

Further features available as options include a high tem-



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**Coperion (Salina, Kan.); [www.coperion.com](http://www.coperion.com); 785-825-3884**

**Pneu-Tech Systems Ltd. (Woodstock, Ont.); [www.pneutechsystems.com](http://www.pneutechsystems.com); 888-517-1596**

## SIZE REDUCTION

### Single-shaft shredders with modified gearbox

Weima's *WLK* series single-shaft shredders are now available with a modified WAP gearbox, with a safety clutch located in the sensor-monitored belt pulley that now protects the shredder even better from impurities and major damage by making automatic stopping possible at any time.

Clogging on the *WLK* units is prevented by the segmented floor guide and the precise guidance of the ram that



presses the material to be shredded against the rotating rotor. The hydraulically lowered swivel screen basket installed as standard improves accessibility and thus simplifies maintenance work.

In addition to the new gearbox, all *WLK* shredders have a Pipespacer hopper that prevents material bridging — an important aspect when, for example, shredding large purgings. The *WLK* Series shredders can be fitted with either the universal V-rotor or the F-rotor, which is developed especially for film and fibres. In addition, a wear protection coating from Vautid GmbH is available as an option for abrasive materials. Both rotor variants have a diameter of approximately 370 mm.

**Weima America Inc. (Fort Mill, S.C.);**

**[www.weimaamerica.com](http://www.weimaamerica.com); 803-802-7132**

## ROBOTS & AUTOMATION

### New collaborative automation solutions

**Sevro Group** will be showing a series of demonstrations and exhibits that harness the power of collaboration to achieve new levels of productivity, quality, and flexibility in

## Materials Handling E-news

Materials are the single largest expense for plastics processing facilities, which is why having a reliable raw material handling system is as important as having reliable workers. It's also why Canadian Plastics will be sending out a daily themed e-newsletter from Sept. 23 - 27 covering some of the latest conveying technologies and best practices to help you get the most from your conveying systems.

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plastics injection molding.

A total of eight robots will be operating at the company's booth at K, including three-, five-, and six-axis models as well as collaborative units provided through a recently

announced partnership with Universal Robots.

One of the two automation cells on the stand will feature a Sumitomo (SHI) Demag molding machine producing a technical component that will be removed from the mold by an SDR Speed 7 robot. Made by Sepro especially for sale with Sumitomo (SHI) Demag machines, this robot (pictured) is a special high-speed version of Sepro's technological S5-25 three-axis Cartesian robot capable of getting in and out of the mold space in under one second.

The other molding cell will also include a Sepro/Universal Robots cobot together with a Sepro Success 11 Cartesian robot operating on a molding machine from Haitian International, which will be producing recyclable drinking cups with a personalized message printed onto a label and then applied to the cup by a cobot.

**Sepro Canada (Montreal);**

**www.sepro-group.ca; 514-515-9349**

## PROCESS COOLING

### Air-cooled chillers for wide range of processes

Designed to support needs from 38 to 130 tons, **Frigel Group** is launching its 3FR modular air-cooled chillers for plastics processors in need of a smarter option for a wide range of processes, including injection and blow molding, blown film, and cast sheet/film extrusion applications.

The line of super-compact 3FR chillers combine high cooling capacities with high energy efficiency to decrease

cooling times, increase quality and repeatability of product production, and decrease overall costs. Each unit is equipped with a single refrigeration circuit, high-efficiency Bitzer screw compressor with an optional inverter drive, remote air-cooled condenser and on-board digital controls. As a plug-and-play solution, the units provide low charges of refrigerant gas, high energy efficiency, and high reliability. Onboard microprocessor controls found on each chiller offer the ability to optimize performance, including energy monitoring, self-diagnostics, and real-time troubleshooting.

The split-system chillers feature an indoor chiller module and outdoor remote condenser, ultimately reducing the system footprint inside the plant.

