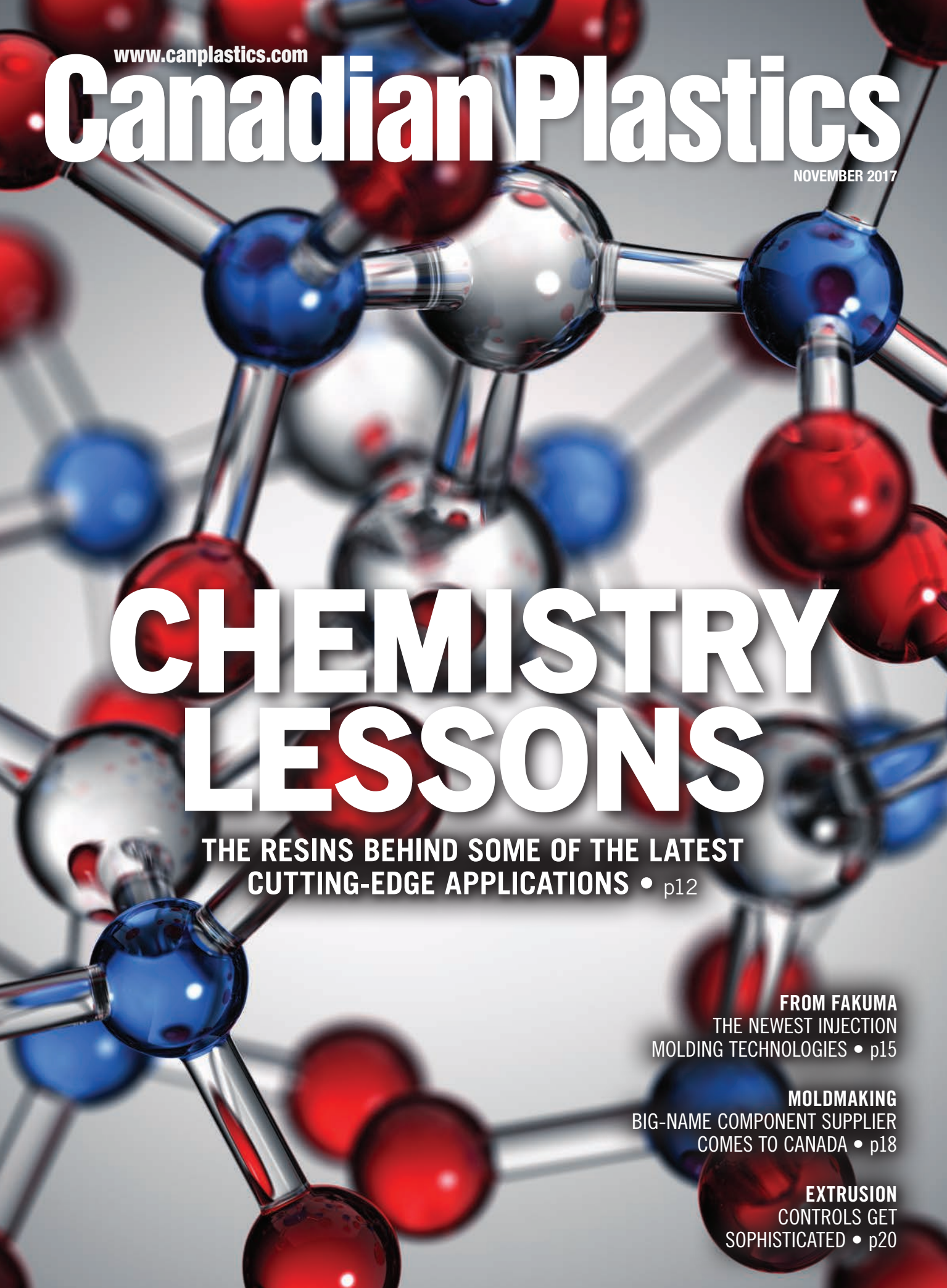
www.canplastics.com

Canadian Plastics

NOVEMBER 2017



CHEMISTRY LESSONS

THE RESINS BEHIND SOME OF THE LATEST CUTTING-EDGE APPLICATIONS • p12

FROM FAKUMA
THE NEWEST INJECTION MOLDING TECHNOLOGIES • p15

MOLDMAKING
BIG-NAME COMPONENT SUPPLIER COMES TO CANADA • p18

EXTRUSION
CONTROLS GET SOPHISTICATED • p20

The POWER of **Performance**

NWB-DC+ Portable Dryer

NOVATEC continues to lead the charge in reliable drying technology and industry-first innovations.

- Most sold
- Easiest-to-use smart controls
- Web-enabled access

5 YEAR warranty

NOVATEC products are made in the USA. Supported worldwide.

Sold & Serviced in Canada by
Maguire Products Canada, Inc.
905-879-1100
info@maguirecanada.com
www.maguirecanada.com

NOVATEC™

www.novatec.com

Canadian Plastics

NOVEMBER 2017
VOLUME 76 • NUMBER 6

contents

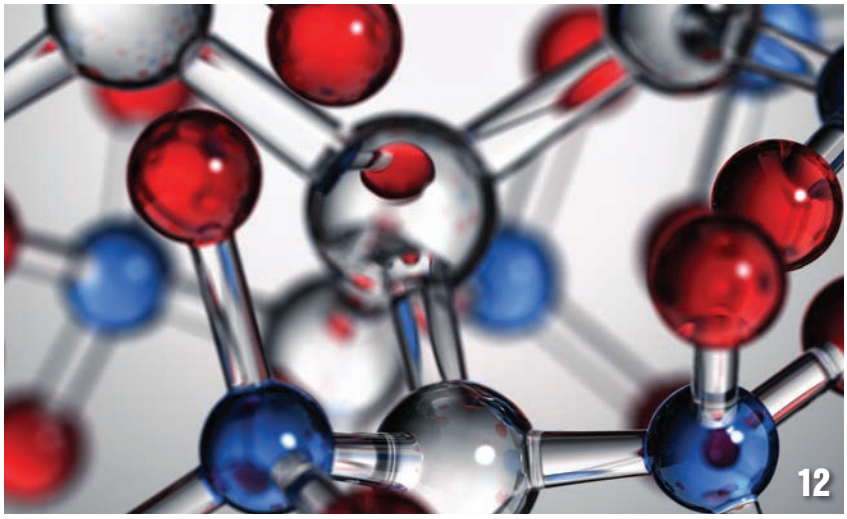
FROM THE ARCHIVES

The July 1967 issue of *Canadian Plastics* told the story of the largest transparent space enclosure in the world to that time: the 20-storey dome that housed the U.S. exhibit at Expo 67 in Montreal. Made from 2,400 individual panels of transparent grey Plexiglas acrylic manufactured by Rohm and Haas Co., the dome was 250 feet wide and 187 feet high, and was constructed only after a miniature prototype survived exhaustive structural load tests by Rohm and Haas. "Three shades of grey in the Plexiglas decrease in degree of light transmittance from the base to the top of the dome to achieve excellent daylighting inside," our story added.

Number of the month:

30*

* The number of business leaders who attended the 2017 Red Carpet Tour in Georgia. (See pg. 6)



Cover Photo: BlackJack3D / Getty Images

12

16

18

in every issue

cover story

features

Visit us at www.canplastics.com

Get the gift of a post-NAFTA strategy

Here's a Christmas gift we could all use: a renegotiation of the NAFTA trade agreement that doesn't hurt Canadian exports. But I'm not overly optimistic. Since President Trump feels extreme pressure to make rapid progress to create new jobs in America and project strength and control, he won't be afraid to tear NAFTA up if necessary.

There are a variety of ways Canadian companies and organizations have responded to the NAFTA uncertainty, ranging from taking a wait-and-see approach to trying to influence the talks and resulting policies. But as Omar Allam, a former diplomat who serves as CEO and founder of the Ottawa, Ont.-based Allam Advisory Group, points out in a recent policy paper, there is a third path that manufacturers should consider: preparing for the U.S. to withdraw from NAFTA. The goal then becomes determining how best to position themselves using Canada and Mexico's existing global trading arrangements as a base.

Allam recommends a two-pronged approach. First, develop your company's own "foreign policy" by honing the skills traditionally associated with diplomacy and statecraft. "It will take a lot of new markets to make up for a U.S. with prohibitively high trading barriers," he said. "The more skill you have as a company with trade and foreign policy, the better able you will be to do business in global markets outside the U.S."

Second, diversify into new and alternative markets outside North America. "Preferential trade deals such as CETA create a window of opportunity for Canadian firms to strategically go after new export and investment opportunities in 28 markets across the Europe Union," Allam said. "Likewise, Mexico has a total of 10 free trade agreements involving 44 countries outside of NAFTA, and Canadian companies can find ways to benefit from Mexican global market access."

If you're still here after the Great Recession to read these words, you already know: A smart business plans for every possible eventuality. So when it comes to the NAFTA renegotiation, be prepared and expect the unexpected.

And while on the subject of Christmas presents, *Canadian Plastics* just received an early gift: a new and extremely capable advertising sales team. Catherine Connolly is our new national account manager, and Joel Verbrugge is our account manager. Together they'll fill the void created when our former publisher Greg Paliouras left the magazine two months ago to pursue a new business opportunity. We wish Greg all the best, and are very happy to have Catherine and Joel on board. Both have extensive sales and marketing experience with other manufacturing magazines, and so are very familiar with the broad outlines of Canada's manufacturing sector. They may be newcomers to the plastics industry, but as I discovered when I joined this magazine 10 years ago, Canada's plastics processors and equipment suppliers are eager to share their expertise with those who want to learn about our sector. And since Catherine and Joel definitely aren't afraid to ask questions, I have no doubt they're both going to learn fast. Which means that *Canadian Plastics* is in good hands.

Catherine Connolly

Joel Verbrugge

To all of our readers, have a safe and happy holiday season.

Mark Stephen, editor
mstephen@canplastics.com

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

www.canplastics.com

EDITOR
Mark Stephen
416-510-5110 Fax: 416-510-5134
mstephen@canplastics.com

NATIONAL ACCOUNT MANAGER
Catherine Connolly
289-921-6520 cconnolly@annexweb.com

ACCOUNT MANAGER
Joel Verbrugge
226-931-1334 jverbrugge@annexweb.com

ART DIRECTOR
Andrea M. Smith

ACCOUNT COORDINATOR
Tracey Hanson
416-510-6762 thanson@annexbusinessmedia.com

CIRCULATION MANAGER
Anita Madden
416-442-5600 ext.3596 Fax: 416-510-6875
amadden@annexbusinessmedia.com

VICE PRESIDENT/EXECUTIVE PUBLISHER
Tim Dimopolous
416-510-5100
tdimopoulos@annexweb.com

COO
Ted Markle
tmarkle@annexweb.com

PRESIDENT & CEO
Mike Fredericks

ANNEX BUSINESS MEDIA
80 Valleybrook Drive, Toronto ON, M3B 2S9
416-442-5600, Fax: 416-510-5134

PRINTED IN CANADA
ISSN 008-4778 (Print)
ISSN 1923-3671 (Online)
Publication Mail Agreement #40065710

CIRCULATION
email: rhtava@annexbizmedia.com
Tel: 416.442.5600, ext 3555
Fax: 416.510.5170
Mail: 80 Valleybrook Drive, Toronto, ON M3B 2S9

2017 SUBSCRIPTION RATES

6 issues Canadian Plastics, plus Dec. 2018 Buyer's Guide:
CANADA: 1 Year $73.50 plus applicable taxes;
2 Years $117.95+ taxes; single copy $10.00+ taxes.
USA: US$128.95/year **FOREIGN:** US$147.00/year
Buyers' Guide only:
CANADA: $103.00 plus applicable taxes and $5.00 shipping

Occasionally, Canadian Plastics will mail information on behalf of industry related groups whose products and services we believe may be of interest to you. If you prefer not to receive this information, please contact our circulation department in any of the four ways listed above.

