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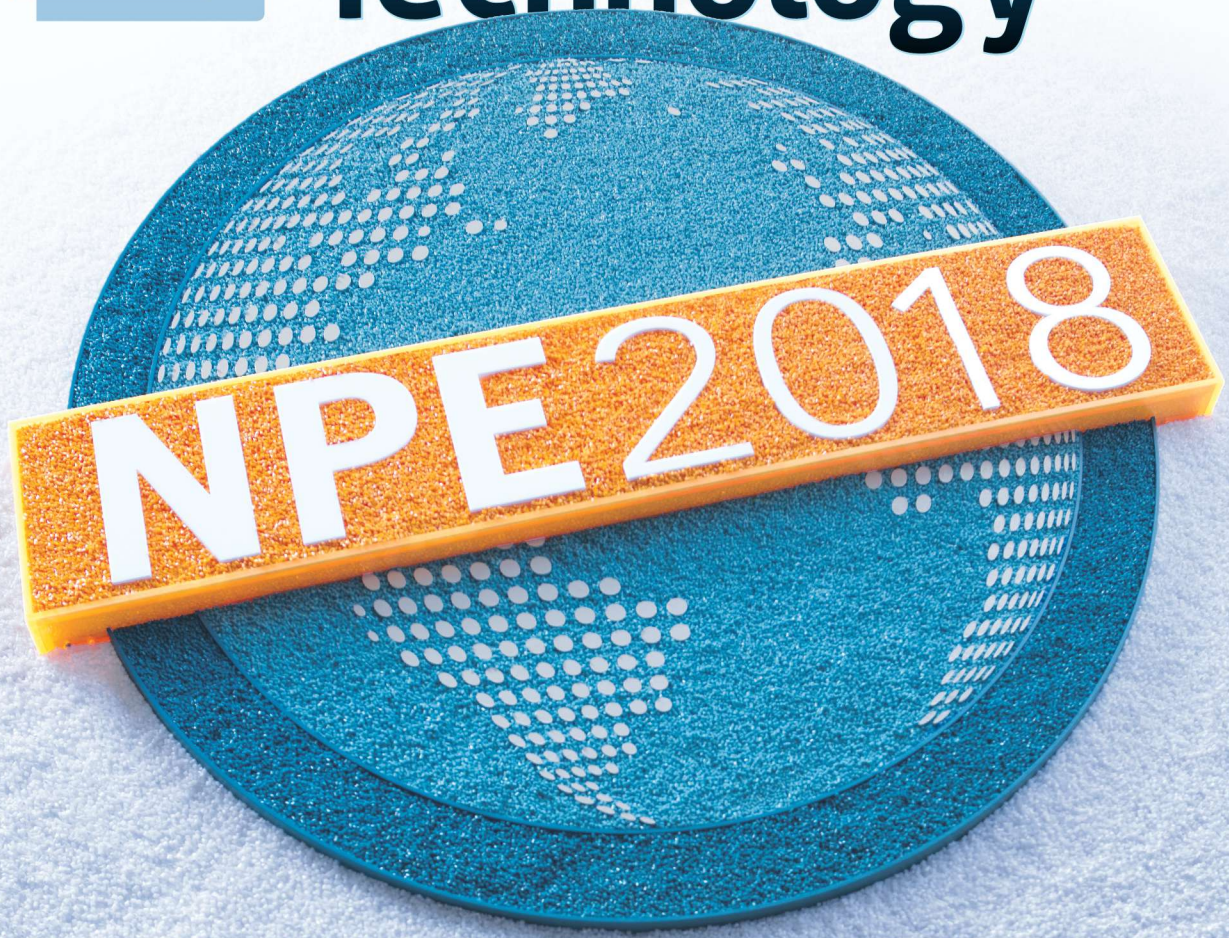

THE PLASTICS SHOW

Why the World Is Coming to Orlando

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Starting on p. 52

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Advantage W3563
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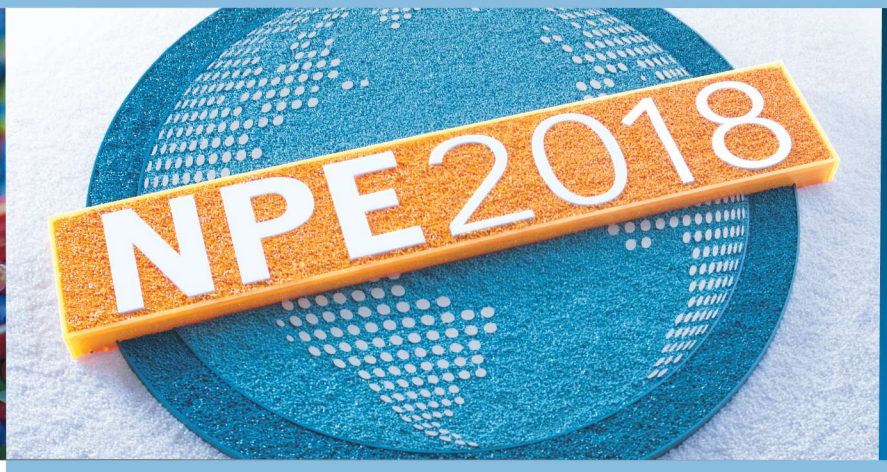


Why the World Is Coming to Orlando

Get All the News in Our Exclusive NPE2018 Show Preview

Cover image designed and created by Jeff Norgord. Colored pellets used on cover image supplied by Clariant Masterbatches.

There's more on the web at *PTonline.com*

Design of Experiments Workshop Lets Molding 2018 Attendees Get Hands-On

Prior to Molding 2018 in Long Beach, Calif., Suhas Kulkarni, founder of injection molding consultancy FimmTech, led participants in a half-day, hands-on Design of Experiments (DOE) workshop. Held in a classroom and at-the-press at molder and moldmaker Comar LLC in Garden Grove, Calif., the workshop showed how DOE can best be applied to injection molding.

youtu.be/cDQ1cRzhhmU

BLOG: Better Color Changes, Faster

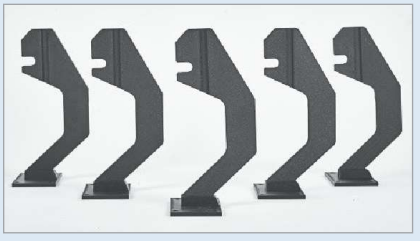
Plastics Technology contributor Garrett Mackenzie focused on fast (3- to 7-min, to be exact) color changes for injection molders in a three-part blog series. Mackenzie tackled assessment, preparation & equipment, and color planning in the posts. Photo: Asaclean

short.ptonline.com/change

BLOG: 3D Printing Meets Chocolate Manufacturing

Additive manufacturing joined up with chocolate making, but not in the way you might have expected. Senior Editor Lilli Manolis Sherman details how a Dutch chocolate maker turned to Stratasys to replace a hand-made component (prone to breaking) with a 3D-printed carbon-fiber-reinforced application.

short.ptonline.com/3Dchoc



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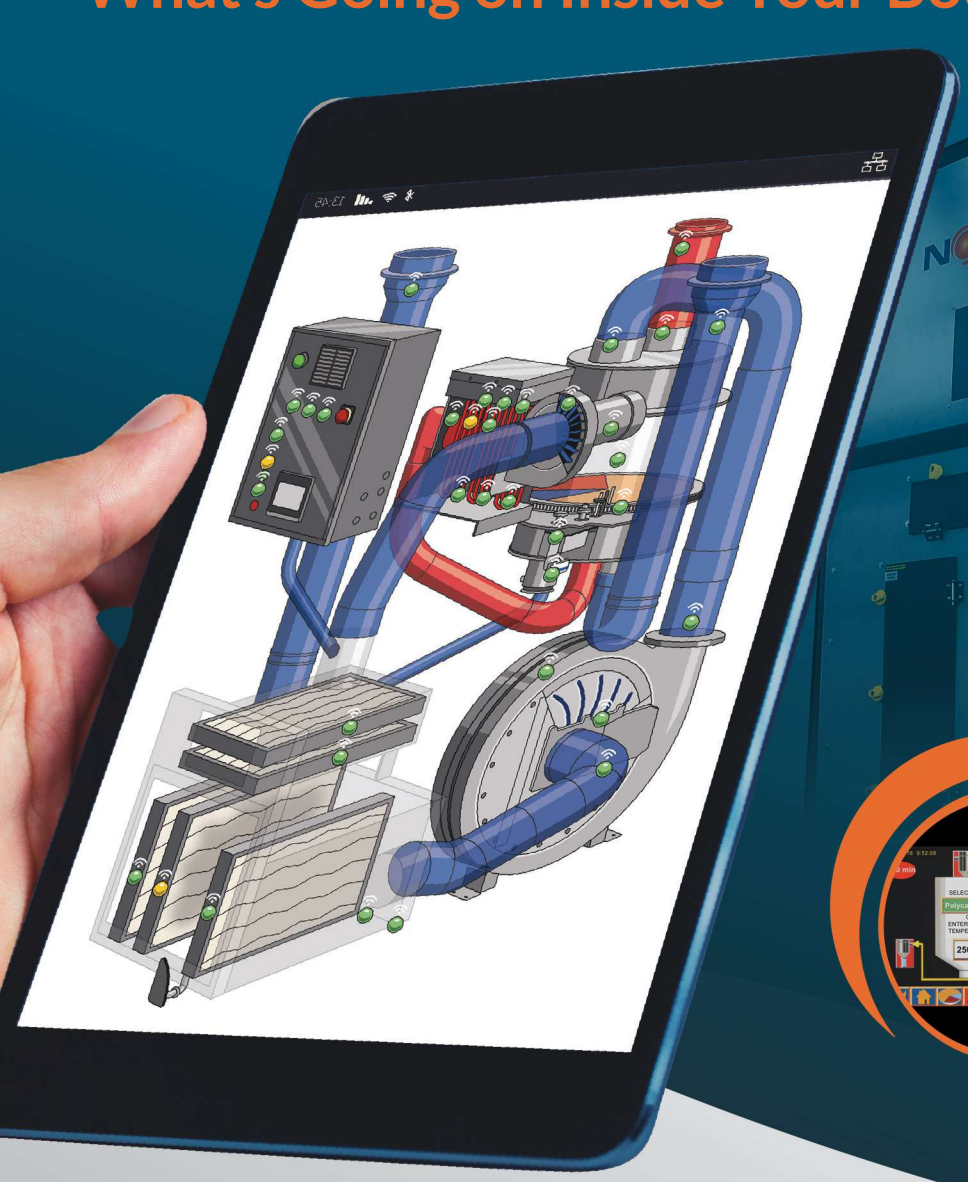
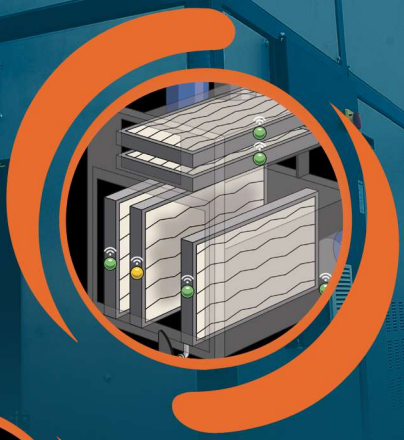
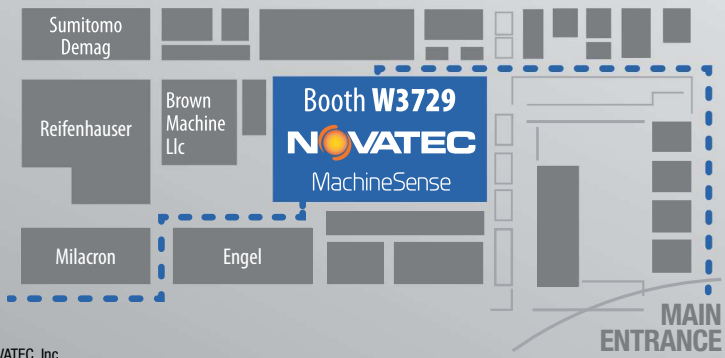




Watching filters to avoid air flow problems

20+ component sensors are smarter than the PLC



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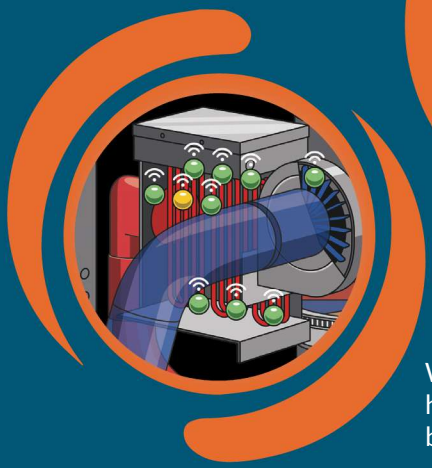
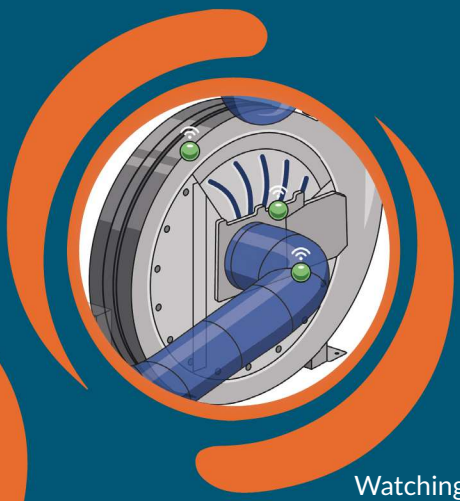


Watching individual heaters before heater bank failure



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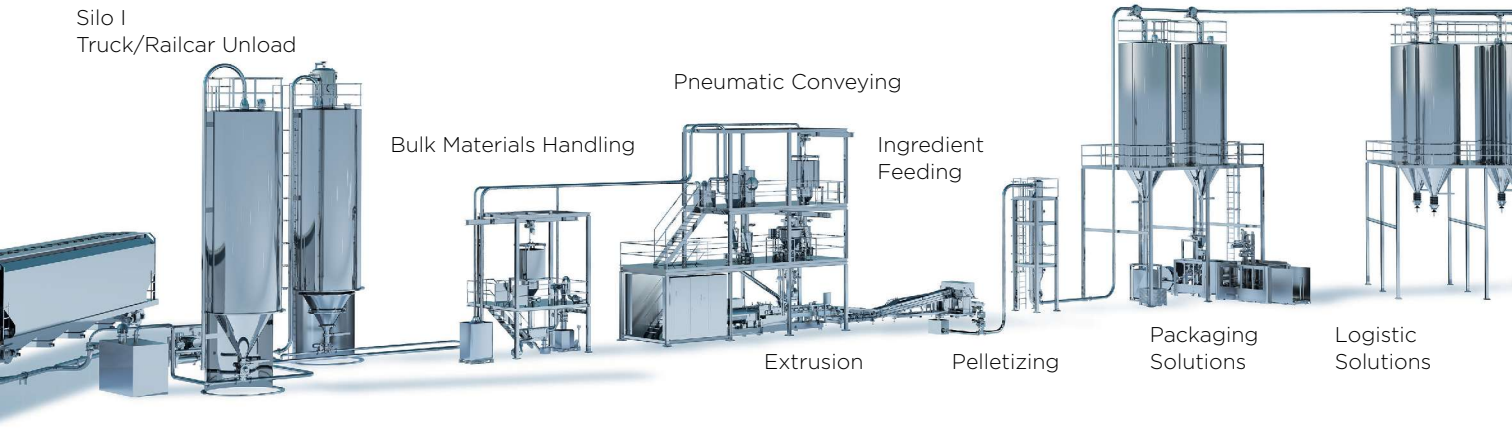

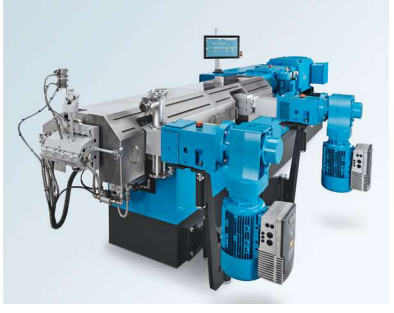

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Time to Change the Conversation About Plastics

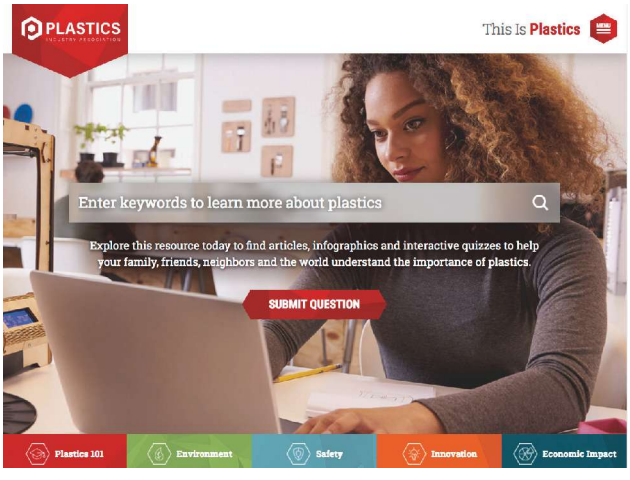
Check out Plastics Industry Association's recently launched website and start advocating for your industry.