**Frigel North America (East Dundee, Ill.);**

**www.frigel.com; 847-540-0160**

**Hamilton Plastic Systems Ltd. (Mississauga, Ont.);**

**www.hamiltonplasticsystems.com; 905-890-0055**



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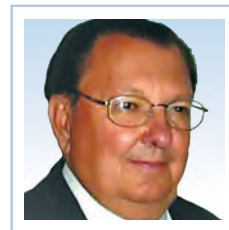
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# Picking the right extruder size

By Jim Frankland, Frankland Plastics Consulting



Knowing that customer requirements change continuously and output improvements are always being pursued, operating people nowadays tend to recommend a much larger extruder than what's really necessary for the job and the capabilities of the downstream equipment. While getting an oversized extruder provides "just-in-case" flexibility, it can also result in much higher daily operating costs. Let's take a look at why.

Both AC and DC drives have a higher power usage per lbs of output at low speeds. DC drives are even more expensive to operate than AC drives at low speeds because of their additional

disadvantage of poor power factor at low speed. The larger extruder increases thermal losses to the environment because the latter are proportional to the heated surface area of the extruder. This can be useful in cold weather to heat the plant, but it's a major cost factor in warm weather, particularly if it requires the use of air conditioning.

more material inside, increasing the likelihood of degradation as well as the amount of degraded polymer.

Simply put, extruder size needs to be considered in the daily economics of producing extruded products. For example, operating a 4.5-inch extruder at 1,000 lbs per hour and a 6-inch extruder at the same output can result in a 50 to 100 per cent increase in total



**Moving up one extruder size roughly doubles the installed capital investment.**



The electrical requirements for heat-up and temperature maintenance are also proportional to the extruder's mass. Heat-up time can double from one extruder size to the next. Although not usually a major cost factor, larger extruders also require more floor space. More importantly, they also require larger capacity utilities with higher expenses associated with installation and maintenance.

Another important cost factor is the extra time it takes to start and changeover a larger extruder. This extra time results in lost production and generation of larger amounts of scrap. Even routine changeovers requiring purging are more expensive, as much more purge material is required to change materials or colours.

Naturally the capital investment expense goes up with machine size, and that has to be amortized into the production cost. Moving up one extruder size roughly doubles the installed capital investment. At equivalent outputs, larger extruders have more residence time and have

operating cost, depending on the particulars of the equipment, electrical cost, number of changeovers, and polymers being processed.

Picking the right size extruder is pretty much a function of the output at a reasonable screw speed. The proper L/D ratio depends on the requirements for mixing, venting, and pressure generation. Horsepower is a function of output and the polymer being processed and can be easily calculated. However, this can be a rather complex matrix of choices, and decisions should be left to experts.

My advice is to develop an hourly operating cost for each extrusion line and try to fit production to the least expensive line as a part of the scheduling procedure.

**CPL**

*Jim Frankland is a mechanical engineer who has been involved in all types of extrusion processing for more than 40 years. He is now president of Frankland Plastics Consulting LLC. Contact him at jim.frankland@comcast.net or 724-651-9196.*

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# MOLECULAR SIEVE DESICCANT

## HIGHEST QUALITY – TWO TYPES – TWO SIZES

**GUARANTEED TO BE PURE – CLEAN – FRESH MOLECULAR SIEVE DESICCANT**

Desiccant dryer manufacturers recommend changing your desiccant tanks or beds periodically to assure optimum performance of your desiccant drying units.

PPE supplies both types 13X and 4A molecular sieve desiccant in two bead sizes. Due to the various designs of desiccant plastic material dryers, you must replace your bed material with the same type and size that was supplied with your dryer.

Molecular sieve desiccant type 13X has a 12% higher moisture absorption capacity and a larger pore size than type 4A. The larger pores allow it to absorb moisture faster and also absorb larger molecules of moisture as well. Depending on the quantity and type of molecules present, these could react on the surface of the 13X during regeneration and not come off, thus reducing its capacity to function over time. Type 13X is more subject to contamination which in time renders it ineffective.

Because of type 4A's smaller pore size, it is less subject to contamination. However, because of its lower absorption capacity and smaller pore openings, the rate at which it absorbs moisture will be lower than with type 13X.

Another factor to consider is the bead size. Small beads (8x12 mesh) have a faster rate of water absorption, but they are more dense and cause a higher pressure drop than the larger (4x8 mesh) beads. Always specify the correct type and size molecular sieve desiccant. If you don't know which type of sieve your dryer was designed to use, contact your dryer manufacturer for their recommendation and then call PPE to place your order.