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

MEMBER: Magazine Canada, Canadian Plastics Industry Association

We acknowledge the (financial) support of the Government of Canada

Making new bio-inspired polymers through electrostatic force

For most of us, the primary result of static electricity is static cling, where clothes annoyingly stick together after being removed from the dryer. But a team of American researchers has achieved something much better by applying an electrostatic charge to polymers to create new synthetic materials that could eventually be used in nanotechnology.

The team — led by Dr. Sarah Perry of the University of Massachusetts Amherst and Dr. Charles Sing, a professor of chemical and biomolecular engineering at the University of Illinois at Urbana-Champaign — worked with a class of polymers called coacervates, and found they could be modified by changing the sequence of electrostatic charges along the polymer chain. Coacervates are commonly used in food products and cosmetics to encapsulate flavours and additives, and as a way of controlling the "feel" of the product. "The challenge has been, if there is a need to change the texture or the thickness, manufacturers had to change the material being used," Perry said.

The goal, then, is to use this kind of chemical patterning to custom-design new synthetic materials. "The idea is to use patterns of chemistry to help design materials in the same way that nature uses amino acids to create functional proteins," Perry said. "We focus on a class of charged polymer solutions called complex coacervates, which in water are known to separate like oil and water into a gel-like substance due to the attraction between opposite charges. We show how polymer sequences can be used to tune this separation process; this opens up new possible ways to design materials, where charge patterns are directly synthesized into a polymer to encode for specific properties."

In the natural world, Perry explained, proteins encode information through a precise sequence of monomers. "However, this precision control over sequence is much harder to achieve in synthetic polymers," she said. "Instead, we can control the charge placement along the synthetic polymer chains to drive self-assembly processes."

The research team's findings, recently published in the journal *Nature Communications*, demonstrate that they can rearrange the structure of the polymer chains by tuning their electrostatic charge to engineer the desired properties. "This is how biology makes the endless diversity of life with only a small number of molecular building blocks," Perry said. "We envision bringing this bio-inspiration concept full circle by using coacervates in biomedical and environmental applications."

Sounds a lot more beneficial than socks clinging together. **CPL**

Getty Images/Thinkstock

DMS executive gets the Red Carpet treatment in Georgia

Mike Hicks and Anna Chafin, CEO of Development Authority of Bryan County and current chair of the Georgia Economic Developers Association.

Arriving at the Masters Tournament.

The police escort.

Photos courtesy of Kiki Morton Photography

With Ontario manufacturers struggling to remain competitive under the combined weight of the province's Green Energy Act and cap-and-trade system, it's instructive — and a bit sobering — to realize just how hard other regions are working to actually *encourage* economic development.

Just ask Mike Hicks, vice president of Windsor, Ont.-based mold component supplier DMS Components. Hicks attended the four-day, invitation-only Red Carpet Tour in April 2017, an event organized by the Georgia Chamber of Commerce to showcase the southeastern state's attractiveness for new business investment. Thirty business leaders from throughout North America traveled to Atlanta to attend the event, each being paired with a Georgia industry leader to provide first-hand accounts of what it's like to run a business in Georgia. Since its inception in 1959, the Red Carpet Tour has generated more than US$3.2 billion in revenue for the state, and over 15,000 jobs have been created through the expansion or growth of tour guest companies. Although guests visit different regions of Georgia each year, attending the Masters Tournament at Augusta National Golf Course, golf's most storied championship, is a Red Carpet Tour tradition.

"I was initially contacted in late 2016 by a representative of the Georgia Chamber of Commerce and invited to attend the April 2017 event," Hicks said. "They got my name from the SAE World Congress in Detroit, which I had attended, and told me they were targeting automotive-related companies for the 2017 Red Carpet Tour. They knew that DMS works with auto parts suppliers and has branch locations in California and Illinois, so we're familiar with the auto industry and with doing business in the U.S. The only other Canadian who participated works for a Toronto-area automotive parts supplier."

MASTERS OF THE HOUSE

The 2017 Red Carpet Tour — which was sponsored by a number of Fortune 500 companies, including AT&T, Coca-Cola Co., UPS, Wells Fargo, and Delta Airlines — had an impressive itinerary: a reception and dinner with Georgia governor Nathan Deal and his wife at the Governor's Mansion in Atlanta on the first night; a private Delta charter flight to Augusta to attend the first round of the Masters the next day, dinner at the tournament, followed by another private charter flight to Athens later that night and a private reception; business seminars and a tour of the University of Georgia Special Collections Library in Athens on the third day, followed by another private dinner reception; and on the last day, a ride in a chartered coach back to Augusta to attend the third round of the Masters, followed by yet another private Delta flight back to Atlanta for connecting flights home. "Unfortunately, the reception and dinner with the governor and his wife on the first night was cancelled due to a severe thunder storm in Atlanta that prevented many of the attendees' flights from arriving on time," Hicks said. "Meeting with the governor is the traditional kick-off for the Red Carpet Tours, and this was the first time ever that it had to be scrapped." But everything else ran like clockwork, including attending the Masters. "We entered the Masters

Georgia on our minds: Strong economic ties between Ontario and Georgia

It's no mystery why Ontarians were among those invited to attend the 2017 Red Carpet Tour: Ontario is Georgia's top export customer, and the two regions share a strong relationship based on that trade, open procurement, and cross-border collaboration. Last year, Georgia and Canada exchanged almost $12 billion in goods, and trade with Ontario accounted for more than half of that. In 2016, Ontario imported $1.6 billion worth of vehicles and vehicle parts from Georgia. Over $140 million worth of vehicles and vehicle parts flow back and forth between Ontario and Georgia every month. A subsidiary of Aurora, Ont.-based Magna International Inc., Decostar Industries, employs 1,000 Georgians and is one of the state's top 10 auto sector employers.

through a private entrance on a red carpet and were met by Augusta staff and some of the tournament organizers, and had access to restricted areas," Hicks said. "We also met some of the golfers and caddies, and then had dinner in a private hospitality tent at Augusta."

And the red carpet treatment wasn't limited to the golf tournament. "All of our charter bus trips had police motorcycle escorts that cleared traffic to make sure we arrived at our destinations on time," Hicks said. "We stayed at the InterContinental Hotel in Atlanta; the actress Lisa Kudrow was also staying there and she asked us why we had a better security escort than she did."

The return-on-investment goal of the Red Carpet Tour, Hicks said, is to convince one of the 30 guests — who are all decision makers at their respective companies — to invest somewhere in Georgia. "The tour sponsors didn't want us to relocate an existing operation, but only to consider Georgia as a site for new business development," he said. "It was a very soft sell: they used all the resources at their disposal to get our attention and interest, but they weren't trying to buy our support."

It was also a first-class event from start to finish, Hicks said. "It was definitely a once-in-a-lifetime experience, and our only expense was our arrival and departure flights — everything else was paid for by the sponsors," he said. "The tour operators, led by Sara Melvin of the Georgia Chamber of Commerce, did an outstanding job of showcasing Georgia's business community. My partner during the tour was Anna Chafin, CEO of Development Authority of Bryan County and current chair of the Georgia Economic Developers Association, and she was very informative and helpful. I keep in touch with both Sara and Anna. My first allegiance will always be the Windsor area, but I have acted as an 'ambassador' for Georgia a few times since, recommending the state to some business acquaintances." CPL

Husky sells 12 systems to Russian medical parts molder

Husky's machines on the Pascal Medical shop floor. Photo Credit: Husky Injection Molding Systems Ltd.

Husky Injection Molding Systems Ltd. has landed a major deal in Russia, selling 12 plastics processing systems to Russian medical parts molder Pascal Medical.

In a statement, Bolton, Ont.-based Husky said that it has been working with Pascal to set up its new 10,000-square-meter facility in Dubna, Russia "with the goal of creating an industry-leading manufacturing organization, capable of replacing foreign-import medical products with premium quality domestic production." Husky has been involved in all aspects of the project, including the planning of the factory, syringe design development, and selection of assembly machines, cleanroom suppliers, and even personnel.

Currently focused on the domestic manufacture of disposable syringes for the Russian market, which is flooded with imported devices, Pascal plans to expand its product range in the future to include prefilled syringes, infusion and transfusion systems, catheters, vacuum blood collection systems, and parts for epidural anesthesia.

Construction of the facility started in July 2016; it opened and began production in September 2017.

"We are thrilled to be working so closely with Pascal as they complete the first stage of their project, and we look forward to continuing our partnership as they expand production lines and the range of injection molded products they offer," said Robert Domodossola, Husky's president of medical and specialty packaging. "As was the case for beverage packaging in Russia 20 years ago, currently there is very little local production of medical disposables."

Working with a single-source supplier minimizes operational risk for Pascal, Domodossola added, allowing the company to focus on producing the highest quality parts. CPL

New plastics recycler officially opens doors in Sarnia, Ont.

A new recycler has opened, said to be Canada's first recycling facility that combines a container recovery facility and a plastics recovery facility in one location.

ReVital Polymers Inc., which was founded last year but officially opened its doors in Sarnia, Ont. on Oct. 20, is owned and operated by recycling industry pioneers Emmie Leung and Tony Moucachen. Leung is the founder and CEO of Burlington, Ont.-based Emterra Group, a national leader in waste resources management that annually processes and markets more than 500,000 tonnes of recyclables; Moucachen is the founder and president of Delta, B.C.-based Merlin Plastics Group, a veteran of the North American plastic packaging recycling and remarketing industry. The two formed a partnership in 2016 to acquire the assets of Entropex, a Sarnia plastics recycling facility that had gone into receivership. The assets included an 180,000-square-foot recycling facility where ReVital is now located.

The ribbon cutting ceremony, with Tony Moucachen (left) and Emmie Leung (centre).

ReVital accepts post-consumer and post-industrial recovered plastics from municipal and industrial, commercial, and institutional recycling programs in Ontario, across Canada, and throughout the U.S., and uses a closed-loop process to recycle materials into raw materials for use in manufacturing again. "Our proprietary process incorporates state-of-the-art technology that sorts and converts waste plastics into discrete resin types, tailored to specific customer end-use applications," Moucachen said. "This customized approach ensures ReVital improves recovery rates for end-of-life products and packaging, extends material value and utility through better end-of-life management, and allows manufacturers and retailers to offer new products and packaging that incorporate recycled content."

ReVital has also developed what Moucachen calls an "innovative, proprietary system" to recover black polyethylene and polypropylene for high-end applications as non-black plastics; target markets for recycled resins include automotive parts and consumer products such as new containers. "This is a real departure from the common practice of using recycled plastic containers to make lower end products such as drain pipes and plastic lumber," he said.

The company's goal is to provide a stable, domestic end-market for mixed plastics in North America. "It's a critical goal, since traditional overseas markets are shrinking in the wake of China's National Sword announcement, which proposes a ban on imports of 24 categories of recovered waste resources, including the full range of 1 to 7 plastics," Moucachen said. "We've been in operation for under a year, but we already have the capacity to meet the plastics recycling needs of central Canada as well as the entire mid-west of the U.S., bringing recovered resources back to Canada to add value to our recycling industry and the local economy." **CPL**

Photo Credit: ReVital Polymers Inc.

Peninsula Plastics installs new Haitian molding machine

Fort Erie, Ont.-based custom molder Peninsula Plastics Ltd. has just added a new Haitian Jupiter JU II 1,450 ton injection molding machine to its shop floor.

Peninsula, which was founded in 1976, now has a total of 32 injection presses in its 90,000-square-foot facility. The new Haitian machine was installed in August, adding more large tonnage capabilities to the company, which manufacturers packaging products, glass case inserts, hydro components, and pest control devices. Peninsula's injection molding machines range from 25 to 1,550 tons.