Jim Callari
Editorial Director

In the 30 years I've been reporting on plastics, there is at least one thing I can state without fear of contradiction: We as an industry are very good about touting the features of plastics among ourselves. To folks outside the industry? Not so good.

That's probably no different from any other industry, to be honest. But with ours involving all these "mysterious" and misunderstood chemicals and all that, it's crucial that we as an industry start banging the drum until the millions of people with misconceptions about plastics hear the good word.

If I'm coming off as accusatory, my bad. Let me tell you a story: My daughter likes to drink bottled water. She brings a bottle or two with her in her car to sip while driving. Thing is, she never finishes the water in the bottle. *Never*. Instead, she'll grab a fresh bottle from the fridge, take the bottle that's maybe 90% consumed from her cupholder, and toss it on the floor of the passenger side of her car. This process will repeat itself again and again until passengers have to wade through a PET pile of semi-consumed water bottles that approach calf level. This irritates me on several levels, but enough with that.



Now my first-born is very environmentally conscious (just not particularly tidy), so at some point, she'll gather up these bottles and put them in our recycling cans. But in the interim, this PET landfill on wheels becomes more and more expansive, as if these mostly empty bottles are somehow breeding. If you happen to be a passenger, the car will resonate with that crunchy PET bottle sound as you shift your feet around, and maybe you'll get splashed with a few drops of water if the cap has not been tightly secured.

Anyway, on one occasion my sister was her passenger (I was in the back). The accumulation of bottles at this point was at a modest ankle high, and my sister—a highly intelligent person—issued her niece a stern warning: "Whatever you do, don't drink the water that's left in the bottles you've thrown on the floor here. You know, after they've been out in the sun for a while, the chemicals in the bottle break down and seep into the water." My daughter replied, "I know. Don't worry."

Sheesh. Seriously? My own flesh and blood with these ridiculous notions? How mortifying. Then I thought about it after I barked at them from the back seat. The fact they had these ill-founded notions wasn't really their fault. It was mine.

With all that in mind, I'd like to introduce you to a website with which you might not be familiar. It's ***thisisplastics.com***, and it's brought to you by Plastics Industry Association (PLASTICS). On its "About" page, PLASTICS explains why a site like this was launched to begin with: "People aren't blogging about the ways plastics are keeping kids healthy and safe. They aren't tweeting about the millions of jobs the industry has created. They're not having conversations in break rooms about how plastics are changing technology for the better. They're talking about plastic bag bans. They're talking about landfills and waste. They're talking about BPA and phthalates, and they often don't hear from us. We're here to help you change the conversation. And that means we're addressing these issues head-on. We're being transparent. We're proud to tell our story. With this resource, we're empowering you with ways to tell the world what you do and why you do it. We're empowering you with the truth about our industry and a material that makes a positive impact."

The site has information on plastics basics (Plastics 101), the environment, safety, innovation, and economic impact. As you get ready for NPE2018 (plenty of news about that in this issue), I ask that you do two things: bookmark this website for yourself, and email or text the link to friends and family.

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Engel's Online Customer Portal To Go Live in Time for NPE

The redesigned e-connect customer portal from Engel Austria has been available in parts of Europe since last fall (see October Keeping Up). It will be launched in North America by NPE showtime in May. "With the new software, we can now provide customers with more specific information at any time and independently of their location, establish contact with them even faster, and provide the best possible support to meet meet the challenges of Industry 4.0," says Wolfgang Degwerth, v.p. sales and service at Engel's U.S. office in York, Pa.

From the first order, all machines and system solutions supplied by Engel are stored in the portal system, with the current status shown. For the best possible overview, users can reproduce the structure of their individual machines in the system and even assign production lines to different buildings or departments online. Customers and service technicians will be able to use the same knowledge base at all times. The equipment history in this knowledge base can make it quicker and easier to find solutions to service issues. And each new service call is fully documented in e-connect.

E-connect especially facilitates purchases of spare parts. Price and availability are stored on the system, so customers can download a quotation from the platform and can track the parts shipment online up to its arrival at their plant.

Besides online support and remote maintenance, the portal includes the new e-connect.monitor for predictive, condition-based maintenance in order to avoid unscheduled downtime. The first two capabilities of this type are monitoring the condition of plasticating screws via an external sensor without dismantling the machine—done in the course of regular servicing—and checking condition of spindles driven by servo motors via automatic online monitoring. In both cases, results of the evaluation are stored on e-connect and are available at any time. Engel will integrate future service products for the smart factory into this customer portal, notes Degwerth.

717-764-6818 • engelglobal.com

Moretto Moves from Ohio To Pennsylvania

Moretto USA LLC, the U.S. subsidiary of Italian auxiliary-equipment firm Moretto S.p.A., opened a 15,000-ft^2 facility in 2015 in Columbus, Ohio. After its sales grew 10-fold, the U.S. branch has moved into a 30,000-ft^2 in site in Jackson Center, Pa., approximately 65 miles north of Pittsburgh. At present, Moretto has nine U.S. employees, but it expects that number to rise to 15 by the end of the year. The new facility will house sales offices, products and spare parts inventory, an assembly area, and a showroom. According to Moretto, the U.S. subsidiary has helped the company win contracts with leading companies in the PET, medical, and automotive sectors.

724-269-7600 • moretto.com/usa

Polymax to Boost TPE Output

Custom TPE compounder Polymax Thermoplastic Elastomers LLC is expanding its U.S.production operation in Waukegan, Ill., adding about 8 million lb of annual capacity. A new compounding line will manufacture SEBS, SBS, TPO, and alloy products. The

expansion is slated to be fully operational this month. Polymax, which ranks among the largest Chinese TPE suppliers, opened its U.S. operations in 2013. Its engineered TPE materials serve automotive, food packaging, consumer, building and construction, and industrial markets.

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Westlake Renames PVC Compounds Business

Westlake Compounds LLC is the new name of the PVC compounds business of Houston-based Westlake Chemical. The new entity originally joined Westlake as part of the company's acquisition of Axiall Corp. in 2016. Westlake Compounds was previously known as Axiall Compounds, and before that as Georgia Gulf Compounds. The company's compounds facilities are in Aberdeen, Gallman, Madison and Prairie, Miss. Combining Westlake and Axiall created the largest LDPE producer in the Americas and second-largest PVC supplier in North America and the third-largest globally.
713-960-9111 • westlake.com

LyondellBasell to Acquire A.Schulman

Houston-based polyolefins supplier LyondellBasell has agreed to acquire compounder A.Schulman, Akron, Ohio. The deal will double the size of LyondellBasell's compounding business.
713-309-7200 • lyondellbasell.com;
847-426-3350 • aschulman.com

SABIC Buys Big Stake in Clariant

The largest shareholder of Clariant Corp. (U.S. office in Charlotte, N.C.; ***clariant.com***) is now SABIC (U.S. office in Houston; ***sabic.com***). SABIC acquired a 24.99% stake in Clariant, previously held by White Tail, an activist partnership of New York's 40 North and Corvex Management—the same entity that opposed a planned merger between the Swiss specialty chemical company and Huntsman Corp.

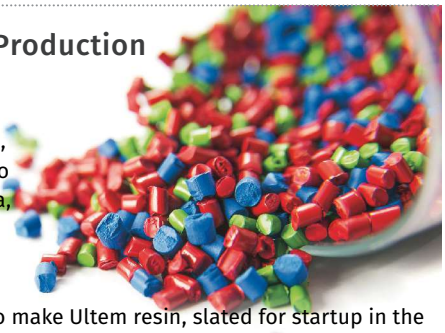
SABIC is a major global chemical company with a significant specialty chemicals business and is a partner with Clariant in the catalyst joint venture Scientific Design (U.S. office in Little Ferry, N.J.).

New Software Collaborations Advance CAD for 3D Printing

Two software collaborations were announced recently to make possible more powerful computer-aided design of 3D-printed parts. One partner in both collaborations is Dassault Systèmes' SolidWorks CAD platform, Waltham, Mass. (***solidworks.com***). Dassault agreed last month to work with HP, Inc., Palo Alto, Calif., to optimize SolidWorks to take advantage of HP's Multi Jet Fusion 3D printing process (photo). A unique capability of that process is to control part properties at the individual voxel (3D pixel) level. This will enable design and production of parts with colors, textures, physical properties (e.g., stiffness or flexibility), or electrical conductivity that vary in a controlled manner throughout the part. No time frame was cited for this development project.

A second announcement last month was the launch of 3DXpert for SolidWorks software from 3D Systems Corp., Rock Hill, S.C. (***3dsystems.com***). This software provides a new layer of tools within a familiar CAD environment to enable SolidWorks users to prepare and optimize designs for both plastic and metal additive manufacturing. The software is said to maintain design integrity by working with native CAD solids without converting them to STL. It reportedly optimizes structures with rapid creation of lattice-based structures for lightweighting and applying surface textures. It uses real-time analysis for best-fit positioning and orientation of the part to ensure surface quality and prevent part distortion. It also accelerates preparation time with automatic features such as tray setup and estimation of material usage and build time. Available exclusively to SolidWorks customers, the standard edition of 3DXpert for SolidWorks is now included in their annual SolidWorks subscription and is ready for download.

SABIC to Expand PEI & PPE Production



To meet increased global demand for two of its high-performance engineering thermoplastics—Ultem PEI and Noryl PPE, SABIC (U.S. office in Houston) has plans to increase capacity through projects in Asia, the Netherlands and North America:

- In Singapore, where it currently has compounding operations, SABIC plans to make Ultem resin, slated for startup in the first half of 2021. SABIC will be the first company to produce this high-heat resin in Asia. (Currently, Ultem PEI is produced in two locations—Mt. Vernon, Ind., and Cartagena, Spain.) When fully operational, the Singapore facility is expected to increase capacity by 50% over today's total.
- SABIC will recommission operations at its Bergen op Zoom PPE resin plant in the Netherlands by the end of 2019. When operational, this facility is expected to add more than 40% to SABIC's 2017 global capacity.
- SABIC expects incremental manufacturing process improvements at its Selkirk, N.Y., and Mt. Vernon plants to provide increases in Noryl PPE and Ultem PEI resin production, respectively, by the end of this year.

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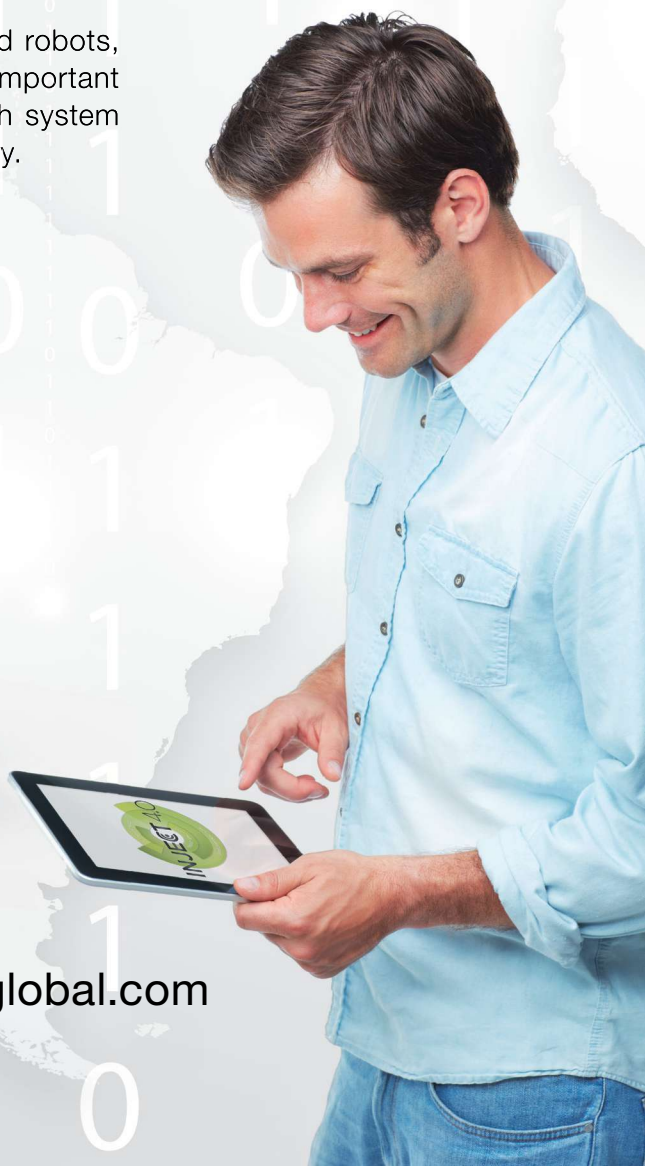

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First 3D Printed Yacht Features Carbon-Fiber-Reinforced Thermoplastics

Carbon-fiber-reinforced high-performance thermoplastics, such as PEEK, will be featured on what is reportedly the world's first 3D-printed yacht. The project is a collaboration of Italian boat builder Livrea Yachts and Germany's Lehvoss Group (U.S. office in Pawcatuck, Conn.). Lehvos supported the process development and engineered its Luvocum 3F customized 3D-printing material specifically for this application since the design work began in 2014.

Called the Mini 650, this yacht is being built for the 2019 solo Mini-Transat transatlantic yacht race from France to Brazil. An Italian sister company of Livrea, called OCORE, developed dedicated direct-extrusion 3D-printing technology for this project and printed the parts for the yacht. In addition to improving the printing hardware—robot, extruder and nozzle—OCORE has patented new material-deposition strategy using an algorithm inspired by fractals. Lehvoss customized 3D-printing materials of high-performance engineering resins reinforced with carbon fibers and further modified to yield improved layer strength with no warping of the printed parts, which resulted in parts that are stronger, lighter and more durable.