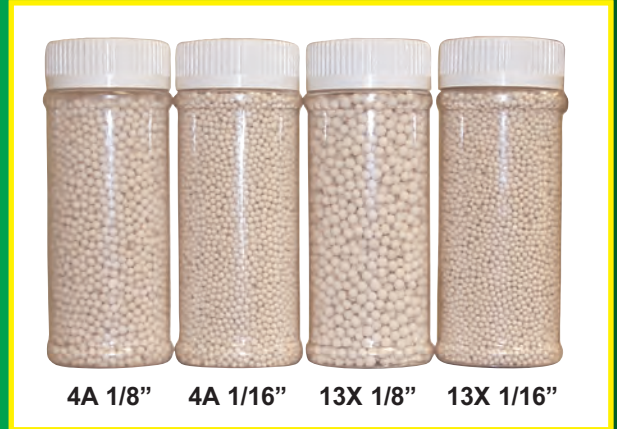
**SOLD IN FACTORY-SEALED CONTAINERS TO STAY FRESH AND DRY!**

Avoids excess moisture or contamination.

The best drying temperature range for desiccant bead regeneration is 400° to 600°F. Do not exceed 1000°F.

**••• LOW DUST TYPE •••**

**FRESH DESICCANT HELPS ACHIEVE LOWER DEW POINTS!**



**ALWAYS KEEP YOUR AIR INLET FILTERS CLEAN!**

**IF YOU BLEND SIZES**

If the smaller diameter bead size passes through your dryer holding tank screen we suggest you consider installing a stainless steel screen of slightly smaller mesh size in your cannister bottom.

**GUARANTEED LOWEST PRICES!**

### TYPE 4A DESICCANT

BEAD SIZE	MESH SIZE	PPE PART NUMBER	CONTAINER SIZE	PRICE PER CONTAINER			
				1 CONTAINER		2 OR MORE	
1/8" <small>Size varies .098 to .177 dia.</small>	4 x 8	MS4A4-030	30 lbs.	\$92.75	(\$3.09 lb.)	\$88.00	(\$2.93 lb.)
		MS4A4-110	110 lbs.	\$322.00	(\$2.93 lb.)	\$306.00	(\$2.78 lb.)
		MS4A4-300	300 lbs.	\$835.00	(\$2.78 lb.)	\$795.00	(\$2.65 lb.)
1/16" <small>Size varies .059 to .098 dia.</small>	8 x 12	MS4A8-030	30 lbs.	\$92.75	(\$3.09 lb.)	\$88.00	(\$2.93 lb.)
		MS4A8-110	110 lbs.	\$322.00	(\$2.93 lb.)	\$306.00	(\$2.78 lb.)
		MS4A8-300	300 lbs.	\$835.00	(\$2.78 lb.)	\$795.00	(\$2.65 lb.)

### TYPE 13X DESICCANT

MIX OR MATCH FOR QUANTITY PRICE BREAKS

BEAD SIZE	MESH SIZE	PPE PART NUMBER	CONTAINER SIZE	PRICE PER CONTAINER			
				1 CONTAINER		2 OR MORE	
1/8" <small>Size varies .098 to .177 dia.</small>	4 x 8	MS13X4-025	25 lbs.	\$85.75	(\$3.43 lb.)	\$81.00	(\$3.24 lb.)
		MS13X4-110	110 lbs.	\$357.00	(\$3.25 lb.)	\$340.00	(\$3.09 lb.)
		MS13X4-275	275 lbs.	\$845.00	(\$3.07 lb.)	\$805.00	(\$2.93 lb.)
1/16" <small>Size varies .059 to .098 dia.</small>	8 x 12	MS13X8-025	25 lbs.	\$85.75	(\$3.43 lb.)	\$81.00	(\$3.24 lb.)
		MS13X8-110	110 lbs.	\$357.00	(\$3.25 lb.)	\$340.00	(\$3.09 lb.)
		MS13X8-275	275 lbs.	\$845.00	(\$3.07 lb.)	\$805.00	(\$2.93 lb.)

SAFETY: Always wear gloves, face mask and safety glasses when handling this product.



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