"The addition of our new Haitian 1,450 ton unit allows us to increase production capacity on our large tools," Peninsula president Craig Bolton said. Earlier this year Bolton traveled to Haitian's factory in Ningbo, China to see the machine being tested. The new unit is Peninsula's sixth Haitian machine, Bolton added.

Peninsula is in the midst of a "super busy" period, Bolton said. The ISO 9001:2008 certified company is expanding its customer base, including the addition of Home Depot, and is also installing a new ERP system.

Craig Bolton with the new Haitian Jupiter JU II 1,450 ton machine at the Haitian factory in Ningbo, China.
Photo Credit: Peninsula Plastics Ltd.

Haitian is represented in Eastern Ontario by Larry Bonehill of Shadow Automation and in Western Ontario by Steve Bell, and in Quebec by Barway Plastic Equipment Inc. **CPL**

Macro Engineering appoints rep for Spain and Portugal

Mississauga, Ont.-based film and sheet extrusion systems maker Macro Engineering & Technology Inc. has expanded its European presence by adding Innopack Systems as its sales agent for Spain and Portugal.

Innopack, which is headquartered in Madrid, Spain, has "many years of experience in the flexible packaging business," Macro's sales manager Martin Baron said, and has been "successfully representing international leaders from the converting sector, such as printing, lamination, and treating."

"We've been looking for an extrusion partner for a while, and we know that Macro is one of the best players in extrusion machinery worldwide," Innopack CEO Daniel Vilchez said. "We are very excited about this deal."

Innopack is the tenth international agent representing Macro. CPL

Innopack CEO Daniel Vilchez (left) and Macro CEO Jim Stobie seal the deal at Macro's headquarters in Mississauga, Ont.

Photo Credit: Macro Engineering & Technology Inc.

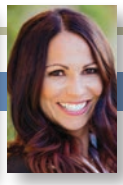
SUPPLIER NEWS

– **iD Additives Inc.**, a LaGrange, Ill.-based supplier of additives to the plastics industry, has named **CCC Plastics** as the Canadian distributor for its foaming agents and purging products. Headquartered in Mississauga, Ont., CCC Plastics was already the exclusive distributor of the iD Additives QuickShots single-dose purge products in Canada. The new iD QuickShots products are single-dose purge compounds that come in individual packets, and are said to work with all resin types on all plastics machinery processes including injection molding, extrusion, and blow molding.

PEOPLE


Glenn Fish


Rob McQuiston


Brigitte Rodriguez


David Rose


Johannes Schwarz


Andre Wieczorek


Erin Tiedemann

– Wayne, Pa.-based packaging materials, medical compounds, and tubing manufacturer **Tekni-Plex Inc.** has named **Glenn Fish** as its new chief operating officer.

– Worcester, Mass.-based **Absolute Haitian Group**, the distributor of Haitian and Zhafir injection molding machines in the U.S. and Canada, has appointed **Rob McQuiston** as a full-time field service engineer for its Canadian customers; he is based out of Southern Ontario. The company has also named **Brigitte Rodriguez** as its new regional sales manager for British Columbia and Alberta, as well as the U.S. states of Arizona, California, Nevada, Oregon, and Washington.

– Monroe, N.C.-based automation equipment provider **Spiroflow Automation Solutions Inc.** has named **David Rose** as its managing director.

– **Johannes Schwarz** has been named as managing director of extrusion equipment maker **battenfeld-cincinnati Austria**, and **Andre Wieczorek** has been appointed as its chief technical officer.

– Pawcatuck, Conn.-based extrusion machinery maker **Davis-Standard LLC** has appointed **Erin Tiedemann** as a process engineer.

Three golden rules for family business success

By Tom Deans

It's never easy to look at an important subject like family business succession planning and offer just three big takeaways to help families protect their hard-earned wealth. But after delivering more than 800 speeches in more than 20 countries on the subject, here are my 3 favourite Golden Rules.

1 HE WHO HAS THE GOLD OFTEN HAS NO CLUE ABOUT THE RULES

For example, no matter how much a business owner loves what he or she has created, they can't take it with them. Lots have tried, and failed. The early Egyptians — some of the earliest family business owners — were buried with their treasures and we all know how that worked out. Letting go and making preparation for the transition of wealth before death continues to perplex some of the smartest, most accomplished entrepreneurs on the planet. How do we know? Over 130 million American and Canadian adults do not have wills. No will, no estate plan; no will, no business succession plan.

Business owners are no more and no less inclined to write a legal will than non-business owners. The stakes are just higher. But how devastating for the family of an accomplished entrepreneur to have to sort through who gets what, when, and how because collectively the family lacked a culture of mutual trust and respect that would have enabled it to discuss and plan for the future! Silence is the great destroyer of family business wealth. Only a few talented advisors know how to keep their business owner clients focused on the really big prize — the preservation of family wealth, which may or may not mean preservation of the family business.

2 ALL THAT GLITTERS IS NOT GOLD

Successful family businesses have a brand, they have a reputation, and they have status — the most successful have even created their own mythology. The funny thing about mythology is that those who have it can seldom transfer it to succeeding generations. In fact, the mythology more often than not suffocates the next generation, who try to replicate, perpetuate, and authenticate something they haven't earned through their own struggles and experiences.

The popular belief that the young generation is less entrepreneurial is, of course, utter nonsense and no more valid than the opposite notion that they are more talented. Every extraordinary entrepreneur I have met credits his or her success to hard work, sacrifice and, most of all, good fortune. Luck is hard to teach, and it's even harder to transition.

3 THE BIGGER AND OLDER THE GOLDEN EGG FIRM, THE HARDER IT FALLS

There is a popular belief among entrepreneurs that the market (by which I mean customers) will always assign a special value to firms that have stood the test of time. Business owners who think this way often discount the brutal impact of disruptive change. Don't believe me? Ask the owner of a fourth-generation family-owned taxi business about Uber.

But if you think a person hailing a cab on the corner of West 54th and Madison cares how long a taxi company has been in business, you've read too many family business books by Leon Danco. Uber didn't come with five years' warning for family-owned taxi companies; it came instead with such blinding speed that the very idea of Uber shed billions of dollars of value from the established taxi industry. Some of that value simply slid over to Uber's balance sheet — a market valuation exceeding one billion dollars before it recorded one dollar of sales. Game, set, and match. Ditto for that big, old behemoth called Lehman Brothers, the iconic one-time family business that holds the record for the biggest bankruptcy in the history of the world. If you hear someone refer to the age of a firm in the context of explaining its value to customers, take your money and run! There are no special elixirs that make a family business last. This is troubling because too many family business owners leave too much of their wealth in their business.

When tough times come, as they inevitably do, the real test of legacy comes when an owner is asked by their lenders to re-invest their capital in their big, old family business. Those can be interesting meetings — and by "interesting" I mean devastating.

CONCLUSION

There are many golden rules for business owners struggling to find the end before the end finds them. The three listed above are my favourites, golden gifts from hundreds of conversations with proud business owners — both those who have nailed their exit and those whose exits have nailed them. CPL

Tom Deans is an author, public speaker, and a fourth-generation business owner. His book "Every Family's Business" is the best-selling family business book of all time, and has been selected by the New York Times as one of the 10 books that every business owner should read. For more, visit www.everyfamiliesbusiness.com.

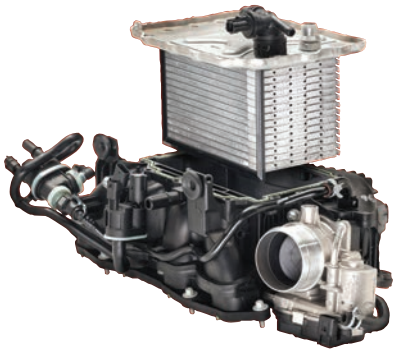
CHEMISTRY LESSONS

That old adage about the difficulty of making a silk purse from a sow's ear? It's not wrong, and it's never more right than when it comes to resins and plastic parts. If the material isn't perfect for the application, it's game over for the product maker before it even begins. But it doesn't have to be that way. Here's a look at some new cutting-edge products made possible by the right resins.

By Mark Stephen, editor

Goldilocks is famous for insisting on things being just right. Which makes her a good role model for plastic product makers on the hunt for a resin, or resins, suitable for a challenging application. If you settle for materials that fall short of being just right, you're practically begging for quality issues down the road. The case studies shown here all got it right.

HEAT-RESISTANT GRADE HELPS POWER TURBOCHARGER SYSTEM



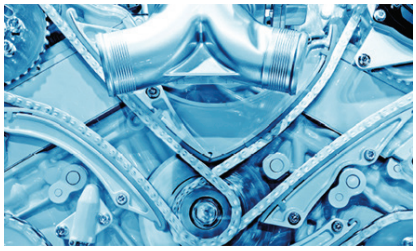
BASF supplied its Ultramid Endure polyamide with high heat aging resistance up to 220°C for two new powertrain applications debuting on the 2017 Alfa Romeo Giulia with the new 2.0 litre turbocharger GME engine, which delivers 280 hp, allowing it to go from 0 to 60 mph in 5.1 seconds, and hit a top speed of 149 mph.

Turbochargers provide high pressure air to the engine that makes fuel burn efficiently, delivering greater engine power while consuming less energy. Problem is, most standard thermoplastics can't maintain the desired performance under the high heat and pressure developed in a turbocharged engine, which is why BASF developed the Ultramid Endure portfolio of engineered resins, which are available for production in North America, Europe, and Asia.

In the first application, BASF collaborated with Toronto-based auto parts supplier ABC Group Inc. to develop the hot-side turbo duct for the Alfa Romeo Giulia. ABC Group used BASF's Ultramid Endure D5G3 BM, a 15 per cent glass fibre reinforced blow molding grade, which has a high melt strength and superior heat aging resistance. "The part requires many weld connections, and our engineers worked closely with BASF's material and joining experts to understand the unique requirements, allowing us to fine tune our infrared welding technology, and assuring success of the welding process for this demanding high temperature duct," said ABC Group CEO Mary Anne Bueschkens.

BASF also worked with Italy-based auto parts supplier Magneti Marelli to develop the air intake manifold with integrated charge air cooler for the Alfa Romeo Giulia. Because the materials need to withstand a 200°C continuous use temperature, Magneti Marelli used Ulramid Endure D3G7, a 35 per cent glass fibre injection molding grade. The air intake manifold also has a burst pressure requirement: Magneti Marelli needed a solution that offered reliable weld strength at elevated temperatures, which Ulramid Endure D3G7 also delivered. "BASF's technical support was useful to ensure the application passed the burst requirement," said Marcello Colli, product manager of throttle bodies with Magneti Marelli. "Their material and welding experience ensured that we could use this heat resistant material and meet long-term durability targets."

MODIFIED PA46 RESIN HELPS FORD BAG SPE AUTOMOTIVE AWARD



With help from Royal DSM, the Ford Motor Co. won a 2017 Society of Plastics Engineers (SPE) Automotive Innovation award in the Materials category for chain tensioner

arms in the Ford F-150 and Mustang.

By using DSM's modified low friction, high wear resistance PA46 Stanyl HGR2v resin as a drop-in replacement for PA66, Ford was able to shave the equivalent of 40 lbs from each vehicle at one-tenth the cost of PA66. Annual environmental benefits include reductions in gas consumption by 12,000 barrels and greenhouse gas emissions by 5,000 tons.

Traditionally, over 40 per cent of the parasitic frictional losses in the timing drive have been attributed to chain-on-plastic interaction. DSM closely collaborated with Ford's advanced materials and processes team in Europe early in the development stage to provide a more efficient solution utilizing the new PA46 material, before rolling the project out on a global scale. It was determined that DSM's Stanyl HGR2 resin is stiffer at engine operating temperature than PA66, and that it provides a lower interfacial shear strength for lower frictional losses and therefore improved operating efficiency, resulting in improved fuel economy. The new chain tensioner arms will soon be implemented across various Ford vehicles globally.