855-681-3226 • lehvoss.us

Albis Plastics Moves Its North American HQ

Following its acquisition of the remaining shares of Albis Barnett Polymers LLC last October, the activities of Albis Barnett Polymers have now been fully integrated into Albis Plastics Corp. As a result of the merger, Albis' North American headquarters has moved from Sugar Land, Texas, to its plant in Duncan, S.C.

As previously reported (Oct. '17 Starting Up), German-based Albis began to manufacture its own prime technical compounds in the U.S. (previously obtained via toll compounding and imports from Germany) under the Alcom brand (including PC, ABS, and ABS/PC), as well as the broad range of customized engineered Altech brands at a new manufacturing site in Duncan with a nameplate capacity of approximately 30 million lb/yr.

864-721-2413 • albis.com

Total Corbion PLA Pilot Plant Opens in Thailand

Total Corbion PLA (U.S. office in Lenexa, Kan.), has brought its new PLA pilot plant in Thailand to full production from the December initial startup. Since then, the plant has produced a broad range of Luminy PLA resins and is now available for customer sampling.

Total Corbion is gearing up to become a world-scale producer of PLA. On the same site, the company's lactide plant is being expanded to 220 million lb/yr, and a 165-million-lb/yr PLA polymerization plant is under construction. The latter is on track to deliver its first commercial quantities of PLA during the second half of 2018. Total Corbion will be producing a broad portfolio of Luminy PLA neat resins, from standard PLA to high-heat-resistant "PLAT" grades for a range of markets from packaging to consumer goods, fibers and automotive.

913-890-5500 • totalcorbion.com

Huntsman Explores TPU Bead Foams

The TPU team at Huntsman International, The Woodlands, Texas, has formed a partnership with Germany's Formenbau GmbH & Co., a manufacturer of molds and tools for plastics processing, to support development of expanded TPU (eTPU) bead foams. Huntsman and Formenbau will offer services such as guidance on material selection and steam-mold design, production and testing. The partners will also collaborate on research projects, exploring eTPU and steam-molding improvements for this lightweight technology, which is used in sports shoes but may have broader potential in a variety of industrial markets.

Huntsman will use Formenbau's technical center to conduct steam-molding trials of its eTPU products, such as smartLite PF 1560 TPU, and will assess new products to ensure compatibility with the very latest steam-molding techniques.

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Metal/Plastic Hybrid Molding: Flexible Alternatives for Teletronics

In overmolding of plastic onto electronic components, the goal today is flexibility. Here are three real-world examples of different kinds of modular cell layouts that have been used in production.

By Matt Naitove
Executive Editor

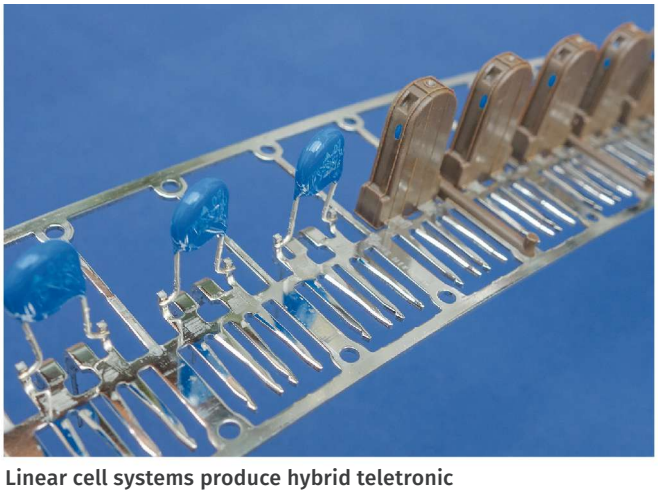
Overmolding of plastic onto metal electronic components is used in various industries, including automotive, appliance white goods, telecommunications, medical technology, and aerospace. Such metal/plastic "hybrids"—for example, switches, connectors and sensors—require highly integrated production cells, most of which are dedicated to one specific product. But today, as life cycles are becoming shorter, manufacturers are looking for more flexible production options. Hence, there is a trend to modular plant layouts, according to sources at Engel Austria, parent of Engel Machinery Inc., York, Pa. (***engelglobal.com***). One such layout is a highlight of Engel's exhibit at NPE2018 in Orlando, Fla., next month.

LINEAR VS. RADIAL SYSTEMS

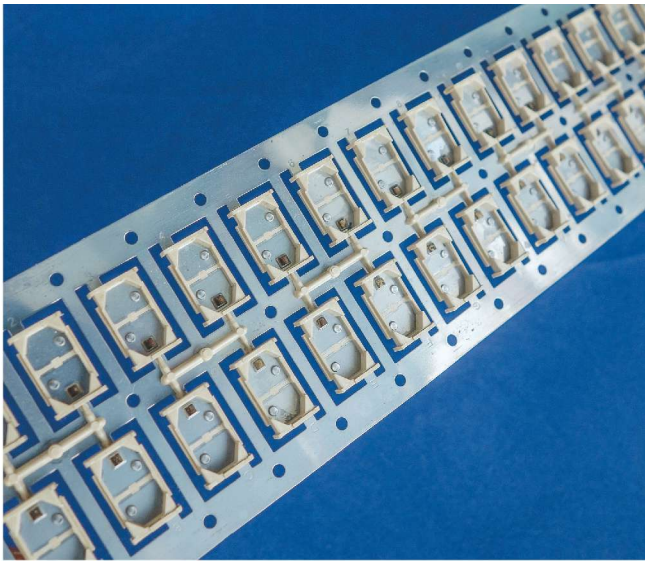
Engel identifies two basic types of production cells for teletronic hybrid molding—linear and radial. Linear machine systems produce hybrid components on a continuous strip, as illustrated above. The strip, or leadframe, is the product carrier through the line. The injection molding machine is located between, and synchronized with, the other production modules. The advantage of this approach is quick and simple operation using minimum floorspace. No other handling systems or robots are required. At the end of the line, the final parts are stamped out or coiled on a reel.

Until recently, highly integrated hybrid molding cells have been dedicated to a single product.

Radial machine systems are used if no connections to a carrier are compatible with the product design, or if the metal parts are much smaller than the plastic component. Here, the injection machine is used with a two- or three-station rotary indexing table, which allows loading and unloading the components simultaneously with overmolding. The setup is normally with a preparation and loading stage on the left and an additional processing stage on the right for post-molding steps such as inspection, labeling, or assembly. Use of servo infeed systems, with multiple x/z axes available, help make the setup very clear and easily accessible. If required by the application, SCARA and six-axis articulated robots can also be used. ►



Linear cell systems produce hybrid teletronic components consisting of plastic overmolded onto a metal carrier strip.



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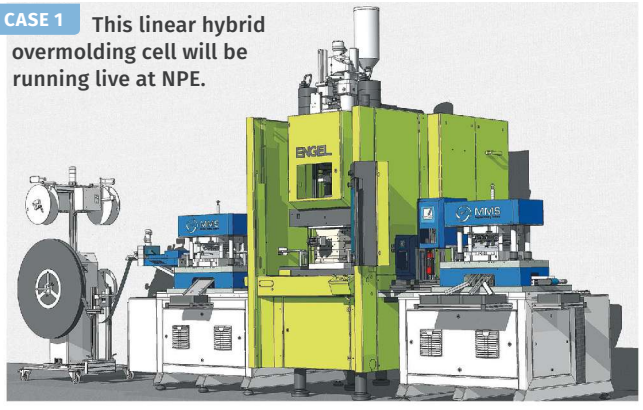
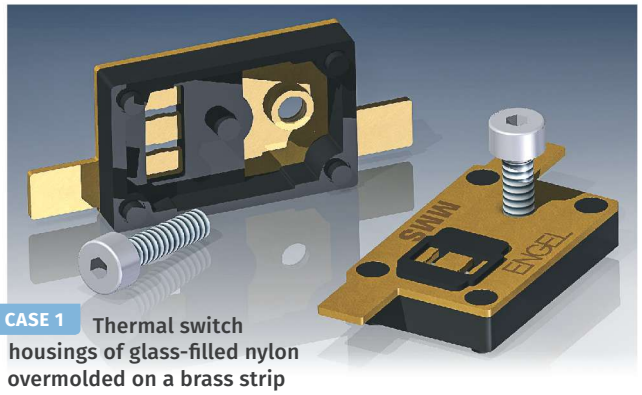
Engel has partnered with MMS Modular Molding Systems of Austria (*mms-technology.com*), a specialist in turnkey production lines for metal/plastic hybrids. MMS offers a universal software and control system with various sub-programs for different processing modules that can be activated when the process and product require them. The software is operated centrally from a 19-in. touchscreen monitor. For larger cells, two or three screens can be placed in strategic positions. The MMS software has been integrated with Engel's CC300 machine controller, so that the entire system can be displayed and operated from the injection press. Additional software for cameras or laser marketing is integrated as a separate module. For setup and manual operation, there is also a handheld terminal with electronic hand wheel.

Engel and MMS collaborated in the following real-world examples of three systems that have been used in commercial production.



CASE 1 This linear hybrid overmolding cell will be running live at NPE.



CASE 1 Thermal switch housings of glass-filled nylon overmolded on a brass strip will be produced at NPE.

CASE 1: THERMAL SWITCH HOUSINGS

This example of a linear system will be running live at NPE2018 next month. It produces a continuous strip of thermal switch housings used to monitor electric motors in cars or home appliances. Typically, such switches are produced in a complex, multi-stage process with the metal components punched and over-molded at different locations. Instead, this continuous line greatly reduces logistics. From punching out the contacts to inspection and labeling of ready-to-use electronic components, all work steps are fully automatic. Thin brass sheet for the carrier plate is fed from a reel and pre-punched in an operation that includes servo-electrically tapping a thread into the brass substrate.

Next, the carrier plates are overmolded with glass-filled nylon in an Engel insert 60V/35 (38.5-ton) vertical injection machine.

In-process quality control includes camera inspection plus high-voltage testing integrated into the tool, guaranteeing 100% short-circuit inspection. For seamless traceability, good parts are laser marked before the sprue and carrier tabs are removed and the components are separated from the belt. Eight ready-to-use switches leave the cell every 20 sec.

Thanks to the modular design of the MMS systems, additional processing units can be integrated, such as resistance testing, laser welding, riveting, assembly, or cleaning of the parts. All these extra operations can also be monitored and controlled via the CC300 control of the insert molding press.

CASE 2: FOUR-PIN PLUGS WITH LSR SEAL

This example of a radial production system produces eight parts every 24 sec. It starts with a pre-punched and galvanized strip of copper/tin alloy, selectively gold plated in the electrical contact area and tinned in the soldering area. The strip is unwound from a coil using an automatic swivel winder (Module 1). The swivel winder makes it possible to position a second coil in standby so as to reduce setup time. The strip can be changed very quickly without thermally degrading the plastic held in the melt state during changeover.

Modular software for every step in the cell operation can be monitored and controlled from the injection press screen.

The servo-electric gripper feeder (Module 2) feeds the flat strip into the system. The linear servo motor ensures very high accuracy. In the subsequent cam-controlled punching and bending (Module 3), connecting webs are separated and the contacts are bent. The following joining and sealing step in the injection mold requires high precision, making it advantageous to feed the parts on a strip. This method also avoids potential damage in a bowl feeder. Bending the parts directly before overmolding allows compensation for internal stresses and hardness variations in the strip. ►

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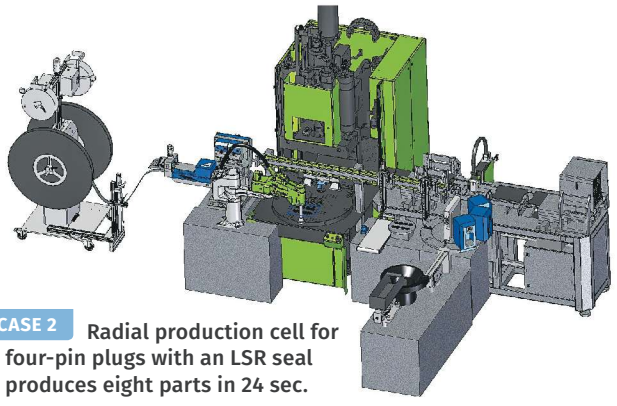
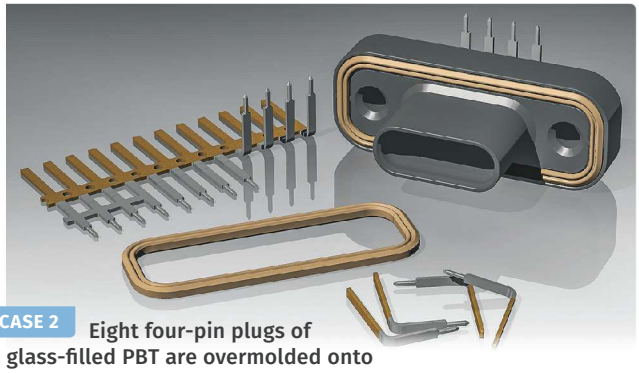


CASE 2 Radial production cell for four-pin plugs with an LSR seal produces eight parts in 24 sec.



CASE 2 Eight four-pin plugs of glass-filled PBT are overmolded onto metal and assembled with an LSR seal.

Still in the punching tool, the parts (four contacts × eight cavities = 32 per shot) are separated and inserted into the injection mold (Module 6) using an Engel easix SCARA robot (Module 4). The Engel insert 60V/35 XS injection press (Module 5) has two lower mold halves on the turntable, so that insert placement and overmolding can occur in parallel. The eight-cavity injection mold is equipped with four hot-runner nozzles and a sub-distribution manifold for the 30% glass-filled PBT material.

The eight overmolded components are demolded by an Engel viper 6 linear robot (Module 7). Directly beneath the gripper is a camera (Module 8) checking that all cavities were completely filled and that all parts and sprues were demolded. On a conveyor belt, sprues and rejects are automatically separated.

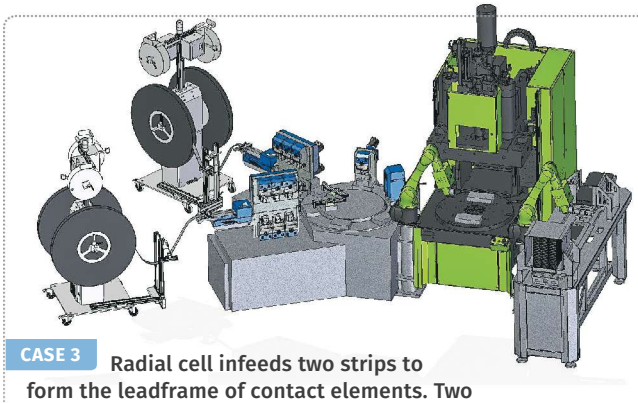
The viper 6 then places the parts on a turntable that acts as a buffer for the downstream processes. The parts are then transferred by the viper 6 to a rotary indexing table for assembly and testing. That table (Module 9) has eight processing stations:

- Station 1: Inserting and positioning the parts.
- Station 2: Free.
- Station 3: Feeding the LSR sealing elements. The parts are fed in the correct position, picked up by a servo handling system, and assembled.
- Station 4: Camera inspection to check the sealing element.
- Station 5: Camera performs optical "wobble circuit test" of the four contacts in the plug.
- Station 6: Test station to check pin height via 3D laser sensor.
- Station 7: Removal of finished parts.
- Station 8: Free.

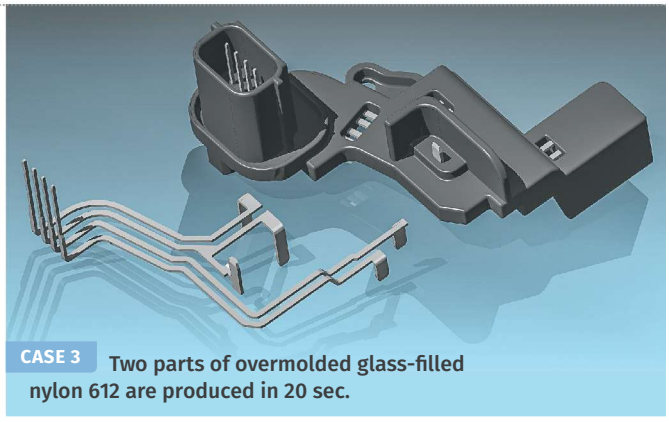
Finished parts are transferred to an MMS tray server by a servo handling system (Module 10). In the tray server (Module 11), preformed blister trays are automatically unstacked and cleaned with a blast of ionized air (Module 12) before being filled. Reject parts and test parts are stored separately. The filled blisters are stored in magazines. Safety circuits allow loading and unloading of blister trays during production.

CASE 3: CONTACT ELEMENTS

This second radial production cell produces two parts every 20 sec. It consists of three units: a rotary table for preparing the contacts, an Engel insert rotary vertical injection machine, and a blister-tray packaging unit. To the left of the injection press, the pre-punched and galvanized strips of tin-plated copper are fed to a rotary-table unit. Due to the complexity of the conducting paths and restricted space in the component, the leadframe must be divided into two strips. Two feeding and bending stations are identically constructed. The tapes are unwound from a swivel winder while rewinding the paper liner that protects the contacts. ►



CASE 3 Radial cell infeeds two strips to form the leadframe of contact elements. Two six-axis robots flank the vertical injection press.



CASE 3 Two parts of overmolded glass-filled nylon 612 are produced in 20 sec.

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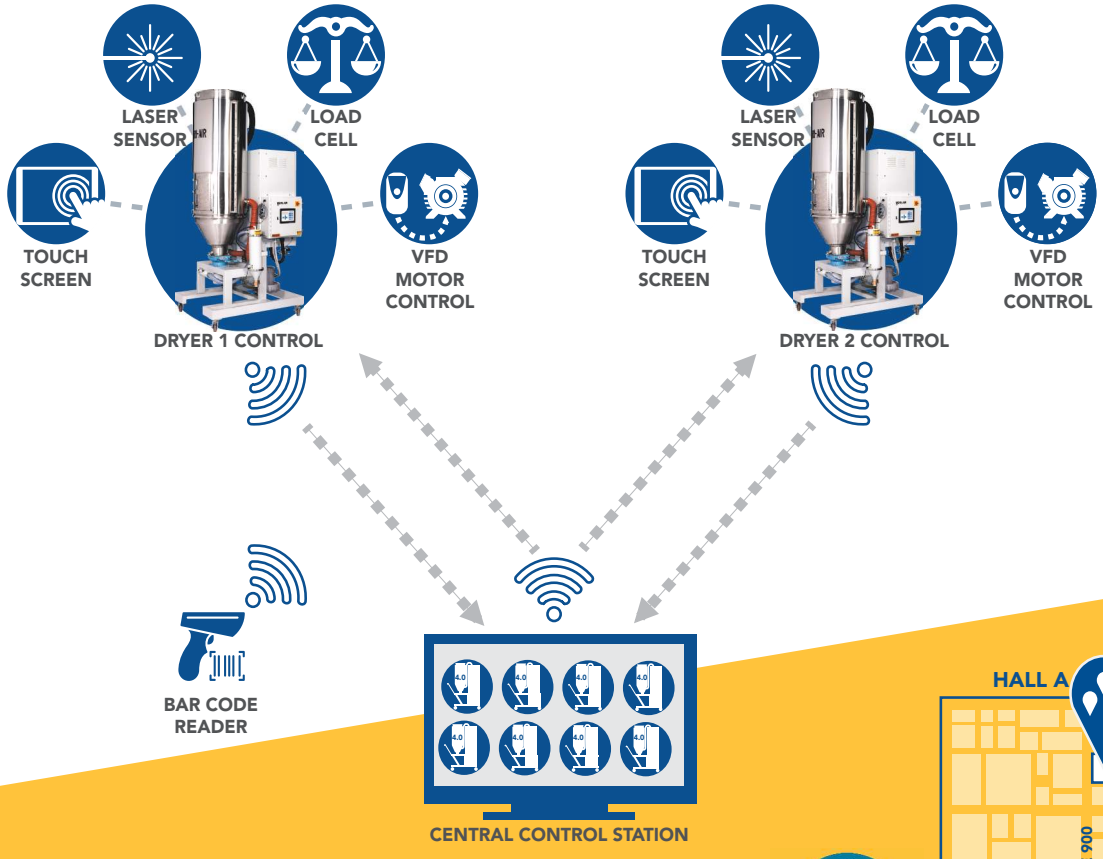

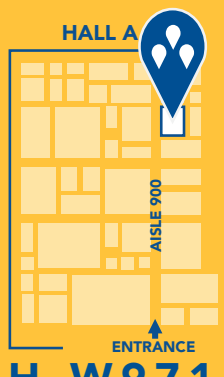

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Both linear robots and six-axis, articulated robots can be used in these automated molding cells.

The tapes are fed into the system by MMS servo-electric gripper feeders. In the subsequent cam-controlled punching and bending module with six independent slide units, the contacts are cut free, bent and separated. The components are then transferred by a moving plate and two servo handling systems to a workpiece carrier. The two leadframes are positioned precisely for the later injection overmolding step.

But first, the contacts are bent in the third station on the rotary table. This is done directly in the workpiece carrier by a cam-controlled bending module, which ensures that the contacts in the connector area are bent exactly 90°; it can be adapted to different metal material properties. High precision is required because the upper half of the mold has to thread the contacts. Before transferring the bent contacts, their geometry is checked by a camera in the fourth processing station. In the fifth station, the contacts are picked up by an Engel easix articulated robot and placed in the injection mold. As soon as two components are placed, the table of the injection machine rotates and the components are overmolded with 30% glass-filled nylon 612. A second easix articulated robot demolds the parts and places them in a blister tray.

All elements of the hybrid molding cell can be monitored and controlled from the Engel CC300 injection press controller.

Having two articulated robots right and left of the injection machine provides optimal access to the mold area, and the parallel operation of the two robots reduces cycle time. The blister tray is provided by an MMS tray server, and the filled trays are stacked for removal. PT

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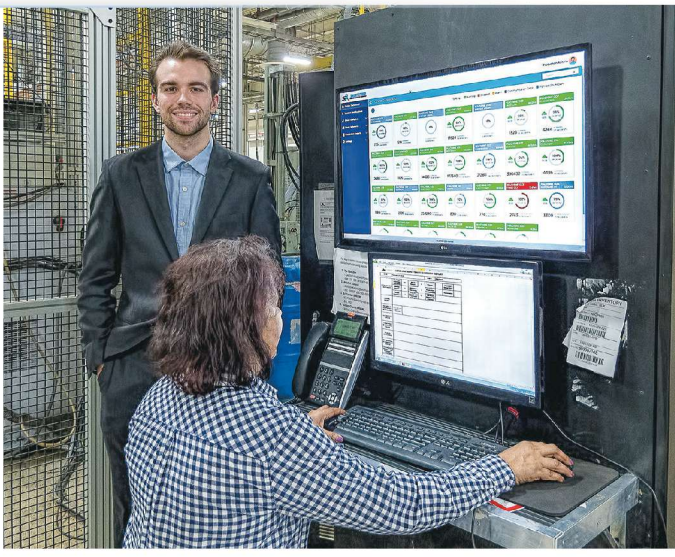
Paperless 'Smart Factory' Based on Automated Production Monitoring

Tier 1 automotive molder's home-built production-monitoring and ERP systems, designed for "the little guy," boost its efficiency rating and profits.



Lead person in Axiom's molding plant uses Smart Attend to monitor production in real time. Behind her stands Max Preston, sales and marketing director for Smart Attend.

By Matt Naitove
Executive Editor

"Let's just build it ourselves," is the motto of Axiom Group Inc. and, more specifically, of its president, Perry Rizzo. An airplane pilot by training, and an "engineer by passion," Rizzo is constitutionally averse to compromising on quality or efficiency. That's why he didn't hesitate to design and build a child's lunchbox when he couldn't find one on the market that would keep both soup hot and a sandwich cold. He used that same approach when it came to production-monitoring and ERP systems for Axiom, a Canadian Tier 1 automotive molder and moldmaker, of which he is co-founder and co-owner.

Based in Aurora, Ont., and with a plant in Mexico and a partner plant in Italy, Axiom (***axiomgroup.ca***) is a $50-million-plus (U.S.D.) business that employs 250. It's headquarters plant occupies 80,000 ft² and houses 31 injection machines from 200 to 1500 tons, including six two-shot machines and a pair of rotary-table vertical presses. A second plant in Aurora houses its tooling department, called Intex Tooling Technologies (***intex-tooling.ca***), which builds all Axiom's molds, and its software development activities for production monitoring and ERP.

Software development—Axiom's most recent venture—is the key to Rizzo's focus on "driving out waste in the system" and becoming "the Industry 4.0 'smart factory' of Canada."

> ***"We transformed into an Industry 4.0 facility without buying a single new piece of machinery."***

'HOMEBREW' SOLUTIONS

Three to four years ago, Axiom started looking around for a production-monitoring system and concluded that the commercial products on the market were too costly and too complex, requiring weeks of personnel training and expensive installation. "Let's build our own," was Rizzo's response.

The result was Smart Attend, the first prototype of which was installed on an injection machine in late 2016. It is now used on all injection machines at Aurora, and on machining systems in its tooling operations. Smart-Attend terminals are at each lead hand's desk and in the central office. A large Smart Attend screen is located on a wall of the molding floor and has become an anchor site for production team meetings. Last June, Smart Attend became available commercially to other processors and moldmakers.

As explained by Max Preston, director of sales and marketing for Smart Attend (***smartattend.com***), "We decided that the 'smart factory' should not be only for large multinational organizations. We built Smart Attend to bring the benefits of real-time manufacturing data to entry-level companies and owner-operated firms that need to move themselves forward in competitiveness."

As explained in detail in a January Keeping Up, Smart Attend collects data (such as 24V I/O signals) from injection machines, extruders, CNC machines, or other equipment and connects to the plant's WiFi network to send data to PCs via web browser or to mobile devices via the Smart Attend app for iOS or Android. Data is collected by a small, WiFi-enabled box that sends encrypted data to a secure "cloud" server. A backup 2GB memory card ensures that data is never lost and can be collected in case of a network disconnect. Any brand of machine of any age can be connected to the system.

Preston says initial configuration can be completed in as little as 20 min without requiring IT or special training. Overall instal- ►

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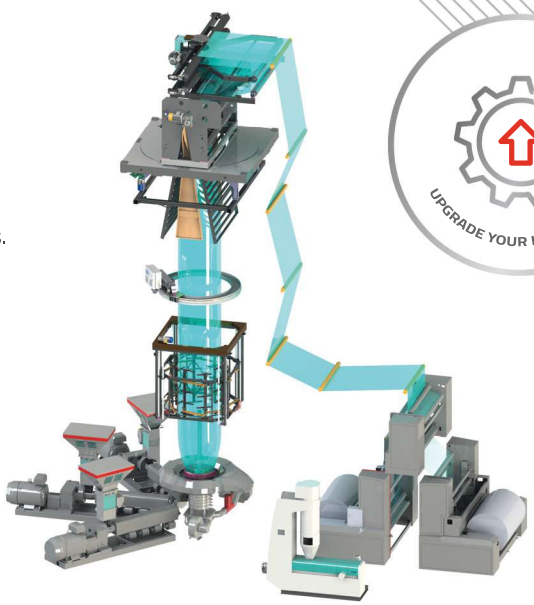

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Perry Rizzo, president of Axiom Group, wanted a simpler, less expensive, easier-to-install production monitoring system—so he tasked a team to create one. The result: Smart Attend.

Green is good: Smart Attend signal lights show machine status and alarms.

lation time averages 2-4 hr. Smart Attend makes data available in three ways. First, a tower light (also made by Axiom) displays machine status and alarms in customizeable colors and modes—flash, strobe, or solid color. Second, a powerful speaker atop the tower light accepts custom sound files to represent specific alarms. And third, the data collected by the system is available on a user "dashboard" that provides a quick overview of plantwide data and the ability to home in any individual machine. The dashboard provides cycle times, machine status, part counts, alarm description, Pareto analysis of downtime causes, hourly incident reporting, job scheduling and tracking, and machine OEE (Overall Equipment Effectiveness).

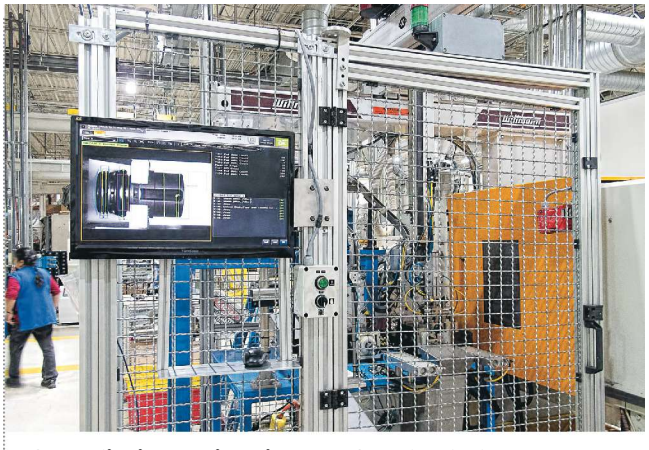
The essence of the dashboard, says Preston, is immediate availability of important, useful data—not a digital blizzard of information—to everyone who can use it. "With Smart Attend, data goes instantly from machines to managers." Smart Attend will exhibit at NPE2018 next month in Booth S10029. (Intex Tooling Technologies will be in Booth S32053.)

The development of Axiom's own ERP (enterprise resource planning) software, called Prism, followed a similar trajectory. Rizzo says, "We didn't have a good experience with a commercial ERP system. It was too complex and inflexible. So we pulled the plug after a full year of attempted implementation."

What followed were several years of full-time software development that resulted in Prism. "It tracks everything from when it comes in the front door to when it goes out the back door for shipping," says Rizzo. "The key thing is that it works in real time. It provides lot traceability to the second. It tells us in real time, which operators are on the floor and which operator made which part."

All Prism data are available to shop personnel on tablet computers. "We're a paperless operation," Preston notes. All inspection data is also available on the tablets. Quality data is available in real time throughout the plant. A digital image of a part defect can be sent to the operator's tablet in minutes.

Axiom has integrated Smart Attend with Prism. Rizzo says that combination is so powerful that he can see doing inventory only once a year in future, instead of twice annually now. What's more, he says that having comprehensive production data means "we can allow lead hands to create, start, pause, and end jobs on the shop floor to keep machines occupied. Equipment utilization is not all driven from the head office." Wide availability of data, Rizzo states, makes possible "real-time manufacturing," whose key elements are "accountability, ownership, empowerment."