Ford was recognized for this award at the SPE Automotive Innovation Awards Gala in Novi, Mich. in November 2017.

3D-PRINTED AIRCRAFT SEAT FLIES HIGH AT AWARDS CEREMONY

A prototype 3D-printed aircraft seat that uses material from Sabic has been named winner in two categories at the 2107 European Plastics Innovation Awards ceremony co-organized by the SPE and the trade association PlasticsEurope.

Designed by Studio Gavari and produced by 3D printing technology supplier Stratasys Ltd. using its fused deposition modeling, and filament made from Sabic's Ultem 9085 resin, the seat won the Best Plastic Application Design category and the Intelligent and Smart Plastics category. "The Ultem 9085 resin is an aircraft-compliant material that meets FAR 25.853 flame, smoke, and OSU 65/65 heat release standards, and offers high heat resistance and mechanical strength," said Jignesh Amin, Sabic's senior business manager for mass transportation. "Additive manufacturing enabled rapid prototyping without the expense of tooling, and demonstrated the potential for part consolidation and manufacturing efficiency. The seat represents the coming together of a breakthrough design and the 3D printing process to enable a lightweight and stylish end-product that can help save fuel while enhancing a passenger's flying experience."

The Ultem 9085 resin, including the brand new Ultem AM9085F filament grade, are well-suited for the production of applications targeted for the aerospace industry, Sabic said.

CARBON FIBRE-COMPOSITE CAR SPOILER WINS BIG AT INNOVATION COMPETITION

A new carbon fibre-composite spoiler made from materials supplied by Solvay Composite Materials is the winner in the Aftermarket category of the 2017 SPE Automotive Innovation Awards Competition.

The one-piece spoiler for the Chevrolet Corvette produced by General Motors Co. integrates a spoiler blade and wicker bills combining full compression areas, open cavities, and co-cured inserts, and is available painted or with an exposed weaved finish. It was manufactured by General Motors' Tier 1 supplier deBotech, headquartered in North Carolina, and is OEM approved. For this specific spoiler application, deBotech selected Solvay MTM 57 cosmetic carbon fibre epoxy composites. "This material is the ideal choice for applications where both structural performance and visual quality are required," said Gerald Perrin, Solvay's global automotive director. "It offers high toughness, as well as excellent resin clarity for outstanding cosmetic results."

The spoiler won the award thanks to the benefits that part integration and the advanced materials selected offered, Perrin continued. "These include the 40 per cent weight saving when compared to a three-piece production spoiler, the same aerodynamic performance, and a cleaner appearance due to the elimination of fasteners," he said.

MEDICAL TPE MAKES FIRST NASAL-ONLY OXYGENATION MASK A REALITY

With help from the TPE division of Teknor Apex, a medical parts supplier has addressed a long-standing problem in procedures involving sedation by creating the first nasal-only alternative to the standard full-face oxygenation and ventilation masks that medical practitioners have used for decades.

Unlike full-face masks, the SuperNO2VA mask developed by Tucson, Az.-based Revolutionary Medical Devices Inc. (RMD) provides easy access to the oral cavity and is designed to deliver a greater flow of oxygen under positive pressure to the patient's airways. The single-use mask consists of a transparent rigid PP component with access ports for an anesthesia circuit or hyperinflation bag, plus a TPE cushion over-molded onto the PP structure. The TPE cushion, made with Teknor Apex's Medalist MD-10105 medical elastomer, plays a critical role by providing a strong yet comfortable seal to the patient's face — it's a gel-like 5 Shore A compound with sufficient "tack" and is designed to form a tight seal on the patient's face.

RMD uses the China-based contract molding subsidiary of a U.S. company to injection mold the components for the SuperNO2VA mask. The cushion part is produced in blue, green, pink, or yellow for purposes of colour-coding. Teknor Apex supplies the Medalist MD-10105 in pre-coloured compounds from a U.S. plant and will supply identical grades from a plant in Singapore once it receives ISO-13485 certification, which is expected by December 2017.

"Over-molding the Medalist TPE onto a PP substrate was challenging for two reasons," said Chris Morehouse, market manager of regulated products for the TPE division of Teknor Apex. "First, the lower the durometer of the TPE, the more difficult it is to make it adhere to PP. Second, the TPE part is complex, with thick- and thin-wall sections and recessed areas, or undercuts, that must retain their shape during ejection of the part from the mold. So we reformulated the TPE to attain exactly the necessary durometer while still achieving a strong bond to the PP part."

The massive undercut at the nose section of the TPE cushion, meanwhile, calls for a compound with a high degree of strength and elongation. "Typically, an undercut with a material that soft would tear apart, but the cushion came out of the mold without a problem," Morehouse said.

SUBSEA INTERVENTION LINE IS LARGEST, LONGEST PEEK-BASED STRUCTURE

A new lightweight continuous pipe made from Victrex PEEK polymers is designed to reduce exploration and production costs and risks in subsea oil and gas systems.

Developed by Houston, Tex.-based subsea pipe maker Magma Global Ltd., the pipe — called the m-pipe — can be deployed to depths of 10,000 feet. Both the largest and longest Victrex PEEK-based structure ever, the composite m-pipe combines PEEK, carbon fibre, and S-2 glass fibres to form a subsea intervention line that meets the demand for a hydraulic pumping system that can handle high pressures and high flow rates, while offering high resistance to corrosion compared to steel pipe.

The Magma system is designed to minimize mobilization time and maximize vessel utilisation by reducing hydraulic pumping time and intervention costs by up to 30 per cent. It allows for flexible high pressure and high flow-rate pumping of intervention fluids into subsea wells from small vessels, and has already been deployed for hydraulic pumping and light well intervention in the Gulf of Mexico. **CPL**

From FAKUMA

Germany's Fakuma trade show is *the* global industry event in the non-K years, and it's always been about injection molding. The 2017 edition was no different, and some of the industry's heaviest hitters were there to unveil their latest technologies. Couldn't be there in person to see it all? We've got you covered with a look at some of what dropped at the big event.

By Mark Stephen, editor

When you attach the prefix "mini" to something, you're not usually trying to be complementary. Dr. Evil's sidekick Mini-Me, for example, was tiny, powerless, and mute. Along the same lines, the Fakuma plastics exhibition in Friedrichshafen, Germany is sometimes called the "mini K show," which makes it seem small. But Fakuma 2015 drew more than 46,000 attendees from more than 120 countries, around one third from outside of Germany. That sounds big to us. Just as importantly, Fakuma has always been predominantly an injection molding machinery show.

Fakuma 2017, which ran from Oct. 17-21, was no exception. Some of the biggest injection machine suppliers in the business were there with their latest equipment introductions. If you weren't able to cross the pond to see it all in person, here are some examples.

REDESIGNS AND PRODUCT EXTENSIONS

Arburg GmbH, a co-founder of the Fakuma show 30 years ago, introduced a hybrid Allrounder 920 H with a new design and new Gestica control system. With a clamping force of 5,000 kN, the machine has a modern colour scheme and shape, and a design that provides for enhanced functionality and significantly improved ergonomics. "The innovative Gestica control system has a high-resolution full-HD screen and uses industrial multi-touch technology to reproduce the look and feel of smart mobile devices," said Michael Hehl, Arburg's managing director. Arburg also made available its hybrid Allrounder 1120 H. The large machine — which has a clamping force of 6,500 kN — was premiered at the K 2016 show in Dusseldorf, Germany, and has been in pilot trials since then; starting with Fakuma 2017, it can now be ordered by customers worldwide.

Fakuma 2017 attendees check out Arburg's new Allrounder 920 H.
Photo Credit: Arburg GmbH

Engel unveiled the new e-mac 280, an expansion of the company's general-purpose, all-electric e-mac line first introduced in 2012, and suited to technical parts and electronic components. "The e-mac 280 is equipped exclusively with exceptionally powerful servo drives," said Friedrich Mairhofer, Engel's product manager for electrical machines. "The ejection and clamping are also handled servo-electrically, which guarantees the best possible precision and process stability while maximizing the effectiveness of the machine as a whole. The drives are operated in an axis system solution with a stabilized intermediate circuit. The short cycle times are achieved in part by the parallel movements of the drive axes." Another advantage of the e-mac series is its compact design, Mairhofer said. "Thanks to optimized toggle-lever geometry, with its length of 6.20 metres the e-mac 280 is the shortest all-electric injection molding machine in this clamping force class on the market, in spite of retaining its very large opening stroke of 600 mm," he said. At Fakuma 2017, Engel ran the e-mac 280 with three software packages for real-time process control: iQ weight control, which maintains constant shot size and compensates for changes in the material or environmental conditions; iQ clamp control, which continuously adjusts clamp force to save energy and protect mold life, while minimizing flash; and the new iQ flow control, which regulates mold temperature control units according to the needs of the process.

KraussMaffei Corp. introduced its new MaXecution manufacturing execution system (MES), which the company said is the first MES system tailored to the requirements of small injection molding companies. "The new

software creates more transparency in production by means of productivity indicators, for example regarding the overall equipment effectiveness, the management of molds and resources, and the statistics on machines and rejects," said Dr. Hans Ulrich Golz, president of KraussMaffei's injection molding machinery segment. The MaXecution system offers reliable real-time data throughout the production phase, Golz said, which facilitates the planning, control, and monitoring of the entire production process. "Current manufacturing orders and the respective machines and personnel can be simply transferred to the shop floor level," he said. "In the event of any malfunctions or deviations, MaXecution provides the opportunity to react rapidly and initiate countermeasures." The MaXecution system is available in three versions: the Basic package that provides operating and machine data collection; the Basic Plus version that includes functions for the graphic fine planning of manufacturing orders, and mold and resource management, for a better overview of production planning; and the Advanced version, which goes a step further to include functions for controlling and monitoring different process parameters and for the transfer of data records.

At Fakuma 2017, Netstal molded three-layer coffee capsules using a precision co-injection process.
Photo Credit: Netstal

A FEW FIRSTS

Starting at Fakuma 2017, Milacron is offering LSR capability as a new option for its Mold-Masters E-Multi secondary injection units. Mold-Masters all-electric E-Multi converts existing injection molding machine equipment to enable multi-shot and multi-material molding, expanding operations potential. "The proven E-Multi platform is fully compatible with any injection molding machine and the ideal solution for precision molding applications in any industry," said Milacron CEO Tom Goeke. "The E-Multi has over 2,000 standard possible configurations available, ensuring the E-Multi is perfectly sized to an application's exact requirements."

Unveiled for the first time at Fakuma 2017, Netstal molded three-layer coffee capsules using a precision co-injection process. The application consisted of an all-electric Elion 1200-250/120 unit producing capsules on a VNC-integrated Plasdan additional injection unit equipped with a four-cavity Fostag test mold. The overall cycle time was approximately 4.9 seconds. An automated handling system from Beck Automation placed in-mold labels from Verstraete IML into the mold and removed the decorated capsules after the injection process. Finished parts were then stacked with the opening face downwards, and an IMD Vista optical inspection system integrated within the removal robot checked the position and thickness of the EVOH barrier. Finally, the Nespresso-compatible capsules were stored in bulk in a container. "The sandwich injection molding process enables IML-decorated plastic capsules and many other packaging products to be efficiently manufactured with a reliable barrier effect," said Marcel Christen, Netstal's applications and packaging product manager.

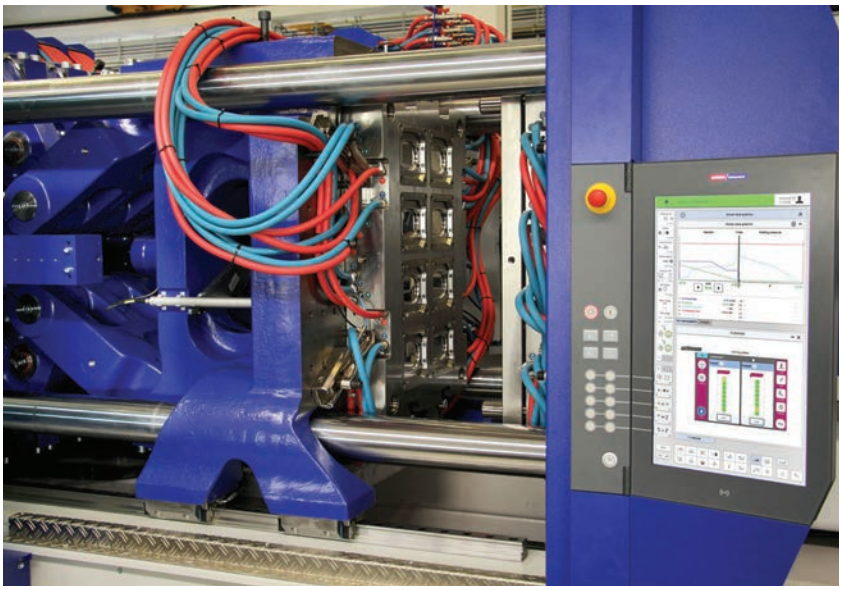
Nordson Corp. introduced a new Xaloy high glass-filled polymer system at the show, designed for compounds with high levels of glass fibre reinforcement. The system provides wear resistance, high throughput, and gentle mixing, running a wide range of resins with filler content from 10 to 60 per cent. Applications include automotive, marine, electronic, and other parts requiring high levels of strength and stiffness. The Xaloy glass-filled system includes a Pulsar I mixing screw, X-8000 screw encapsulation, X-800 barrel inlay, and an application-specific valve.

Photo Credit: Engel

Engel's new e-mac 280, an expansion of the company's general-purpose, all-electric e-mac line.

HIGHLY PRECISE, INCREDIBLY FAST

Sumitomo (SHI) Demag highlighted its new generation of IntElect all-electric machines, intended primarily for precision assemblies, engineering components, and optical parts. "The IntElect is a complete series with clamping forces of 500, 750, 1,000, 1,300 and 1,800 kN," the firm said. "The 1,800 kN machine expands the new



Wittmann Battenfeld's new high-speed, all-electric EcoPower Xpress 400/3300+.
Photo Credit: Wittmann Battenfeld GmbH

IntElect series, both in terms of clamping force and upward tie bar clearance, and fills the gap which existed between models with clamping forces up to 1,300 kN and mid-sized IntElects available with forces of 2,200 to 4,500 kN." The units feature a completely new generation of drive motors developed in cooperation with parent company Sumitomo Heavy Industries. Design innovations reduce space requirements and improve machine accessibility, ergonomics, and precision. The IntElect control cabinet is integrated in the machine bed, the company said, enlarging the space around the machine used for downstream units and improving operator access to the nozzle area and complete clamping unit. "The new IntElect design is considerably more compact than its predecessor," the firm said. "The installation footprint is on average 10 per cent smaller than that of comparable all-electric machines from competitors. For example, the 500 kN version is around half a metre shorter than its predecessor."

Wittmann Battenfeld GmbH showcased its new high-speed, all-electric EcoPower Xpress 400/3300+, designed for molding packaging and other thin-wall applications. Available in clamping sizes of 400 and 500 tons, three sizes of injection units for injection speeds up to 600 mm per second, and injection pressures of up to 2,500 bar, the Xpress replaces the TM Xpress, the high-speed hydraulic toggle-lever machine. One notable feature, the company said, is a high injection dynamism of up to 1,500 mm per second squared. Injection is handled by a rack-and-pinion gear unit driven via a dual motor system. Because the driver uses minimal rotary mass, the press can reach extreme acceleration and speed values. The press also has KERS, Wittmann Battenfeld's patented kinetic energy recovery system, which transforms braking energy into electrical energy for use in the machine. At Fakuma 2017, the EcoPower express molded HDPE closing caps on a 96-cavity Plastisud mold with a cycle time of 2.7 seconds.

The next edition of Fakuma — the "mini" show that isn't — is scheduled for October 2019. Which gives you just under two years to book your trip to Friedrichshafen. **CPL**

RESOURCE LIST

Arburg Inc. (Newington, Conn.); www.arburg.com; 860-667-6500

DCube (Montreal); www.dcube.ca; 514-272-0500

Engel Canada (Waterloo, Ont.); www.engelglobal.com/na; 519-725-8488

KraussMaffei Corp. (Florence, Ky.); www.kraussmaffei.com; 859-283-0200

Milacron Canada Corp. (Burlington, Ont.); www.milacron.com; 888-254-1919

Netstal (Florence, Ky.); www.krausmaffei.com; 859-283-0200

Nordson Corp. (Duluth, Ga.); www.nordsonpolymerprocessing.com; 770-497-3400

Sumitomo (SHI) Demag Machinery (America) LLC (Norcross, Ga.); www.sumitomo-shi-demag.com; 770-447-5430

Wittmann Canada Inc. (Richmond Hill, Ont.); www.wittmann-group.com; 905-887-5355

BORDER CROSSING

Opening a new mold component and hot runners parts warehouse in the Windsor, Ont. region — its first facility in Canada — is just PCS Co.'s latest move in its new direction.

By Mark Stephen, editor

PCS staff and Windsor-area dignitaries cut the green ribbon at the opening ceremony on Nov. 2, including Windsor-Essex Economic Development Corp. CEO Stephen MacKenzie (second from left), Dave Cataldi (third from left), Essex Country warden Tom Bain (third from right), and Tecumseh councillor Tania Jobin (second from right).

Dave Cataldi with tooling products.

Looking down an aisle at the new warehouse.

"Location, location, location" is more than just the real estate agents' mantra; it's a key consideration for any business that actually wants to stay in business. If you're selling sun block, for example, you'll probably want to open that new branch office in Hawaii, not Alaska. And for mold component makers looking to service Canada's mold, tool, and die making sector, the Windsor, Ont. area is even hotter than Hawaii. Which is why U.S.-based mold component and hot runner component supplier PCS Co. recently launched its first Canadian distribution centre in nearby Tecumseh, Ont.

Opened on Nov. 2, the Fraser, Mich.-based firm's 2,500-square-foot Tecumseh warehouse is a key part of its plans to expand its presence in Southern Ontario and eventually all of Canada. "We are in the Windsor area because we view this in some ways as the epicentre of the moldmaking market in Canada and to a certain extent in North America, and we think having a presence in the Canadian market is critical to our strategy going forward," PCS president Dave Cataldi said. "In the past, we've serviced the Canadian market by crossing the Michigan/Ontario border, which is time-consuming and negatively impacted our ability to deliver product — it's just not a practical way to grow our business in Canada. Given its proximity to the local automotive sector, we are very confident that locating in the Windsor-Essex region makes great business sense."

THE NEW MODEL

The new warehouse represents a US$200,000 investment, Cataldi said, and will create a total of four jobs: two in the warehouse and two in sales. "We can ship parts from here, or customers can come by and pick parts up themselves with help from our warehouse

staff," he said. "Our two sales people, meanwhile, will use the warehouse as a *de facto* office." In more ways than one, the new site also represents a shift in the company's business strategy. "Our old business model focused primarily on the U.S., but we wanted to develop a plan to make competitively priced products readily available for the Canadian market," Cataldi said. "We can now deliver products to the Windsor area faster because there's no risk of getting delayed at the border, and also use the warehouse as a launching point for quicker delivery throughout the rest of Canada."

The new site also has enough extra space for PCS to expand its product range, which is the second prong in the company's new strategic focus. "PCS was founded in 1960 as a supplier of mold components exclusively, and that remained our focus for a long time," Cataldi said. "Over the last 20 years, however, we gradually expanded into supplying mold bases and hot runner products, and most recently temperature control units and our PurgeMax purging compound, which features one universal grade for all types of resins and processes. These last two in particular were developed with the goal of allowing us to branch out and serve the molders directly — the people who use the tools. Our longer term goal is to head further east from Windsor and establish relationships with plastics processors in the GTA. We're at the beginning of this new direction, and we have a long way to go, but these are important first steps."

And as with any journey in a new direction, it starts from the right location. In this case, Windsor-Essex. **CPL**

North America automotive vendor tooling spending:

Good news, bad news going forward

Driven by the high level of North American vehicle launches predicted between 2018 and 2020, spending on automotive vendor tooling will reach a record high of US$11 billion next year, a new report from manufacturing industry analyst Harbour Results Inc. (HRI) said.

But the news isn't all good: Southfield, Mich.-based HRI also projects a drop of 40 per cent in tooling spending from the high of US$11 billion in 2018 to approximately US$6.7 billion in 2020.

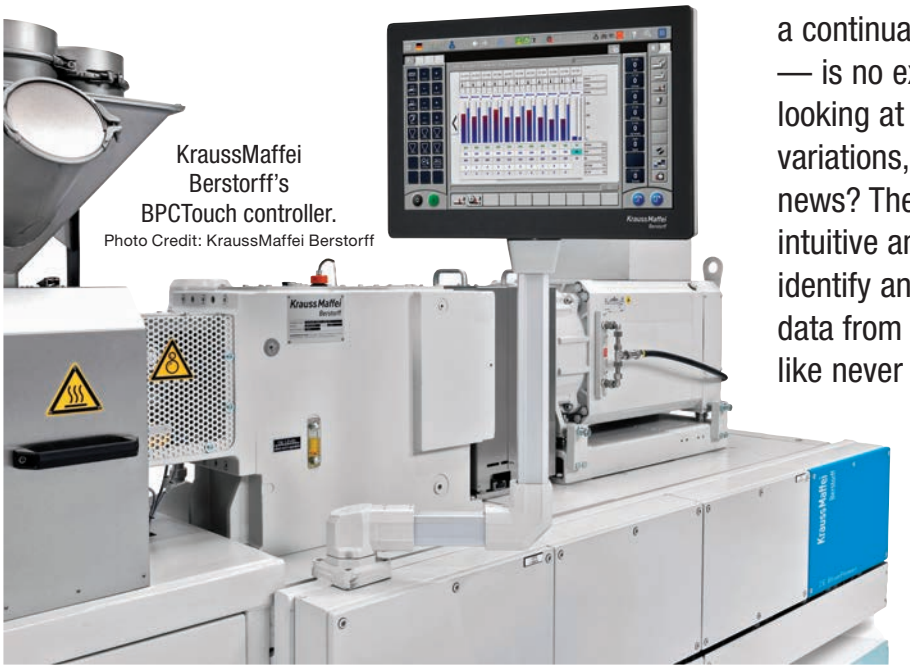
HRI estimates that 177 new vehicles will be introduced between 2018 and 2020, with 66 per cent of these launches being sport utility vehicles and truck platforms, which require more tooling to manufacture than a car platform.

"In 2017, we are estimating tooling spending to be approximately US$9 billion, which has resulted in high capacity utilization among tool shops — 88 per cent for die shops and 81 per cent for mold shops," said HRI president and CEO Laurie Harbour. "This created a new tooling model of outsourcing. In fact, between US$1 billion and US$1.5 billion of tooling was outsourced this year to help manage the growing demand, and we can only expect this trend to grow in 2018."