If a quality issue arises, images of good or bad parts can be uploaded to Smart Attend screens in minutes

Axiom plans to market Prism in the long term, and is willing to discuss it with visitors to its NPE booth. Next steps for the system will include adding interactive video streaming on topics such as how to inspect a particular part for quality issues. ►

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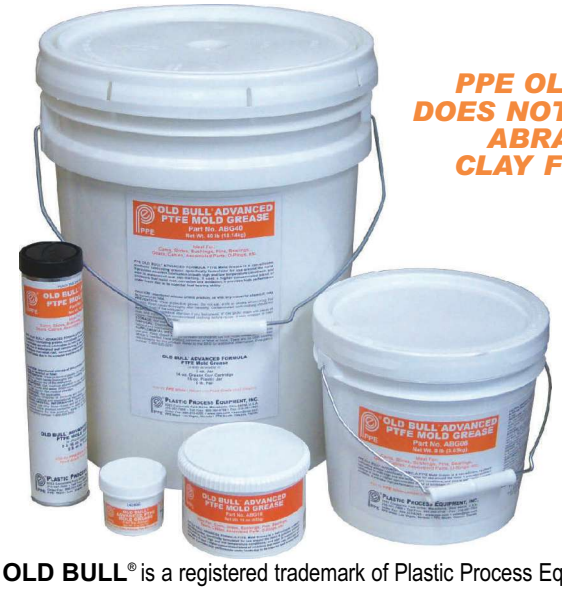

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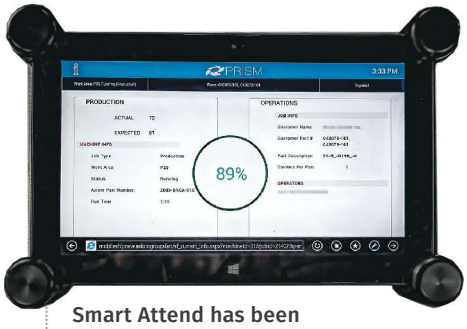
This wall-mounted Smart Attend screen is a hub for informal meetings to discuss production status.

WHAT'S IT ALL WORTH?

With Smart Attend, Axiom gained four to five percentage points of OEE, according to Rizzo. "That's worth tens of thousands of dollars a month to us." OEE is a metric used widely in the automotive and other industries. It combines equipment availability (uptime), productivity performance (cycle time), and good/bad parts production (quality) into a single percentage number. Rizzo says OEE of 70-80% is average for the plastics industry; greater than 80% is "very good." Axiom has achieved 89-91% since implementing Smart Attend.

Rizzo adds, "Our five-year global quality rating from the auto industry is 100%, delivery rating is 100%, warranty rating is 100%, and overall system cost rating is 98%."

This gets to what Rizzo defines as the most immediately relevant meaning of Industry 4.0. The term has been applied widely by machinery producers to data communication from machine to machine. That will no doubt have value, Rizzo agrees; but for him, there is much greater immediate benefit for company managers from having crucial manufacturing data in real time to enable prompt and accurate decision making. "We transformed into an Industry 4.0 facility without buying a single new piece of machinery."



Smart Attend has been integrated with Axiom's home-grown ERP system, called Prism. Smart Attend screen on Prism tablet shows OEE figure of 89%.

He cites the example of Smart Attend's Pareto charts that make it quickly apparent to managers where (or when) their biggest—and most expensive—sources of downtime and quality problems are occurring. "It takes away redundant, burdensome thought processes from managers and highlights their top three or five issues that need attention." The future of Smart Attend, Rizzo hints, may be application of artificial intelligence to identify trends that are costing the plant money.

"For us, the importance of Smart Attend has been monumental," says Rizzo. "We're a lean Just-in-Time operation. We don't hold safety stock for our customers. We can't make mistakes." Before Smart Attend, he notes, Axiom sometimes made more parts than necessary—which wastes money and resources. "In the automotive business, do you know what it costs to miss an order ship date? Or to short-ship an order? Or the cost to expedite a shipment that would be late because of production problems?" In fact, Axiom saved thousands of dollars in the first week of using Smart Attend by not having to expedite parts shipments, thanks to better production data.

"Our biggest problem in implementing Prism was the human interaction—manually entered data, which could be missing or inaccurate. Smart Attend ends that. Smart Attend does not have opinions; it has data. It tells us that we made so many parts by counting cycles. Prism tells us that so many boxes of parts were barcode scanned into the system. If there's a difference between the two, we know to start asking, 'Where did the parts go?' For example, Smart Attend told us that on one job that was making left and right-hand parts in the same mold, we were scrapping out left-hand parts. But the parts are shipped in pairs—so what happened to the extra right-hand parts?"

Rizzo notes that "every day brings another story of what Smart Attend did." On one night shift, Smart Attend sent an alert to a manager at his home. He contacted the lead person, who reported that parts were sticking and the robot was struggling to get the parts off the mold. The manager checked Smart Attend, and saw that cycle time on that job had stretched from the usual 45 sec to 70 sec. He then asked if any new operators were working that job. The lead person checked and found that, yes, new operators were being trained, and that was responsible for cycle times lengthening, leaving time for parts to shrink tighter on the mold and resist removal. Put experienced operators on that job now, the manager ordered. And sure enough, the sticking problem went away. The moral of the story, says Rizzo: "Without the data from Smart Attend to give the manager a clue to the cause, we might have pulled the mold and sent it out for polishing—which would have been a huge, unnecessary cost and delay."

Data-driven decision making, says Rizzo, "is a quantum shift in how people run their business. In many shops today, people come in Monday morning—or any morning—and get together to discuss the weekend's or last night's problems, and then people fan out to try to gather information on what went wrong and why. With Smart Attend, there's no need for morning meetings. Problems were identified when the issue happened overnight; the appropriate people were notified; and they had data in their hands that could help them find a solution right away." PT

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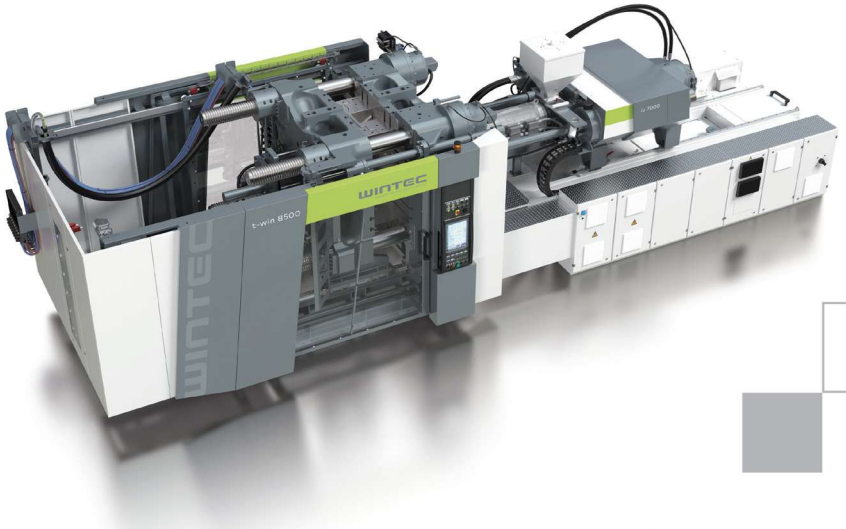

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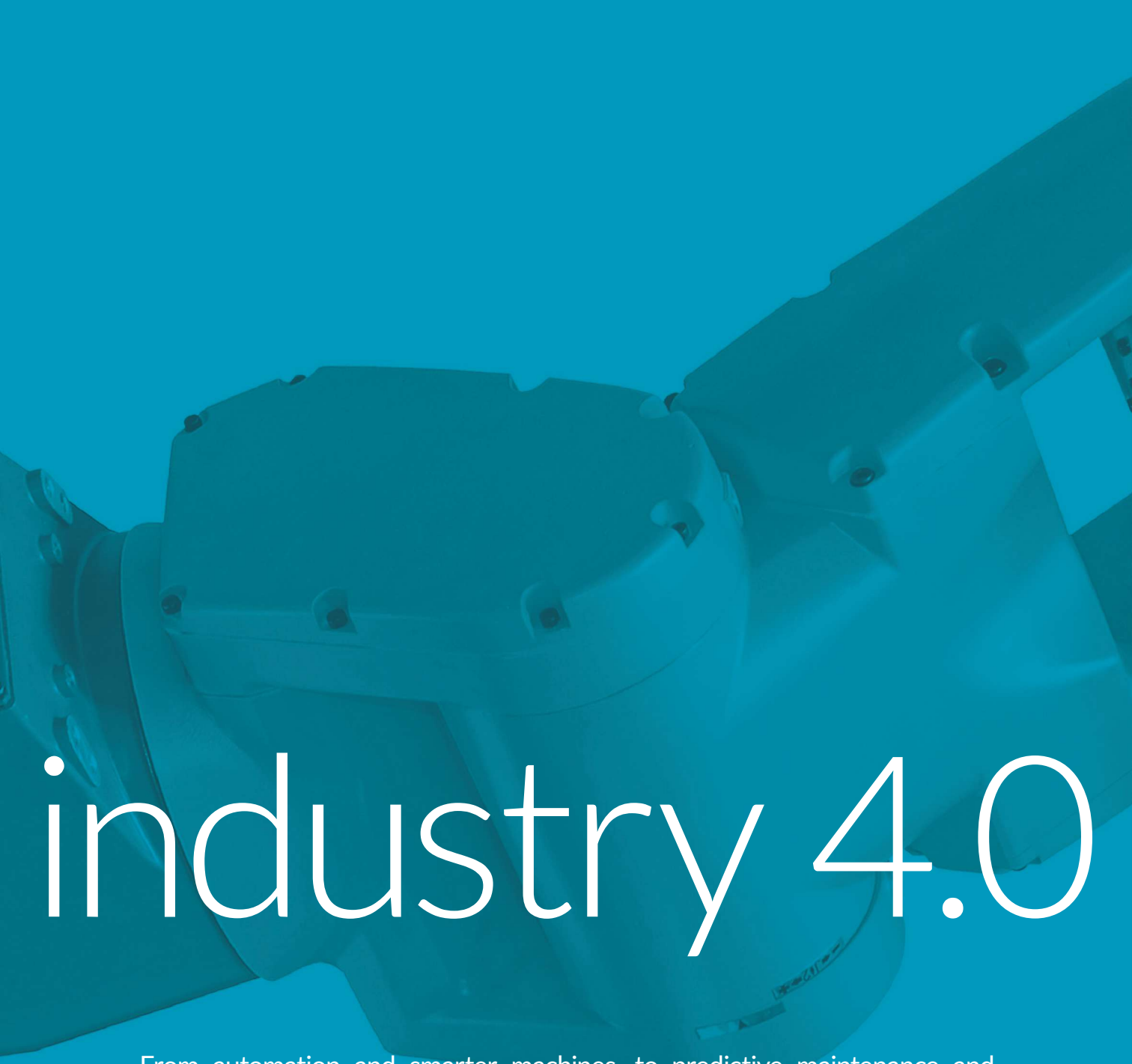

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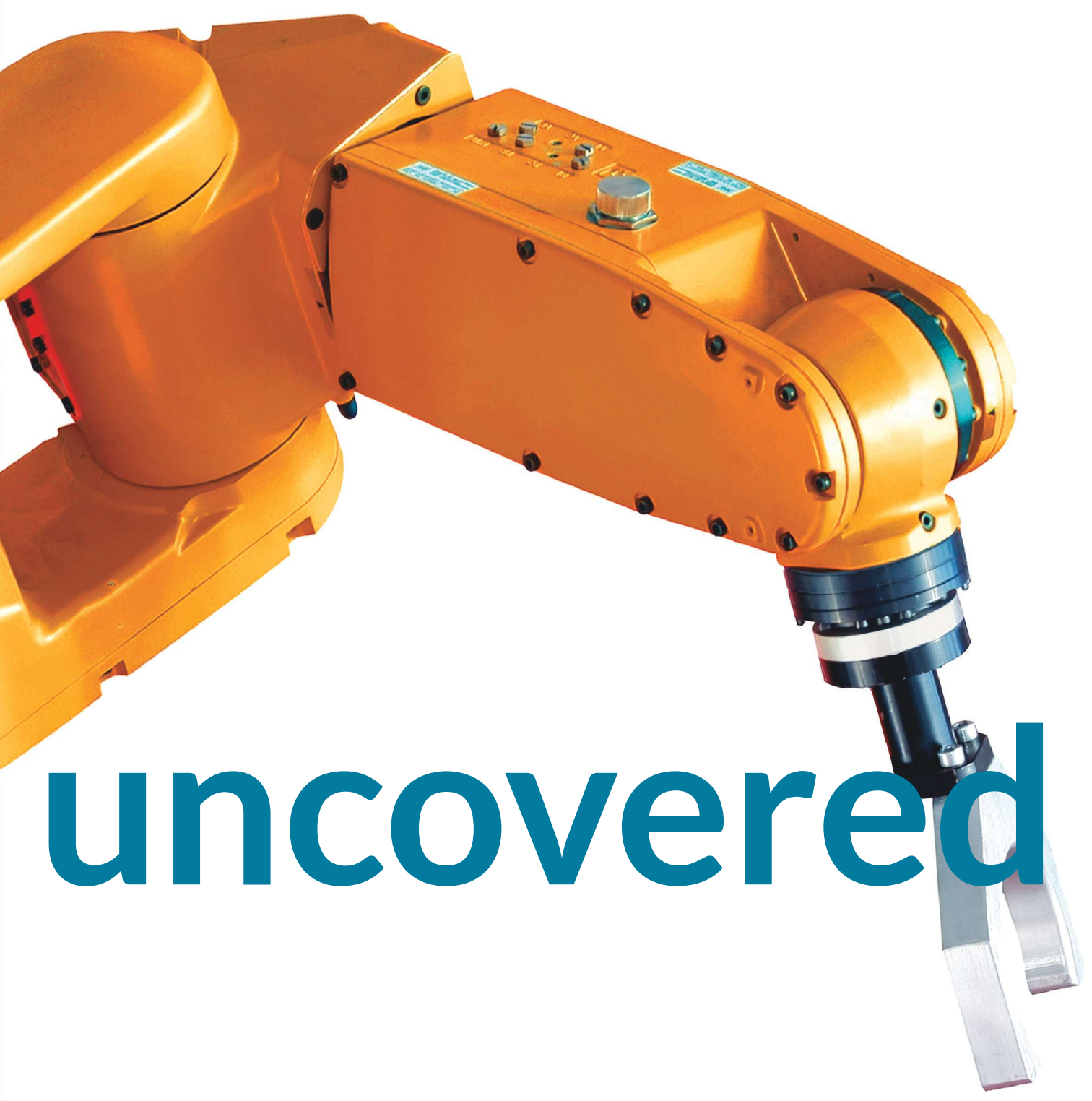

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MATERIALS

PART 4

A Processor's Most Important Job

Engineering polymers require higher mold temperatures to achieve their ideal structure. The temptation to turn down the mold temps can hurt part performance.

By Mike Sepe

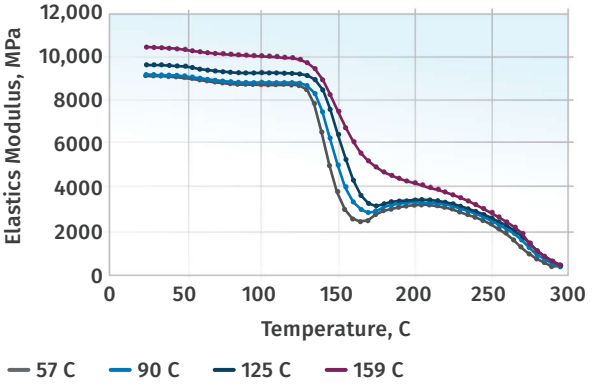
Generally, higher performance in polymers is associated with the ability of a material to withstand exposure to elevated temperatures. In semi-crystalline polymers, two important transitions characterize this capability: the glass-transition temperature (T_g) and the melting point (T_m). Polypropylene, which we discussed at the end of the last article, is generally considered to be a commodity material with a T_g that is sub-ambient, near 0 C, and a T_m for most grades at 320-329 F (160-165 C).