However, HRI projects the 40 per cent drop to begin shortly after. "Our team looked at a number of factors and issues impacting the automotive industry in addition to vehicle launches — including the elimination of vehicle models, new foreign-owned plants and products, OEM profitability, political and economic climate, and the changing consumer landscape — and we developed an automotive vendor tooling spending forecast of US$50 billion from 2016 to 2021, with 2020 being the lowest spending year during that time. Although the predicted dip in 2020 isn't nearly as significant as we experienced in the recession, it's important that tool shops continue to focus on improving operations and investing in technology during the good times to remain competitive during the dip." **CPL**

CONTROL FREAKS

Life is all about control, and extrusion — a continual process with umpteen variables — is no exception. Get it wrong and you're looking at aesthetic flaws, size and dimensional variations, and angry customers. The good news? The newest control systems are more intuitive and user-friendly than ever, and can identify and monitor parameters, and tie in data from upstream and downstream like never before.



KraussMaffei Berstorff's BPCTouch controller.
Photo Credit: KraussMaffei Berstorff

By Mark Stephen, editor

As Donald Trump's staff has long since learned, it's not easy to control something that's unpredictable and never stops. Extrusion shops can definitely relate. Extrusion is a continual process with a lot of variables, some based on equipment, others on operating conditions, and ranging from the quality of the die and materials to temperatures and pressures

Get it wrong and you're looking at some major problems: aesthetic flaws, such as pits, black specs, pinholes, drag marks, die lines, and sink marks; size variance, either intermittent or contiguous; and dimensional variations. Which means that to ensure successful extrusion manufacturing, every parameter has to be identified, controlled, and monitored all the time.

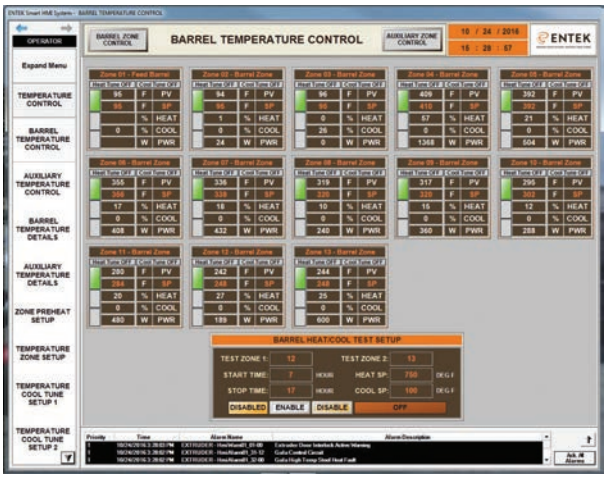
And which is why extruder manufacturers never stop introducing new controls with new capabilities — and offering new features and enhancements to existing controls — that reflect the latest industry standards. The general trend? Controls are becoming easier to use, touchscreens are becoming more available, systems are now focusing on the entire production line by tying in control data from upstream and downstream equipment, and both data archiving and troubleshooting are becoming simpler. Here's a look at some of what we mean.

UPLIFTING UPGRADES

German equipment manufacturer Coperion GmbH recently introduced a modified version of its STS Mc11 twin-screw extruder configured especially for masterbatch production. With a screw diameter of 35 mm, the new STS 35 Mc11 features a series of improvements, including a new die head specifically developed for demanding colour masterbatch applications, a new manifold with coaxial solenoid valves, improved heat covers, and quick-release clamps for the feed hopper. Controlling it all is Coperion's CSpro medium control system. A feature of Coperion's ZSK series extruders since 2010, the reliable, user-friendly CSpro is now standard for the STS Mc11 line. The control system comes with standardized and pre-tested software, is fitted with the latest Siemens SPS-Generation S7-1500, and is connected via ProfiNet to the CPU with compact ET200SP peripheral modules. Integration and data exchange in superordinated networks (ERP) takes place via the standardized OPC-DA and OPC-UA protocols. The control system is rounded off with additional complex software functions such as recipe management, order and material management, analysis of downtimes, and the evaluation of historical values. The CSpro medium enables the condition of the plant to be easily visualized via a web browser in the net-

work with support for display of this information on smartphones and tablets.

Davis-Standard LLC recently updated its DS-eTPC controller with a larger touchscreen with zoom capability and more connectivity than the current control. The DS-eTPC controller is a touch-panel solution designed to replace discrete temperature controllers, pressure indicators and controllers, driver operators, and indicators, and is capable of controlling three extruders at once, making it well-suited for laboratory lines as well as basic blown film, elastomer, pipe and profile, and sheet applications. According to John Clemens, Davis-Standard's director of extrusion controls, upgrading controllers like the DS-eTPC is not uncommon. "Controls are one of the first things to become obsolete, yet one of the easiest to upgrade," he said. "Certain upgrades also come equipped with our ReACT support system, making it possible to do remote troubleshooting via a secure Internet connection." Upgrades for Davis-Standard's two other most widely used control systems — the DS-eVUE and the EPIC III — are continually available to address a wide range of process requirements and budgets, Clemens added. "The DS-eVUE is designed for mid-range processes such as medical tubing, pipe and profile, and elastomer applications, and replaces obsolete PLC controls and older computer supervisory systems," he said. "Upgrades include software and hardware updates, graphic overview, custom reports, historical trending, event logs, data collection, and electronic signature. This option includes the ReACT upgrade." For larger custom processes, meanwhile, Davis-Standard recommends the EPIC III. "This system is also equipped with ReACT and can be upgraded or used to replace older or obsolete controls, and is the most full-featured control system we offer," Clemens said. "It's available with a 23-inch widescreen monitor, panel-mounted fanless PC, solid-state drive, detailed graphic overview and custom report features, historical trending, event logs and data collection, multi-level security, and network capability." This system is typically used for wire and cable, sheet, and select tubing applications, he added. "All of our controls are built to support both Davis-Standard and non-Davis-Standard equipment, making them a viable solution when upgrading or replacing obsolete systems," Clemens said.



Screen showing Entek's Smart HMI barrel temperature control readout. Photo Credit: Entek

INTELLIGENT INTEGRATION

In what it called "an effort to minimize the challenges customers faced due to their external temperature controllers repeatedly being made obsolete," Entek has recently been working to integrate a temperature control for extruder barrel zones and auxiliary equipment into its Allen-Bradley PLCs. The internal temperature control ran in a trial in the Entek pilot plant for over two years. With the testing now over, Entek is offering a new service to replace existing temperature controls with its internal PLC temperature control. "The replacement includes the latest Allen-Bradley CompactLogix PLC and all the I/O modules required to replace the existing Watlow or Partlow controllers," Entek said. In addition to the upgrade of the existing temperature control to the internal PLC temperature control, this new service also includes a new roll-a-round cart and HMI. "The HMI is the Entek-based Smart HMI that runs in a Windows-based environment, which allows for more intuitive programming and an easier learning experience," Entek said. "It has a lot of new features that the existing PanelMate does not, including touchscreen control and historical trending."

KraussMaffei Berstorff unveiled its BPCTouch controller late last year. Part of the company's Plastics 4.0 system — which networks all machines and production processes among the Krauss-Maffei, KraussMaffei Berstorff, and Netstal brands — the new controller features state-of-the-art technology for easy control and configuration. The control and its ergonomic 21.5-inch interface, which is easy to clean and

Coperion GmbH's modified STS Mc11 twin-screw extruder now comes standard with the CSpro medium control system. Photo Credit: Coperion GmbH

suited for use in dusty or humid environments, features a clear menu structure to reliably guide the machine operator through all process steps, the company said. All relevant peripheral components and downstream equipment can be rapidly tied into the software using standardized interfaces. Each operator is required to log in at the integrated transponders by RFID chip card; and depending on the user level, access to the assigned functions is granted, after which the control system records all steps performed by the operator. KraussMaffei Berstorff has upgraded all of its twin-screw compounding extruders in the ZE BluePower, ZE UTX, and ZE Basic lines with the BPCTouch new control. "All downstream components can easily be integrated into the BPCTouch control, which is able to measure the energy consumption of the extruder and peripheral equipment," the company said.

Also late last year, auxiliary equipment supplier Maguire Products Inc. partnered with Syncro srl, an Italian manufacturer of control technology, to develop new equipment platforms for materials and extrusion control. Maguire has also taken an investment position with Syncro in order to facilitate the partnership. "The strategic partnership and investment from Maguire in Syncro underlines both companies' commitment to providing more choice for our customers to maximize extrusion efficiency," said Frank Kavanagh, Maguire's vice president of global sales. "Maguire's experience in materials handling and blending systems combined with Syncro's extensive range of control options for extrusion will enable customers to use existing equipment from Maguire while easily expanding control elements on both existing and new lines going forward." To suggest some of the possibilities of the combined portfolio, Maguire displayed an extrusion control interface at the K 2016 trade show, with examples of a 7- and 21-inch HMI alongside a new range of Maguire blending systems, the WXB series, which combine batch functionality with loss-in-weight control.

With all of this control software and collaborative work available — and many more advancements to follow, and soon — it's too bad none of it can benefit Trump's beleaguered staff. **CPL**

RESOURCE LIST

Coperion Corp. (Ramsey, N.J.); www.coperion.com; 201-327-6300

Davis-Standard LLC (Pawcatuck, Conn.); www.davis-standard.com; 860-599-1010

Auxiplast Inc. (Ste-Julie, Que.); www.auxiplast.com; 866-922-2894

Entek Extruders/Entek Manufacturing Inc. (Lebanon, Ore.); www.entek-mfg.com; 541-259-1068

KraussMaffei Corp. (Florence, Ky.); www.kraussmaffei.com; 859-283-0200

Maguire Products Canada Inc. (Vaughan, Ont.); www.maguirecanada.com; 905-879-1100

Barway Plastic Equipment Inc. (Vaudreuil-Dorian, Que.); www.barway.ca; 450-455-1396

AUXILIARY EQUIPMENT

Vertical dryer saves energy

Herbold Meckesheim USA's new **HVT** series centrifugal dryers are designed to provide a gentle, energy-saving drying of regrind, especially hollow bodies, PET bottles, polyolefins, and other plastics.

The HVT's distinguishing feature is its vertical rotor shaft, which ensures longer dwell time in the drying chamber. This vertical design also offers the added advantage of significant space savings versus horizontal systems. The refinement of the HVT's internal geometry, including the rotor and housing, minimizes the occurrence of fines and allows for greater yield.

HVT dryers operate on the principle of centrifugal drying. Material is accelerated against a screened stator surface, and simultaneously transported from bottom to top by rotor paddles. Feeding is via a horizontal drainage screw, which eliminates most of the surface moisture before material enters the dryer.

Energy savings are achieved by a reduction in motor size. A typical one- or two-stage drying system for PET flakes with a 150 hp motor would yield a throughput of between 2.5 to 3 tons per hour; an HVT system can equal that performance with a drive motor of only 75 hp.

Large doors on the HVT's housing provide easy access to components, which simplifies maintenance. Rotor paddles and screens can be changed quickly and easily, and the unit's housing is equipped with strategically located replaceable wear plates.

HVT dryers are available in standard or stainless steel configurations.

Herbold Meckesheim USA (Slatersville, R.I.); www.herboldusa.com; 401-597-5500

EXTRUSION

High-speed FPVC system and multipurpose microbore tubing line

A new **FPVC** extrusion system and multipurpose microbore tubing line from **Davis-Standard LLC** is capable of speeds from 5 to 100 meters per minute for processing 2 to 8 mm OD tubing with accuracy of +/- 50u.

Line components include an extruder, water-cooling, precision internal air supply, OD gauge, and combination puller/cutter.

The multipurpose microbore tubing line is designed for single- or dual-layer tubing, and single lumen tubing with or without a stripe. It is equipped with two extruders, an OD/ID wall thickness measuring and controlling system, closed-loop control via vacuum sizing tank and puller, and a high-level central control system.