This temperature difference between the two transitions is typical for most semi-crystalline materials. Aliphatic nylons such as nylon 6 and nylon 66, and semi-crystalline polyesters such as PBT and PET, form the next tier on the performance ladder, with T_g's of 131-194 F (55-90 C) and melting points of 437-500 F (225-260 C). Unlike PP and polyethylene, which can be run at relatively low mold temperatures, these engineering polymers require higher mold temperatures to achieve their ideal structure. It is with these materials that the temptation to turn down the mold temperature can become problematic for part performance.

As we go up the performance scale to SPS, PPS, partially aromatic nylons—sometimes referred to as PPA, and very high-performance materials such as PEEK, the stakes get higher. These materials have T_g's that exceed the boiling point of water (230-302 F). Therefore, maintaining mold temperatures high enough to allow these materials to crystallize to a satisfactory level requires the use of pressurized water, oil or electric cartridges. Not all processors are willing to adopt these technologies. But at this high-performance level the consequences of failing to achieve the mold temperatures required to promote adequate crystallinity become especially severe.

Figure 1 shows the behavior of test specimens molded using the four different mold temperatures noted in the legend: 57, 90, 125, and 159 C (135, 194, 257 and 318 F). The material is a partially aromatic nylon (PPA) reinforced with 35% glass fiber. Specimens from each sample group were tested using dynamic mechanical analysis (DMA) to evaluate the temperature-dependent behavior of the material. This is provided as a plot of the elastic modulus of the material as a function of temperature. The different levels of crystallinity that the polymer was able to achieve at these various mold temperatures are evident from the response of each sample.

FIG 1 **Effect of Mold Temperature on Modulus vs. Temperature Behavior of a PPA**



This shows the behavior of test specimens molded using the four different mold temperatures noted in the legend. The different levels of crystallinity that the polymer was able to achieve at these various mold temperatures are evident from the response of each sample.

Notice that the initial modulus of the material trends upward with increasing mold temperature. The modulus of the sample molded at 57 C is approximately 9000 MPa (1300 ksi) while the sample molded at 159 C has a room-temperature modulus of 10,350 MPa (1500 ksi). This is a 15% improvement. The largest increase occurs between the samples molded at 125 C and 159 C. But a much greater difference in performance is evident as the test temperature increases. As the temperature of the tests reaches 130 C (266 F) the modulus of all four samples begins to decline rapidly. This is the onset of the glass transition. An exact measurement of the T_g for this material gives a value of 145 C (293 F).

Semi-crystalline polymers exhibit a significant decline in modulus as they pass through the glass transition. When polyamides (nylons) are filled with this level of glass fiber it is expected that the ►

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material will retain approximately 50% of its room-temperature modulus above the T_g. This is exactly what is observed for the specimen molded at the highest mold temperature. The samples molded at the lower mold temperatures exhibit progressively larger modulus reductions as the mold temperatures used to produce the samples decline. At the lowest mold temperature, the modulus decline is nearly 75%. This will have implications for long-term performance characteristics such as creep resistance and fatigue resistance, even at temperatures below the glass transition.

It is unfortunate that some suppliers of high-performance semi-crystalline materials tell molders that full crystallization is only important if the part is intended for use at temperatures above the glass transition. This is not at all true, something we will address in a later article.

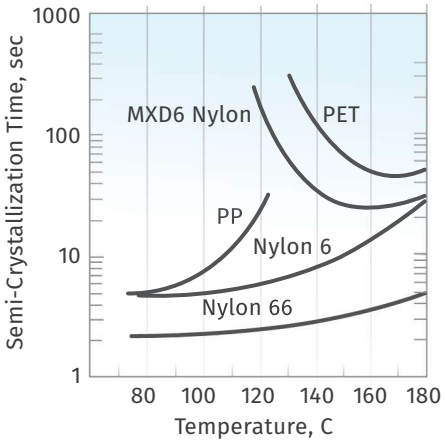
Another notable difference between the sample molded at the highest mold temperature and the other three samples can be observed at the conclusion of the glass transition. The part molded at the highest mold temperature enters a slowly declining plateau region between the end of the glass transition and the onset of the melting point near 300 C (572 F). This is typical behavior for a properly crystallized polymer. The other three samples show another symptom of incomplete crystallization. As soon as the glass transition is complete, the modulus begins to increase, even though the temperature is increasing. This is caused by the formation of crystals that were intended to be produced during the molding process. But because these mold temperatures are too low to allow for a complete level of crystallinity, the shortfall has to be made up in the solid state once the mobility needed to form crystals has been re-established. This upturn in the modulus is also associated with the previously discussed dimensional changes that always accompany crystallization.

Some suppliers of high-performance semi-crystalline materials tell molders that full crystallization is only important if the part is intended for use at temperatures above the glass transition. This is not at all true.

It is not a coincidence that the dividing line between the properly crystallized sample and the ones that fall short is the glass-transition temperature of the polymer being molded. Maintaining a temperature above the T_g provides the molecular mobility needed to form crystals. Figure 2 shows the relationship between mold temperature and the rate of crystallization for various materials. Three of the profiled materials—PP, nylon 6, and nylon 66—are materials with glass-transition temperatures below the temperature range shown in the graph. The PP, with a T_g of approximately 0 C, will show only a marginal increase in crystallinity at higher mold temperatures, while crystallization time increases significantly, slowing the cycle time. The nylons, with T_g's of 65-70 C, will reach "full" crystallization using mold temperatures of 90-100 C, and it is evident that in this temperature range the crystallization time is essentially constant. As it rises above this point, the crystallization time slowly increases, once again extending cycle time.

However, note how differently the other two polymers behave. The PET evaluated here is a non-nucleated material, so the behavior documented here is not typical of the highly filled semi-crystalline grades used for injection molding. The MXD6 is one of the partially aromatic nylons that we have been referring to. These materials, and others like them, such as PPS and PEEK, display a much different behavior than the polypropylene and the aliphatic nylons. With these materials the rate of crystallization decreases significantly once the mold temperature declines below a certain point that is related to the T_g of the polymer. The effect is considerable. For the MXD6 the crystallization time is 25 sec at a mold temperature of 160 C, while it increases to 180 sec at a mold temperature of 120 C. For these materials, not only does the lower mold temperature prevent the achievement of the desired level of crystallization, it increases the time required to reach an ejectable modulus, which in turn increases cycle time. Understanding the consequences of changing the mold temperature requires knowledge of the specific polymer being processed.

FIG 2 Crystallization Time Vs. Mold Temperature for Various Polymers



As this graph indicates, knowledge of the specific polymer being processed is crucial to understanding the impact of changing the mold temperature..

In our next article we will look at a semi-crystalline polymer that does not follow the rule that maintaining a mold temperature above the T_g is the only requirement for achieving appropriate crystallinity. PT

ABOUT THE AUTHOR Mike Sepe is an independent, global materials and processing consultant whose company, Michael P. Sepe, LLC, is based in Sedona, Ariz. He has more than 40 years of experience in the plastics industry and assists clients with material selection, designing for manufacturability, process optimization, troubleshooting, and failure analysis. Contact: *(928) 203-0408 • mike@thematerialanalyst.com*.

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INJECTION MOLDING

How Backpressure Adjustments Influence Shot Size

Raising backpressure results in increasing shot size, which can cause a host of other problems.

By John Bozzelli

A processor has vast trove of processing "handles" available on today's injection molding machines. Often they seem simple enough, especially if you change one machine parameter at a time. The problem is that when you change one setting on the machine controller it often influences two or more different process conditions.

In a previous column discussing backpressure and its influence on temperature (Nov. '17), I left out an important process change. A former student of mine, Seng Lo of Hellerman Tyton Americas, emailed me to point this out. Worse yet, it was not included in the list of "why we need backpressure" that was published in that issue.

So, in the interest of completeness, why do we need backpressure? Reasons include:

1. Better melt-temperature control (not increase melt temperature);
2. Better melt uniformity in consistency and temperature;
3. Better blending in colors or additives at the press, if you are running a correctly designed screw;
4. Better shot-size position control;
5. Better filling of the flights to prevent black specks and degradation where the flights meet the root diameter of the screw;
6. Prevent screw augering due to pellets being wedged between flight land and feed throat (a problem for smaller screws in particular);
7. Control of shot size (this is the one I missed).

If density is higher there is more plastic in the same volume or shot size.

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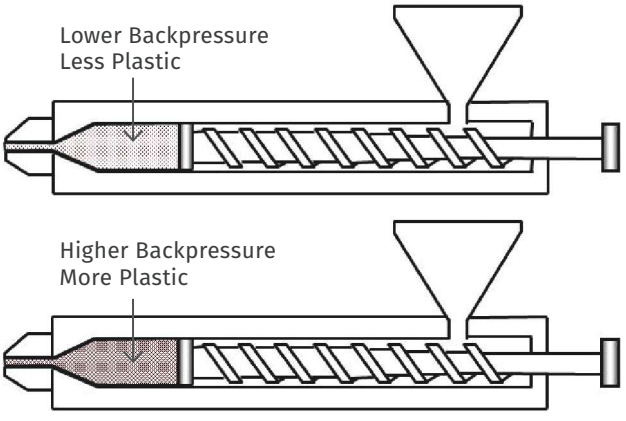
Identical Shot Size but Different Densities



As shown here, increasing the backpressure results in more plastic being packed into the same shot size. This may over-pressurize the cavity, which in turn wears the parting line, which eventually results in flash.

How does backpressure control shot size, and what does a change in backpressure change in your molding process? Processing is not just about understanding the machine; a good processor knows how plastics behave. In this case, they have to understand that molten plastic is compressible. For example, room-temperature or solid density for HDPE is 0.957 g/cc, while its melt density is 0.759 g/cc, or less than 80% of its solid density. This means the polymer molecules are farther apart from one another in the molten state, and at typical backpressures the molten HDPE can be compressed. Typical backpressures (plastic not hydraulic pressures) for most resins are in the range of 300 to about 1500 psi (20-103 bar). These pressures do compress the melt.

To illustrate this effect, let us review a common issue on the shop floor: short shots. It is not unusual for a process to be running fine, and then when a new color or lot or some other change in the system occurs, the result is periodic short shots. As my November column noted, some processors may decide to raise the melt temperature to fix the shorts. To speed this along, ►

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Crusty (my fictitious grumpy old processor) adds a bit more backpressure to get the temperature to increase faster. That is, before he or she read my previous article, which provided data that proved backpressure *does not* increase melt temperature.

It may seem as though raising backpressure increases temperature because the short shots stop. The rationale here is that the higher temperature lower the viscosity, making the short shots disappear. But that's not the case. Yes, the parts are full, but *not* because of an increase in melt temperature or lower viscosity, but because more plastic is packed (at higher density) into the same shot size (see illustration p. 36). If density is higher, there is more plastic in the same volume or shot size. It is not a temperature effect but a density change that provides more plastic in the same shot volume. The shot size changes without any change of screw position.

Dubious? Then check it out for yourself. The proper procedure for a change in backpressure is to take off second-stage pack and hold, change the backpressure, then note how full the cavity is. Most likely you will need to re-establish the same fill volume for the parts by changing the cutoff position. This is critical if you want apples-to-apples comparisons for DOEs. Why?

In the example above, you have what you wanted, full parts. The problem is that you changed the shot size and now that extra material put in during first-stage fill may be packing out the part in that first stage. This over-pressurizes the cavity, which in turn wears the parting line, which eventually results in flash. Now you have an even bigger problem.

Over-pressurizing the cavity wears the parting line, which eventually results in flash.

Bottom line: always think things through. Whenever you change a process parameter ask yourself four questions:

1. Did this change the melt or mold temperature, and what will be the result?
2. Did this change the plastic pressure of the melt, and what is the result?
3. Did this change the plastic flow rate, and what is the result?
4. Did this change the cooling rate or time, and if so what is the result? PT

ABOUT THE AUTHOR: John Bozzelli is the founder of Injection Molding Solutions (Scientific Molding) in Midland, Mich., a provider of training and consulting services to injection molders, including LIMS, and other specialties. Contact *john@scientificmolding.com*; *scientificmolding.com*.

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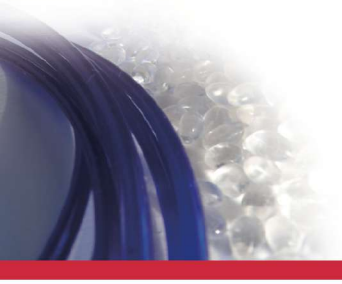

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EXTRUSION

Why There Are No Truly Universal Dies

Flow characteristics of different polymers vary considerably. So while adjustment features are available, for the most part dies must be designed for an individual polymer.

Any given extrusion die can produce a specific shape with only a relatively narrow range of polymers. That's because polymers are non-Newtonian in behavior; they have different viscosity-thinning characteristics at increasing shear rates.

By Jim Frankland

Shear sensitivity is largely related to molecular weight and molecular-weight distribution, which vary widely between different polymers as well as between grades within the same polymer family. To compensate, many dies have built-in adjustable features to compensate for the flow variations caused by shear thinning in different materials.

To illustrate this point, a sample set of flow calculations for a simple corner molding was made for three different polymers, showing the variation in the profile with each polymer and illustrating the lack of universality.

If an LDPE profile with an MI of 2 was extruded at 100 lb/hr (1.03 in.^{3}/sec), it would have a linear velocity of about 22 ft/min. Assuming the original internal geometry of the profile die was properly designed to produce the desired shape with 2 MI LDPE, what would it look like with a 5 MFI PP homopolymer or a 0.76 IV PET?

The larger the die and/or the greater the variation in part thickness, the more that shear thinning affects the flow.

The PP and PET flow rates were adjusted to the same volumetric output to compensate for the differences in density and thus clarify the analysis. If the two "legs" of the profile are treated as separate rectangles for flow analysis, the difference in velocity of the legs between a 2 MI LDPE, a 5 MFI PP and a 0.76 IV PET would produce results like the accompanying illustration.

According to the power-law coefficients, the LDPE and PP have similar shear-thinning tendencies, so even though the viscosity of the 5 MFI PP is about two-thirds that of the 2 MFI LDPE, the flow remains relatively balanced. The vertical leg of the corner profile will have about 18% greater flow rate than the horizontal leg and would distort the part shape. ►

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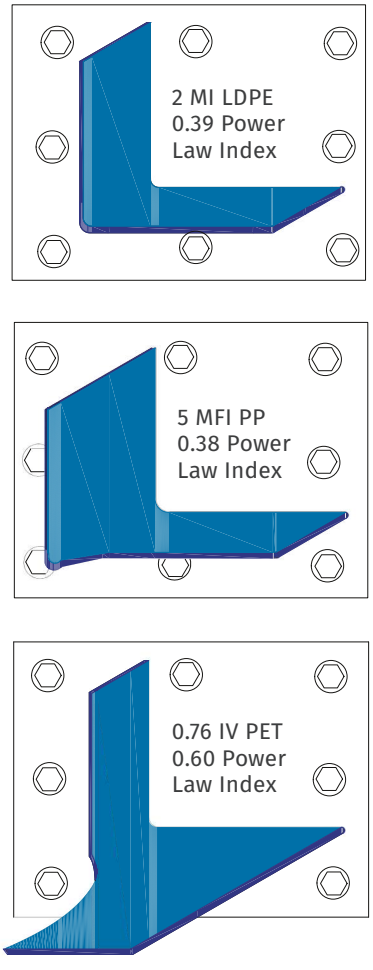

Profile dies must be designed to suit the polymer. Non-Newtonian fluids have different viscosity-thinning characteristics at increasing shear rates, causing flow changes as illustrated by the variations in this simple profile with three different resins. Power-law coefficients are an indication of how much a resin's viscosity changes with shear.

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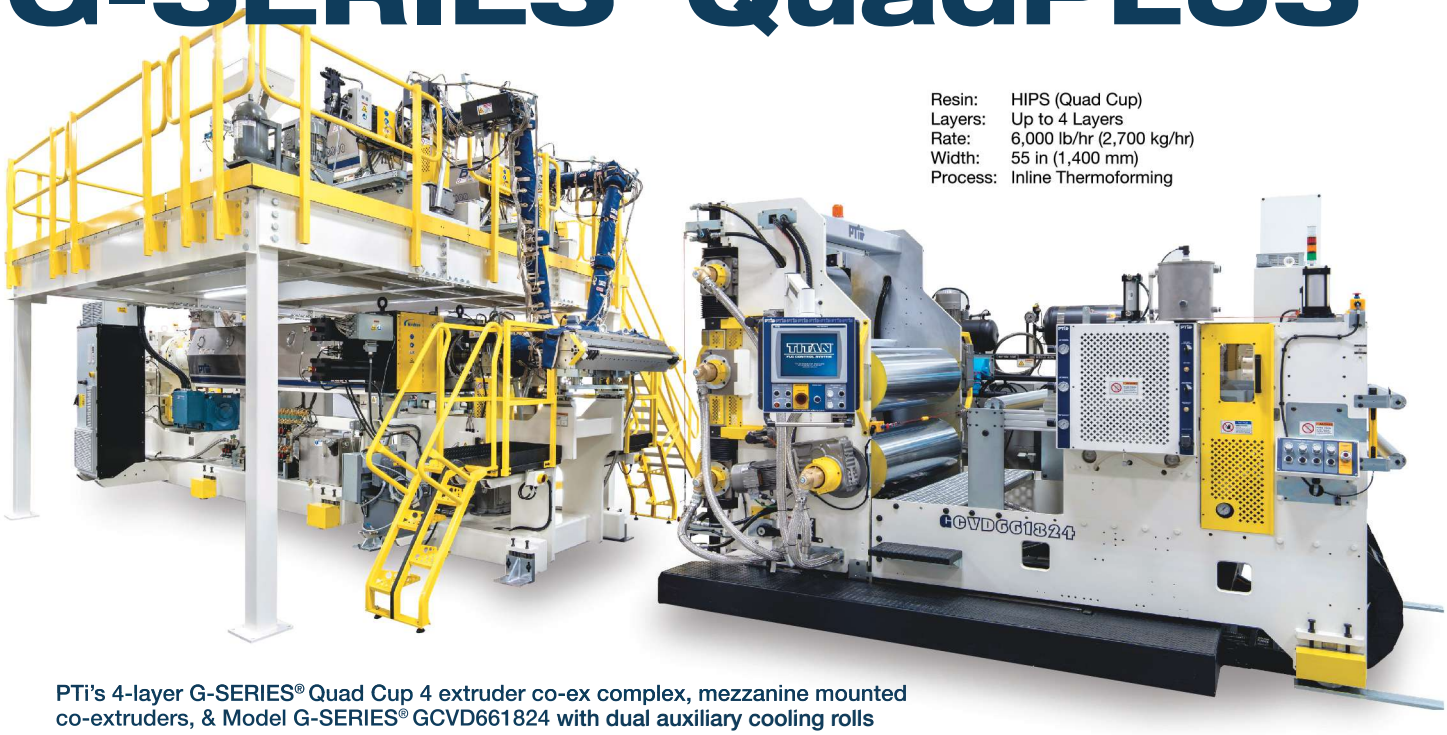

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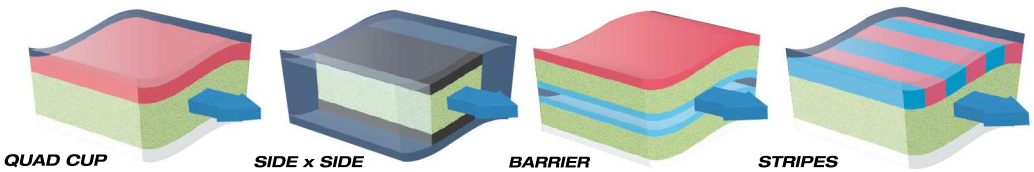

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It's the opposite situation for the 0.76 IV PET, which has a viscosity about two-thirds higher than the LDPE. PET's reduced shear sensitivity creates about 80% greater flow in the horizontal leg, completely unbalancing the profile shape. The differences in flow are caused by the differences in shear rate in the legs, with the vertical leg being half the thickness of the horizontal leg.

At the same linear velocity in both legs, the shear rate is unbalanced because of the difference in thickness between the horizontal and vertical leg. With the shear rate changing exponentially based on the width of the legs, and the viscosity changing logarithmically with the shear rate, it is very difficult to anticipate the flow changes without benefit of rheological data and flow calculations.

The polymers' power-law coefficients are a reference to the degree polymers change viscosity with shear rate but are too general to be used for computational purposes and vary even within the same polymer type. Working from actual rheological data, this PP shear-thinned more than the LDPE but even more than was indicated by the power-law coefficients. This is likely due to the reduced molecular weight, as represented by the higher MI.

The PET had a very large change in flow between the two legs and was more reflective of the difference in the power-law coefficients, although still well outside what could be used for computational purposes. This analysis shows power-law coefficient values did not reflect the actual differences seen in the die flow for each polymer but are still a general indicator of likely flow variations. Consequently, rheological data is necessary to determine the degree to which polymer shear sensitivity will affect the flow performance of the die.

The sample analysis shows that the flow characteristics of different polymers varies considerably, making die design specialized to an individual polymer. This applies to every kind of die except a round solid profile that is center fed. The larger the die and/or the greater the variation in part thickness, the more the effects of shear thinning affect the flow.

Many dies have adjustable features to give them more range, such as a restrictor bar on a sheet die or an adjustable-pressure ring on a tubular die. Even profile dies can have inserts to give them more range, but something has to be done in every die to compensate for the varying shear-thinning characteristics of polymer types and grades. PT

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TOOLING

What You Need to Know About Jump Gates

Many molders don't care for jump gates because they have to process around them. But here are some tricks of the trade.

By Jim Fattori

The aptly named jump gate is used to gate indirectly into a feature beyond the outer edge of a part. This gating method is used when the aesthetic requirements prohibit any type of gate scar on an exposed outer surface, because the material enters the cavity from the interior or underside of the part. Jump gates increase the flexibility of where you can locate a gate, which can be very advantageous when the thickest wall section is otherwise inaccessible. However, many processors don't care for jump gates. They often must process around various issues they can cause. This column is intended to help you understand and avoid those issues.

From time to time, a mold designer will tunnel gate into a tubular boss for a screw, or into a thin interior rib. Technically, these are not jump gates; they are ordinary tunnel gates because they gate directly into the part. To be considered a jump gate, the mold designer specifically adds a feature, such as a cylindrical boss formed by a shortened ejector pin, into which to gate. Unless this boss has a relatively small diameter, you will probably have a hard time eliminating an opposing sink mark on the exterior surface of the part. This is why the most common jump-gate design is where a tunnel gate feeds into the side of a machined ejector pin.

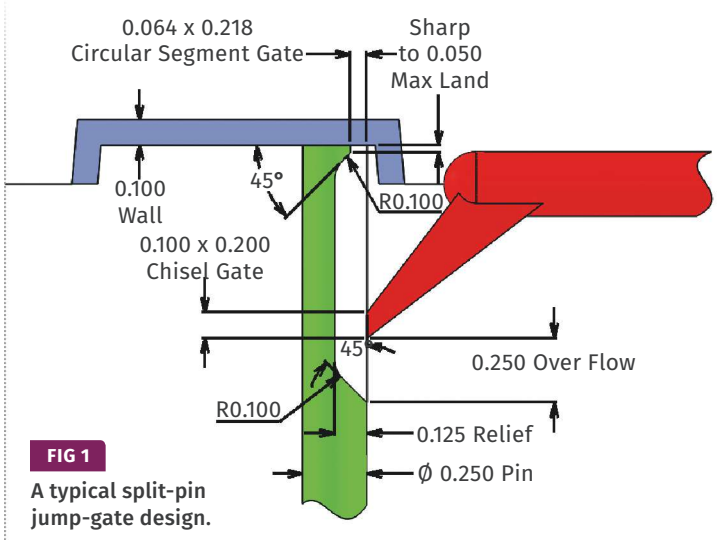

FIG 1
A typical split-pin jump-gate design.

The pin is relieved on one side, sometimes as much as half its diameter. This ejector pin is often referred to as a "split pin." The material flows through the tunnel gate and into the void created by the machined pin. From there, it flows up the void and into the cavity. Figure 1 is an example of a typical jump-gate design of this sort.

Split pins should be made of through-hardened steel.

When a part with a split pin is ejected, a D-shaped stem of material remains attached to the part. Sometimes it is acceptable to leave this stem attached. Sometimes it can simply be bent over while it's still warm, so as not to interfere with an adjoining part. The more common scenario is that it needs to be completely removed. It is important to know exactly what is required to deal with this stem after the part is molded, because it will affect how you should design the split pin.

The split pin must be keyed for proper orientation and the flat side cannot face the top of the mold, unless you use a robot to extract the part. Otherwise, the part could hang up on the pin and get crushed when the mold closes. If you're not going to use a robot, the flat side of the pin should preferably face the bottom of the mold, so that the part will fall down unobstructed. It will usually fall freely if the pin faces the operator or non-operator sides of the mold, or any angle in between.

Split pins should be made of a through-hardened steel, such as M2, with a 58 to 62 Rockwell hardness. Standard ejector pins are nitrided and have a thin, brittle casing that can chip or crack. There is no need to vent a split pin, because any outgasses are going to flow into the non-restricted material flow path. If the split pin is installed in a soft or non-heat-treated core, it is a good idea to install a fixed sleeve for the pin to ride in. The sleeve should be made of a different type of steel and preferably have a 10-point Rockwell hardness differential to prevent premature wear or galling. A sleeve made of H-13 with both the ID and OD nitrided to 65 to 74 Rockwell C works very well for this application. The reason for the hardened sleeve is that there is a lot of plastic pressure pushing the split pin off to one side. The pin will rub ►

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against the side of the core and over time, create an egg-shaped hole, which will soon develop down-flash.

If you are going to use a sleeve, it must be keyed, and the portion of the tunnel gate machined in its side should be stepped down about 0.005 in. per side, so as not to create a hang-up.

Most people consider the tunnel-gated stem to be an added feature of the molded part. That may be true, but that train of thought can get you into trouble. It helps if you don't consider the tunnel gate to be the gate. Instead, think of it as a restrictive section of the cold-runner delivery system. The void on the side of the ejector pin should be considered a half-round runner, and the tip of the pin to be the actual gate feeding the part. This will give you an entirely different perspective on what size and shape to make the split pin and the tunnel gate. That's important because the most common problems I have seen with jump gates are blush and sink marks on the surface of the part directly opposite the tip of the split pin. So, let's start at the tip of the split pin and work our way toward the primary runner.

Assume you were going to edge-gate a part. Depending on the type of molding material, you might use a gate depth that is 50-80% of the part's wall thickness, and depending on the flow length, the width of the gate being two to six times its depth. Multiply the desired depth by the desired width and you get the flow area in square inches. At a minimum, you want that same flow area where the tip of the split pin meets the part.

Never let the tunnel gate freeze off before the tip of the split pin.

One of the biggest mistakes you can make is failing to consider the appropriate diameter of the split pin and the appropriate size of the gate. All too often, the same pin diameter used to eject the part is used to make the split pin because it "looks" right, and the depth of the gate is based on a diameter often used to determine the size of an elliptical gate. There's a lot more to it than that.

Figure 2 shows three common ejector-pin sizes that have been machined to form the "D"-shaped void—all of them 1/16 in. deep. Even though the depths of the gates are the same, they have considerably different flow areas, flow-length capabilities, and gate-freeze times.

Figure 3 shows the same three ejector-pin sizes machined to form the D-shaped void—this time all of them have the same exact flow areas. These three pins also have considerably different shapes. But in this case, the smaller, 1/8-in. diam. pin will work better for eliminating sink marks on thicker parts because it is deeper and will remain open longer. The larger, 1/4-in. diam. pin will work better for maximizing the flow length on long, thin parts because it is wider and will freeze off sooner. You need to ask yourself, "What does my part need?" and select the split-pin diameter, flow area and gate depth accordingly. Keep in mind, if gate blush is an issue, a deeper gate will usually help. It allows a slower fill speed with less shear to be used without the gate freezing off before the part is packed out.

If this were a standard edge gate, the next thing you would do is specify the land length— typically half the depth of the gate, but never more than 0.050 in. But this is where you need to know what is going to be done with the D-shaped stem after the part is molded. If you are going to leave it on, then use a typical land length. If you are going to bend it over, you might add a small radius just past a typical land length. If you are going to cut it off, use a typical land length, but make sure there is ample room for the operator to easily get a gate cutter into position down at the base of the stem. However, if the material is brittle, you don't want any land length at all. If the tip of the pin has a large reverse taper with a dead-sharp edge, it creates a notch-sensitive line and the operator may be able to simply flex the segment once to snap it off.

Sometimes you get good results when the part is still warm. Sometimes the results are better when it's cold. There is a small risk with this type of degating method. Depending on the gate size and the wall thickness of the part, you can get a white stress mark on the surface of the part caused by the stem bending a little before it snaps off. ►

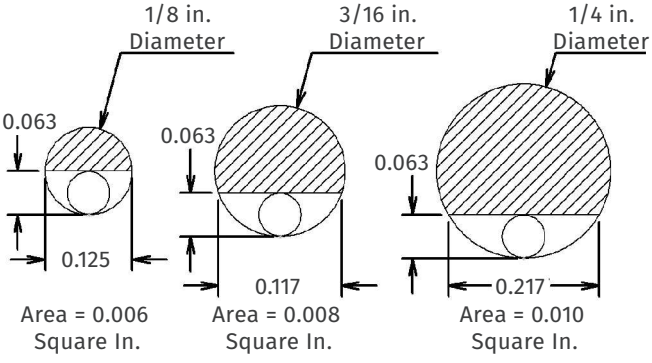

FIG 2 **Three different-diameter ejector pins with equivalent relieved depths (0.063 in.), but much different flow areas.**

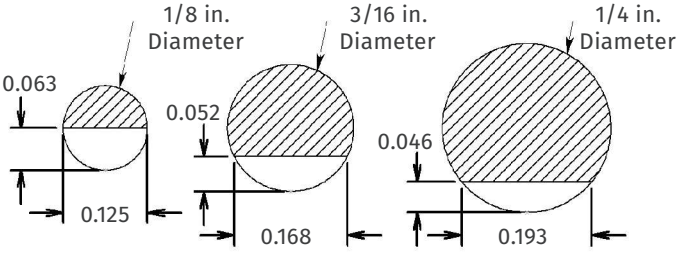

FIG 3 **Three different-diameter ejector pins with equivalent (0.006 in.²) flow areas, but much different depths.**

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You can have almost any transitional shape between the end of the gate land and the beginning of the relieved section of the pin, such as a 45° angle or a full radius. I prefer a combination of the two—as if it were the end of a parabolic runner. Just don't use anything that could generate unwanted shear or create problems with the part falling freely off the pin, such as machining a right angle.