Davis-Standard LLC (Pawcatuck, Conn.); www.davis-standard.com; 860-599-1010
Auxiplast Inc. (Ste-Julie, Que.); www.auxiplast.com; 866-922-2894

BLOW MOLDING

Smart solution integrates five process steps

The **Super Combi** from **Sidel Group** is designed and engineered to be a single solution for producers of water and CSD beverages, integrating five process steps: preform feeder, blower, labeller, filler/capper, and cap feeder into an all-in-one system.

The system combines intelligent automation with innovative technologies of connected machines and data analytics management, leading to optimised production and maintenance services.

To ensure a sustainable production, the Super Combi has been designed to minimise the use of resources. For example, the Super Combi blower — based on the Sidel Matrix platform — operates at high oven efficiency and minimal environmental footprint while also pushing the boundaries of ultra-lightweight bottle production and handling, thanks to the labelling process now integrated in the solution. Consumption of electrical power is reduced by up to 45 per cent, preform heating time is lowered by up to 15 per cent and, with the option of AirEco2 double air recovery, a 35 per cent reduction in the use of compressed air is also achieved.

With different machine configurations possible based on the output required, the new labelling process is highly efficient and can be optimised to work with up to three stations running simultaneously or with a "master/slave" configuration, in which the one or two stations run while the designated "slave" station remains idle. When a reel change is required, the roles automatically switch, so that no product loss or reduction in speed of production occurs.

Sidel (Canada) Inc. (Laval, Que.); www.sidel.com; 450-973-3336

ROBOTS & AUTOMATION

Suction cup monitoring for Wittmann servo robots

To prevent wear on gripper systems, **Wittmann Battenfeld Inc.** is now equipping its **W8** series servo robots with an adjustable wear monitoring function for the suction cups.

The new vacuum analysis function now provides an additional advance warning system to the existing Wittmann R8 robot control system. Should the vacuum levels continue to deteriorate — which could be an indicator of increasing wear — a warning signal to that effect will be issued. The robot, however, can continue to operate until an actual part loss occurs, or ideally until early remedial action in the automatic system, which would prevent an unplanned machine standstill. Wittmann W8 robots permit the support of eight vacuum hoses as standard, of which each one can be configured separately.

The individual vacuum levels are imported via an analog measuring input and analyzed for the early warning system. The threshold values for early warning can be set by the operator. This function is included as a standard feature in the functionality of the R8 control system.

Wittmann Canada Inc. (Richmond Hill, Ont.); www.wittmann-group.com; 905-887-5355

HOT RUNNERS

Inline hot runners for tight part spacing

The new **Ultra SideGate** inline hot runner technology from **Husky Injection Molding Systems Ltd.** is designed and optimized for challenging applications with high-balance requirements, such as long, thin parts, and is suited for part spacing as low as 18 mm.

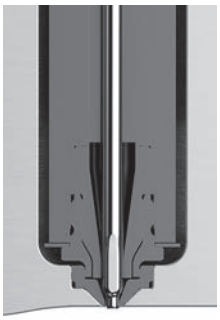
The new inline option provides all of the same benefits and features of Husky's standard Ultra SideGate, which

allows for high cavitation molds with a small footprint, reducing cost while providing gate quality and offering moldmakers added design flexibility and the added benefit of tighter part spacing.

By direct-gating parts with Ultra SideGate, molders can achieve significant resin savings, faster cycle times, and better performance across a wider temperature range. In addition, the technology allows direct access to the individual tips without needing to remove the mold from the injection molding machine, saving molders time on maintenance.

Husky Injection Molding Systems Ltd. (Bolton, Ont.); www.husky.com; 905-951-5000

Valve gate solution eliminates flash



With its new **HPgate** product, **HRSflow** presents a new, quality-enhancing, cost-saving valve gate solution for the manufacture of quality parts without flash.

Compared to the conventional versions, the gate is machined on a hardened metal insert manufactured in-house by HRSflow. This insert is simply screwed into the mold, making it easy to replace in the event of wear.

Another benefit is the product's special needle geometry, in which the conical contact surface allows a better thermal control of the needle temperature. With the conventional conical configuration, when the valve closes there is always the formation of the typical plastic layer at the gating point; when the mold opens this layer is torn off from the part and can lead to flash formation. Through the elimination of the layer due to the cylindrical needle closure, the HPgate solution reduces the time required to optimize the respective process parameters. Superior molding quality is attained much faster, which is basically equivalent to enlarging the process window.

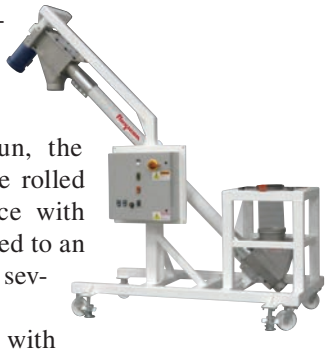
An even higher gate quality can be obtained by combining the HPgate technology with HRSflow's FLEXflow technology. Here, the needle position can be precisely controlled, thereby reducing even further the influence of the process conditions. The result is superior quality reproducible parts with optimum gate aesthetics.

HRS Hot Runner Systems NA Inc. (Windsor, Ont.); www.hrsflow.com; 519-973-0212

CONVEYING

Mobile screener-conveyor handles non-free-flowing materials

The new **Bev-Con** mobile flexible screw conveyor with round vibratory screener from **Flexicon Corp.** removes oversize particles and reduces soft agglomerates before conveying on-size bulk materials from powders and large pellets that flow freely, to non-free-flowing products that pack, cake, seize, or smear due to compression or frictional heat.



Ready to plug in and run, the caster-mounted system can be rolled into position, locked in place with jacking footpads, and connected to an upstream material source in several minutes.

A rugged flexible screw with geometry optimized for difficult-to-move products is the only moving part that contacts with the material, and is driven above the point at which material exits the conveyor, preventing material contact with seals and associated bearing failure and product contamination.

As the screw rotates, it self-centres within the conveyor tube, providing clearance between the screw and tube wall, eliminating or minimizing product degradation.

Aside from the smooth polymer conveyor tube, all material contact surfaces are of stainless steel finished to food, pharmaceutical, and industrial standards.

Additionally, a lower clean-out cap can be removed to flush the smooth interior surfaces with steam, water or cleaning solutions, or to fully remove the flexible screw for cleaning and inspection.

Flexicon Corp. (Bethlehem, Pa.); www.flexicon.com; 888-353-9426

Rate Technology Systems Ltd. (Mississauga, Ont.); www.ratetechnology.com; 905-607-3240

Bulk bag unloader provides closed-cycle dust containment

A new process-specific bulk bag discharger from **National Bulk Equipment** (NBE) is designed to enable operators to easily and properly spout the bulk bag while simultaneously enclosing the bag spout interface within the NBE E3 closed-cycle dust recovery system.

The **NBE E3** closed-cycle dust recovery system prevents the release of dust into the work area by recovering within the E3 the contained dust and reintroducing the material dust back into the discharge path. As material flow moves from the bulk bag through the bag spout interface, the suspension system of the E3 automatically reacts to the lessening volume of material in the bulk bag and lowers the bag spout interface to pull the bag into a taut, conical shape. This bag-shaping function ensures that no residual material remains in the bulk bag and, as a result, no residual material dust is released during unspouting. Personnel, product, and process operations are protected from harmful contaminants.

This NBE bulk bag discharger unloads various semi free-flowing, hygroscopic, contaminable powders at a rate of 6,000 lbs per hour. Changeover times were significantly shortened due to reduced equipment cleaning times and improvements in operator bag spouting efficiency.

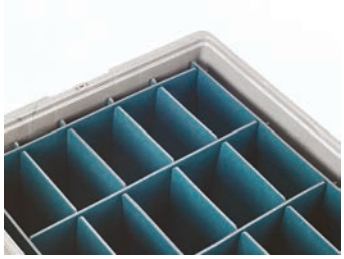
This bulk bag discharging system is built on the NBE integrated construction and controls infrastructure. The complete process sequence — including bulk bag loading and conditioning, material size reduction, and feeding — operates on paired, process-specific structural framework chassis with all automation and control functions centralized to a single, menu-driven HMI to enable standardized and system-wide data reporting.

National Bulk Equipment Inc. (Holland, Mich.); www.nbe-inc.com; 616-399-2220

PACKAGING

Dunnage protect Class-A parts during shipping

ORBIS Corp. recently introduced **Proluxe**, a laminate-sided foam dunnage designed to protect sensitive Class-A parts for the automotive industry — particularly painted components such as door handles and mirror assemblies, chrome trim, badges, and headlamps and tail lamps — from damage during transit.



As part of the ORBIShield line of dunnage products, Proluxe can be installed primarily in handheld totes and also bulk containers and metal transport racks, to protect parts and components throughout the automotive and industrial supply chain.

Proluxe dunnage is fabricated using a special proprietary adhesive to affix brushed polylaminate to crosslinked foam, resulting in a durable, long-term dunnage solution for Class-A parts. This flexible foam dunnage is ergonomically designed so it is soft to the touch and offers maximized part protection. The dual-sided laminate will keep decorative and Class-A parts highly protected and clean with its lint-free composition.

ORBIS developed this proprietary solution to protect parts from scratches, scuffs, and dust during rugged shipping applications, and conducted third-party testing to

determine point of delamination. The pounds of force per inch (lbf/in) value represents the average force it would take for the brushed polylaminate to delaminate. Proluxe testing resulted in an adhesive value of 6.3 lbf/in, compared with the leading competitive material of only 1.2 lbf/in. Proluxe outperformed the third-party testing by 5.1 lbf/in.

ORBIS Corp. (Toronto);
www.orbiscorporation.com; 416-745-6980

COOLING

Adiabatic towers cut power, water consumption

With improved, multi-mode controls that conserve electricity while dramatically reducing water consumption, the **ESTW** series EarthSmart adiabatic cooling towers from **Conair Group** are designed to provide a cost-efficient process cooling solution by cutting power usage and water consumption.

The new adiabatic towers eliminate the constant water consumption and treatment requirements of conventional evaporative towers, utilizing closed-loop cooling that isolates process water from contamination, cycling it through finned heat exchangers where ambient air absorbs process heat and cools it for recirculation.

The advanced controls in EarthSmart adiabatic towers offer multiple modes that also save energy and water in conditions when less-than-full cooling capacity is required. In normal mode, the system runs without using any water and the smart control regulates fan speed, air flow, and process coolant flow to achieve the desired process cooling setpoint. No adiabatic cooling water is used.

When conditions require additional cooling, it operates in either of two wet modes, and gives processors the flexibility to choose whether to conserve water or power depending on changing utility and resource costs. In water-saving mode, the control minimizes water consumption in favour of increased airflow to achieve the desired process cooling setpoint. In energy-saving mode, meanwhile, the control system reduces electrical con-

sumption by activating use of adiabatic cooling as soon as power consumption reaches a user-defined setpoint; adiabatic cooling is then increased until the process cooling needs are satisfied or the adiabatic capacity is up to 100 per cent before power consumption is increased.

Conair Group (Cranberry Township, Pa.); www.conairgroup.com; 724-584-5500

Dier International Plastics Inc. (Unionville, Ont.); www.dierinternational.com; 416-219-0509

Industries Laferriere (Mascouche, Que.); www.industrieslaferriere.ca; 450-477-8880

Turner Group Inc. (Seattle, Wash.); www.turnergroup.net; 206-769-3707

MEASUREMENT

Accurate, intuitive part dimension verification

New from **Cognex Corp.**, the **In-Sight** laser profiler is designed to be an intuitive and highly reliable tool for obtaining height, gap, position, and angle measurements and detecting defects on the factory floor.

The In-Sight device combines an easy-to-use interface and the VC200 vision controller, along with the accuracy and dependability of Cognex's 3D laser displacement technology. Anyone who knows how to use a 2D In-Sight system can set up a laser profiler application within minutes.

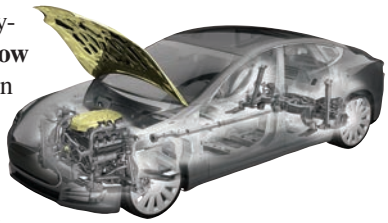
Part profile verifications are used across a wide range of industries, including automotive, electronics, consumer products, and food and beverage, to ensure parts are manufactured within specified tolerances. Slight dimensional variations can adversely affect product quality, consumer safety, and brand integrity. The In-Sight profiler identifies these issues before they reach customers.

By allowing users to set up inspection applications in a few easy steps, this new measurement system eliminates the complexity required by other laser profiling solutions. Additionally, the In-Sight laser profiler also makes it easier to monitor production line activity from anywhere on the factory floor using a web-enabled laptop, tablet or smartphone.

Cognex Corp. (Natick, Mass.); www.cognex.com; 855-426-4639

MATERIALS

Foam hoodliner hits goals for acoustics and lightweighting



The new **SpecFlex** polyurethane system from **Dow Automotive Systems** can be customized to meet under-the-hood performance requirements while balancing weight and processing targets.

In addition to offering sound absorption and barrier and/or damping qualities for hoodliners, SpecFlex provides customized flammability and fast-curing systems to enable increased productivity and deliver large, complex shapes.

The lightweight polyurethane foam provides better acoustics control and weight advantages while also delivering a high level of thermoforming and stiffness. In addition to under-the-hood applications, SpecFlex can also be used for air intakes, engine side dashboards, transmission tunnel insulators, and water boxes.

SpecFlex solutions are available with low density to pass requirements such as MVSS 302, and superior flammability to pass PV 3357. The foams meet physical, acoustical, and processing requirements with minimal waste.

Dow Automotive Systems (Auburn Hills, Mich.); www.dow.com; 800-369-2436

Versatile compounds to replace nylon

RTP 100 XP compounds from **RTP Co.** are designed as alternatives to nylon or other hygroscopic compounds where moisture can reduce the load-bearing capability of the polymers.

Available worldwide as standard pellets in formulations containing glass fibre reinforcement ranging from 10 to 50 weight per cent, additional additive technologies may be incorporated to create robust compounds that are engineered to meet extremely demanding requirements such as long-term heat aging, cold weather impact resistance, flame retardance, ultra violet protection, or compliance with government agency approvals.

Getty Images/Thinkstock

Well-suited for large or small geometries, RTP 100 XP compounds are easily injection molded with generous processing guidelines, making them a good choice for any industry application that requires lightweight performance. Possibilities include large structural tote bins, interior automotive trim, office furniture, and construction panels.

RTP Co. (Winona, Minn.); www.rtpcompany.com; 800-433-4787
Ontario and Eastern Canada: Phil Lem; 647-821-9788

Butene film resins promise higher efficiency

Nova Chemicals Corp. has introduced three new polyethylene butene film resins designed to enable film manufacturers to achieve significant output increases and improved performance compared to traditional butene LLDPE.

Each of the three resins in the **Novapol PF-Y818** series has the same performance properties, but is formulated with a different set of additives for the specific needs of film extruders. Designated individually as PF-Y818-BPX, PF-Y818-CPX, and PF-Y818-FX, the resins can be used in a wide range of flexible film applications, including food packaging, stretch film, industrial liners, retail trash bags, and collation shrink.

The new series' enhanced melt strength allows extruders to simplify structures and blends by reducing or eliminating the need for LDPE. In addition, these three resins feature a superior balance of physical properties, including good clarity and low gels, which significantly improve optics over traditional butene LLDPE.

Nova Chemicals Corp. (Calgary, Alta.); www.novachemicals.com; 403-750-3600

advertising index

Clamp tonnage in preform molding

By Ottmar Brandau, Apex Container Tech Inc.

I see too many molding machines that are set to full clamp tonnage when it's not necessary. Using the minimum tonnage without flashing is an important component in maximizing tool life: The lower the tonnage, the longer the taper locks hold up, the vents stay open, and the longer the tool will be in operation.

What determines the necessary tonnage? The clamp has to be held closed when material pressure pushes against it; when the material pressure overcomes the clamp tonnage, the tool flashes. Let's understand, first, when the tool will flash: either at the end of injection or during hold time. During injection, the screw or shooting pot fills the cavity. At the start of injection the cavity is empty and very little material pressure is exerted. This makes it possible to clamp up and inject simultaneously, a cycle time-saving measure optional on many machines that should always be used in preform molding. When the cavity is full, the machine should switch to hold pressure where less pressure at slower speed allows material delivery to account for shrinkage. In PET molding we always switch on distance, not on time or pressure, and the point where we do is called the transition or switch-over point. When the transition point is set at too small a number, the machine tries to inject into the already-filled cavity and flashing is possible. When the transition point is set too high, the preform may not form entirely, causing a short shot.

How do we set the transition point? Let's first think about why we separate injection and hold, and what happens in either process. PET has a solid density of 1.335 g/cm^3 and a melt density of 1.15 to 1.2 g/cm^3. In the heated state, PET molecules push each other away and so require more space, hence the lower density. As the material temperature drops during hold, the PET molecules pack more tightly together and the density increases. When the cavity is full at the end of injection, the average temperature of the material has cooled to a degree unknown to us. PET directly pushed against the cold mold walls is already at solid density while the material in the centre is still at melt density.

We can attempt to calculate the difference in densities as a percentage and convert that to distance during injection. The idea here is that we calculate how much of the stroke needs to take place during hold to account for the increase in density. It's done like this (I use the middle value between 1.15 and 1.2 g/cm^3):

Difference between solid and melt density is:

$$1.335 - 1.175 = 0.16$$

Percentage of this difference to solid density:

$$0.16 / 1.335 * 100\% = 12\%$$

If we assumed that the material is still at melt density after injection, we therefore have to make up 12 per cent of the total shot from the shot size to the cushion position during hold. This is a reasonable calculation for preforms with a wall thickness of 2.5 to 4 mm, but it doesn't work as well for very thin and very thick performs. With very thin performs, there is a large amount of the total material in the cavity exposed to the cold mold wall, and therefore the overall temperature is lower; with very thick performs, it's the long injection time that cools the material down more. In either case, the material is colder and there is therefore less distance needed to make up for the shrinkage. The percentage then drops to eight per cent or even five per cent, and we can now calculate with some degree of accuracy where the transition point should be.

Now that we don't have to worry about flashing the tool during injection, how do we calculate the necessary hold pressure and what tonnage is required for a given pressure? When it comes to hold pressure, less is always better up to the point where sink marks appear. Over-pressuring the preform can lead to gate problems and blowing difficulties. You can start with about 60 per cent of the maximum injection pressure and reduce if necessary. All machines offer at least 3 hold pressures and you may reduce it to 50 per cent and 40 per cent for pressures 2 and 3. There is no ironclad calculation for that, but it's best to start with a low pressure, increasing it only to overcome sink marks.

Necessary clamp tonnage *can* be calculated, however. The material pressure works on the circular surface where it is largest: the "E" dimension of the neck. While both the threads and the neck support ring are larger than the "E" dimension, hold pressure for these geometries works both in the forward and backward direction and has therefore no net force pushing against the clamp.

One caveat to this procedure is the concern that the mold "breathes" by slightly opening and closing as the material pressure increases without leading to flash. This is highly undesirable as it will actually increase wear, so watch the mold closely. A reasonable approach is to start at full clamp tonnage, optimize the hold pressure, and then lower the tonnage to a value somewhat above the calculated value. Use small steps of 30 tons or so and watch for little protuberances at the parting line of the neck finish, as flash will appear there first.

So in the end, there's more than one reason to run the lowest clamp tonnage. **CPL**

Ottmar Brandau, president of Wasaga Beach, Ont.-based Apex Container Tech Inc., has been working in the plastics industry since 1978, and can be reached at 705-429-1492 or emailed at apex@blowmolding.org. His newest book, "The Rapid Guide to Perfect PET Bottles," describes 31 common defects and their solutions; for more information, visit www.blowmolding.org/shop.

BRASS PRESS TOOLS

FOR USE ON AND AROUND YOUR MOLDS, DIES, NOZZLES, SPRUE BUSHINGS, ETC.
FINEST QUALITY - RUGGED INDUSTRIAL TOOLS - HEAVY DUTY

MIX or MATCH for Quantity Breaks

TYPE	PART NO.	SIZE	TIP	MATERIAL	PRICE EACH 1-11	12-23	24+
STRAIGHT ROD TOOLS	M1805	1/8" DIA. X 7" LONG	POINTED	BRASS	$1.95	$1.85	$1.75
	B1800	1/8" DIA. X 14" LONG	POINTED	BRASS	3.75	3.55	3.40
	D3600	3/16" DIA. X 14" LONG	POINTED	BRASS	3.75	3.55	3.40
	L1400	1/4" DIA. X 14" LONG	POINTED	BRASS	4.40	4.20	3.95
	LX1400	1/4" DIA. X 23" LONG	POINTED	BRASS	7.40	7.05	6.65
	E3800	3/8" DIA. X 15" LONG	BLUNT	BRASS	5.20	4.95	4.70
	F380P	3/8" DIA. X 15" LONG	POINTED	BRASS	5.40	5.15	4.85
	FX380P	3/8" DIA. X 24" LONG	POINTED	BRASS	8.60	8.20	7.75
90° BENT ROD TOOLS	A1890	1/8" DIA. X 14" LONG	POINTED	BRASS	3.75	3.55	3.40
	C3690	3/16" DIA. X 14" LONG	POINTED	BRASS	3.75	3.55	3.40
	K1490	1/4" DIA. X 14" LONG	POINTED	BRASS	4.40	4.20	3.95
	N1432	1/4" DIA. X 38" LONG	POINTED	ALUMINUM	6.50	6.15	5.85
SCRAPERS	BBRS12	1/8" X 1" X 12" LONG	CHISEL	ALUMINUM	5.00	4.75	4.50
	BBRS18	1/8" X 1" X 17" LONG	CHISEL	ALUMINUM	6.25	5.95	5.60
	G181S	1/8" X 1" X 12" LONG	CHISEL	BRASS	7.30	6.95	6.55
	GXL181S	1/8" X 1" X 17" LONG	CHISEL	BRASS	11.00	10.45	9.90
BRUSHES	P032B	3-1/4" LONG / .0045 WIRE	N/A	BRASS	1.50	1.45	1.40
	TS714S	7-1/4" LONG / .0055 WIRE	N/A	STAINLESS STEEL	.95	.90	.85
	J778B	7-1/4" LONG / .0055 WIRE	N/A	BRASS	.85	.80	.75
	R858B	8-5/8" LONG / .0075 WIRE	N/A	BRASS	1.70	1.60	1.52
	H100B	10" LONG / .011 WIRE	N/A	BRASS	4.60	4.35	4.10
	S140B	14" LONG / .012 WIRE	N/A	BRASS	6.95	6.70	6.40
SCREWDRIVER	† EX3880	13" LONG X 5/16" BLADE	FLAT	BRASS	8.00	7.60	7.20

LOWER PRICES!

† EX3880 is not for turning screws. It's solid brass

PLASTIC PROCESS EQUIPMENT, INC.
www.ppe.com • e-mail: sales@ppe.com

PPE WEST
6385 Montessouri Street, Las Vegas, Nevada 89113
702-433-6385 • 800-258-8877 • Fax: 702-433-6388

PPE SOUTH
11218 Challenger Avenue, Odessa, Florida 33556
727-834-8888 • 800-282-6783 • Fax: 727-834-8873

PPE
8303 CORPORATE PARK DRIVE, MACEDONIA (Cleveland), OHIO 44056, USA
216-367-7000 • **Toll Free: 800-321-0562** • Fax: 216-367-7022 • Order Fax: 800-223-8305

Toll Free: USA, Canada & Mexico
800-362-0706