FIG 4 A trapezoidal jump-gate stem with a chisel-type tunnel gate.

Now that the land area and the transition are taken care of, the next thing to do is determine the amount of steel to remove from the pin to form the runner section. If this were a two-plate, full-round cold runner, you would probably make the diameter of the runner feeding the gate approximately 1-1.5 times the thickest wall section of the part for free-flowing materials, or 1.5-2 times the thickest wall section for more viscous materials. Obviously, this is a general rule of thumb. If you want to calculate the pressure drop empirically, or if you have a flow analysis performed, these would give you a more accurate value of the best size to use. Now calculate the cross-sectional area of that round runner and machine the split pin to have at least an equivalent amount. It would be best to go a little deeper because the pressure drop in a full-round runner is a lot less than a half-round, or circular-segment-shaped runner.

The relieved portion of the pin should extend beyond where the tunnel gate feeds into it. If this were a two-plate cold runner, you would add an overflow approximately 1.5 times the diameter of the runner to catch and retain any solidified material at each runner turn. Why should this be any different? During ejection the split pin advances and the tunnel gate withdraws from its bore. Since the split pin has zero taper, the tunnel-gate orifice must be extremely sharp. Any ragged edges can cause small plastic shavings to lodge inside the hollow tunnel-gate bore. If the overflow in the split pin is insufficient, on the next shot you will see small specks on the outer surface of the part.

The last item to consider is what type of tunnel gate to use and what size to make it. While elliptical tunnel gates are one of the least expensive to machine, my preference has always been the chisel-type tunnel gate. It forms a rectangular gate that is less prone to flaking and is excellent for tweaking a mold after the initial sampling. Since we are gating into a runner and not into a gate, the size of the tunnel gate should be considerably larger than you might normally choose. You never want the tunnel gate to freeze off before the gate at the tip of the split pin. That is the primary reason why you get sink marks on the surface of the part opposite the pin. I suggest the flow area and the depth of the tunnel gate be no less than 1.5 times the flow area and depth of the gate at the tip of the split pin.

Figure 4 is an example of an improved jump-gate design. This mold designer did not like the negative aspects of material flowing through a circular segment. So, he machined a tab into a custom-made blade ejector, which mimics a conventional trapezoidal cold runner. He left a sufficient area to form a cold well, and fed the tab using an appropriately sized chisel-type tunnel gate.

While writing this article, I was reminded of something I'd like to share. Despite decades of experience and a wealth of information available on the internet and in trade books, I always ask my peers to review my articles before submitting them for publication. Growing up, one of my father's favorite words of advice was, "No one has a monopoly on brains." My dad, Lazzaro Adam Fattori, passed away Jan. 14, 2016. He was a World War II vet and was very well-known and respected in the injection molding and moldmaking industries.

I was once at a very large and well-respected tool shop in Europe, inspecting some molds we had ordered. The owner of the tool shop pulled my father aside and asked for his advice on a particular mold-design problem he was having. A customer of his had rejected a very large and expensive mold for an automobile dashboard. It had an edge gate on the bottom of the dashboard, which left an objectionable knit line where the material flowed around the cutout for a gauge.

The most common problems with jump gates are blush and sink marks on the surface of the part.

My father took a quick look at the mold drawings but didn't see a solution. I took a look, thought for a minute, and then suggested replacing the edge gate with long tunnel gate under the lower half of the part. The tunnel gate could then feed into another tunnel gate coming in from the opposite direction. Effectively, it was a tunnel gate jumping into another tunnel gate. From there, the material would flow up the tunnel gate and into a short cold runner with an edge gate feeding the top inside edge of the gauge cutout. The owner quickly said, "That won't work." My father took another look and said, "Yes it will." The mold was modified per my suggestion and his customer approved the parts. That was 43 years and about 80 pounds ago. The point I am trying to make is: Anyone with a little imagination can solve a seemingly impossible gating problem, and jump gates are often a good solution. PT

ABOUT THE AUTHOR: Jim Fattori is a third-generation injection molder with more than 40 years of molding experience. He is the founder of Injection Mold Consulting LLC, and is also a project engineer for a large, multi-plant molder in New Jersey. Contact *jim@injectionmoldconsulting.com*; *injectionmoldconsulting.com*.

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RESINS & ADDITIVES AT NPE2018

Spotlight on Performance, Economy, Sustainability

NPE will host lots of news in engineered thermoplastic compounds, customized TPEs, polyolefins for packaging, bioplastics, recycle-content compounds, purging agents, 3D printing materials, and a slew of innovative additives.

Ascend's Vydyne XHT nylon 66 series is positioned as an alternative to higher-cost materials typically specified for high-heat underhood components like charge-air coolers.

By Lilli Manolis Sherman
Senior Editor

Specialty formulations that zero in on target applications and offer more efficient processing, and in many cases sustainability, are key themes in the wide range of new materials and additives that will be showcased at NPE2018. Expect to see several customized engineered compounds and TPEs targeted on automotive, electrical/electronics, consumer goods, industrial, building/construction, healthcare, and additive manufacturing.

Advanced polyolefins and bioplastics for sustainable flexible and rigid packaging will also be highlighted. Moreover, there will be new bioplastics and post-consumer recycle (PCR) engineered compounds for structural applications, automotive, electronics, and consumer products. Specialty PVC compounds for building and construction and short- and- long-glass reinforced PP for automotive will also be on hand, as will some intriguing acrylic products and more efficient purging compounds. Expect to see new 3D-printing materials as well.

Reinforced thermoplastics are the subject of a new guide to replacing metals in a wide range of applications.

In additives, look for a nucleating agent and modifier for PP impact copolymers, and additive masterbatches for improved scratch and mar resistance in automotive filled PP and TPO; impact modifiers for TPEs; and a blowing agent and compatibilizer geared to reinforced nylon and recycled PE/nylon alloys, respectively. Also on hand will be stabilizers and modifiers for engineering resins and polyester alloys. Look for advances in natural silicates as flame retardants for wire and cable, new colorants for bioplastics, and a black masterbatch that rivals carbon black in glass-filled nylon.

SPECIALTY ENGINEERED PLASTICS

RTP Co. (***rtpcompany.com***) will feature a range of new applications made with its engineered thermoplastic compounds. RTP engineers will showcase *7-Steps: A Metal-to-Plastic Conversion Guide,* a guide-line for successful metal-to-plastic part conversion. RTP boasts extensive expertise in using filled thermoplastic compounds to replace metal in a wide range of applications.

Also new is a selection of thermoplastic alloys that demonstrate abrasion resistance comparable to UHMWPE but are designed specifically for injection molding. RTP's Abrasion Resistant Alloys series is available in multiple resin and additive combinations to provide further functionality such as wear and friction resistance, flame retardance, and conductivity.

Lehvoss North America (***lehvoss.us***) will focus its exhibit on customized material solutions and its expanding capabilities in custom compounding, additive manufacturing, and masterbatches. The Luvocom 1114 series, based on high-temperature-resistant PEKK, is designed to provide exceptional tribological and thermal properties. It is said to offer several advantages in tribological (wear) applications compared with other high-temperature polymers such as PEEK. The wear and friction characteristics of the Luvocom 1114 line reportedly exhibit a low and particularly uniform curve up to 329 F (165 C), plus elevated heat-deflection temperature.

Ascend Performance Materials (***ascendmaterials.com***) will launch the latest additions to its Vydyne nylon 66 family: the XHT series of extreme-heat-resistant compounds. Said to represent a step change in Ascend's heat-resistance portfolio, the series will debut with two grades for demanding automotive applications and capable of withstanding prolonged exposure at 410 F (210 C) and 446 F (230 C). Modifications in both polymer and heat-stabilization technologies position the XHT series as an alternative to higher cost materials

BASF will showcase a prototype lightweight TP composite robot collaboratively developed with Shanghai SIASUN Robot.

typically specified for such applications as high-heat underhood components like charge-air coolers and air ducts.

Teknor Apex Co. (*teknorapex.com*) will showcase Chemlon 102HI BK001, its "next-generation" nylon 66 compound said to overcome cycle-time limitations of earlier grades, allowing molders of fasteners and similar parts to meet product performance requirements while increasing productivity.

Polymer Resources Ltd. (*prlresins.com*) will highlight its engineering resin compounds, including nylons, ABS, PC and blends, PBT, PEI, ASA/PC and PPE/PS. New customized services include a significant expansion of the company's Express Services offering for compounds, a new expedited service for color matching, and additional stocking programs for shorter delivery times.

A new series of highly transparent TPEs boasts excellent adhesion to polypropylene.

BASF (*basf.com*) will showcase parts resulting from successful collaborations with various customers. For instance, BASF has been working with truck and trailer manufacturer Wabash National Corp., Lafayette, Ind., to develop an all-plastic composite refrigerated trailer, part of which will be on display. Lighting Technologies, Oxford, Mich., will show a sustainable, lightweight composite pallet. Also on hand will be a prototype lightweight robot collaboratively developed with Shanghai's SIASUN Robot.

Arkema (*arkema.com*) will highlight new applications with its Kynar UHM PVDF fluoropolymer. Included is foamed PVDF, a breakthrough technology first launched by the company in 2013, as well as the more recent development of glass-reinforced grades that have opened up new applications that require a stiffer, stronger, and higher heat-resistant fluoropolymer, such as pipes, fittings, valves, nozzles, clamps, fluid connectors, wires, tanks, and cable insulation.

PolyOne (*polyone.com*) will highlight its "extreme-heat" compounds based on PEEK, PES, PEI, PPS, PSU and PPSU, the result of its 2016 acquisition of Germany's Comptek. Properties achieved with these materials include transparency, electrical and/or thermal conductivity, laser marking, and X-ray opacity.

SABIC (*sabic.com*) will present a broad range of innovative materials from both its petrochemicals and specialty plastics portfolios by featuring a wide array of end-use applications across multiple industries, including automotive, building and construction, consumer goods and electronics, healthcare, mass transportation, packaging, and personal hygiene. SABIC will also display at its booth new and emerging technologies in additive manufacturing and composites. Among them:

- Glass-reinforced Noryl PPE alloy will be featured in a water-filtration module from Cerafiltec of Saudi Arabia. Noryl's hydrolytic and dimensional stability and chemical and heat resistance enabled Cerafiltec to replace corrosion-prone steel framing with a fully injection molded design.
- Lexan CXT high-clarity, high-heat, injection moldable PC copolymers offer a balance of high-temperature resistance, high flow, and excellent color stability under extreme molding conditions, together with a high refractive index. The materials were designed for use in optical applications in the electronics, consumer, industrial, and healthcare industries.
- Lexan DH65011 thermoformable sheet is opaque, low-gloss PC/ABS that is compliant with the U.S. Federal Railroad Administration (FRA) NFPA 130 fire-safety standard for passenger railcar interior walls, ceilings and seat frames. It offers numerous decorative customization options.
- Udmax GPE 46-70 tape, the newest addition to SABIC's portfolio of unidirectional fiber-reinforced thermoplastic composite tapes is glass-filled HDPE, which may be used for reinforcing industrial components such as oil, gas and water pipes and pressure vessels. Featuring high tensile strength, it offers one of the highest glass contents available today, (70% by weight, 46% by volume) combined with optimal fiber impregnation, thanks to SABIC's proprietary high-pressure technology.
- Ultem UTF120 PEI 7-µm dielectric film, developed for capacitors in higher-voltage applications that require thicker film with greater

A new series of Kraiburg TPEs offers a silky and velvety surface, along with excellent adhesion to polar thermoplastic compounds.

storage capacity, is the second in a planned portfolio of high-performance dielectric films featuring different thicknesses to help meet customers' specific voltage requirements. SABIC, which launched a 5-µm Ultem UTF120 film last year, claims to be the only materials supplier offering extruded PEI film at these thicknesses. SABIC also plans to unveil several new technologies, including a portfolio of PP compounds for improved haptics in automotive interiors; a series of heat-resistant LNP compounds for electronics; two healthcare filament grades for additive manufacturing; and a carbon-fiber hollow-core aircraft seat back.

New PE resins and other recent innovations are enabling multilayer moisture- and oxygen-barrier food packaging to move from non-recyclable structures to recycling-compliant structures.

MORE CUSTOMIZED TPEs EMERGE

Kraiburg TPE (***kraiburgtpe.com***) will feature its custom-engineered TPE solutions, including new grades and target applications within consumer, industrial, automotive and medical markets. Product innovations include the newly launched VS/AD/HM series for consumer electronics that offers silky, satin-smooth surfaces with high-scratch/abrasion-resistance, excellent durability, and resistance to chemicals such as skin oils, creams, and common household detergents. The VS/AD/HM series also offers excellent adhesion to polar thermoplastics such as PC, ABS, PC/ABS, PU, ASA, SAN, and nylons 6 and 12. Available in natural color and black, their applications include controllers for game consoles, remote controls and headphones, toys, protective covers for mobile phones, tablets, and cosmetics packaging.

Also to be showcased is Kraiburg's FC/ht series of highly transparent materials for applications such as food-packaging seals, toothbrush handles, detergent pods, and toys. This series of TPEs is characterized by its excellent adhesion to PP as well as high flow. It boasts a smooth, non-sticky feel and, due to its high transparency, is suited to applications requiring custom pigmentation or vibrant colors.

Nova will feature sustainable packaging such as this multilayer pouch that has resulted from new PE resins and other recent innovations.

Turkey's Elastron (***elastron.com***), a global producer and marketer of TPEs for over 35 years, plans to open a North American headquarters in Gainesville, Ga. Last year, the company announced a partnership with thermoplastics distributor M. Holland Co. (***mholland.com***) to provide an alternative source of TPVs and other TPEs to the North American wire/cable market. The two have been qualifying Elastron TPEs ahead of the new 32,000 ft^2 Gainsville compounding facility, due on stream in the third quarter. The facility will produce a broad range of thermoplastic elastomers including TPV, TPO, SBS and SEBS. Elastron USA will serve all major markets, including automotive, industrial, construction, medical, consumer and E/E.

Star Thermoplastics (***startthermoplastics.com***) will showcase its expanded StarSoft line of super-clear TPEs that now include an array of super-soft, gel-like materials. There will also be newly enhanced flame-retardant and conductive TPE compounds, as well as an expanded line for extruded profiles and sheet.

PolyOne will feature its low-VOC/fog/odor OnFlex LO TPEs for auto interior components.

POLYOLEFINS FOR PACKAGING

Nova Chemicals (***novachem.com***) will be demonstrating its Bonfire computer tool for modeling flexible film structures and its customized computer-modeling tool for caps/closures. For sustainable packaging, new PE resins and other recent innovations enable multilayer moisture- and oxygen-barrier food packaging to move from multi-material, non-recyclable structures to recycling-compliant structures. Physical samples will be shown.

For e-commerce food packaging, Nova has been working with film processors, package makers, and brand owners to develop packaging with the durability (stiffness/toughness balance) and other properties that are required for the rigors of the e-commerce supply chain.

Meanwhile, ExxonMobil (***exxonmobilchemical.com***) will demonstrate how to create differentiated solutions and will feature the following products:

- A new family of advanced polyolefins.
- New eXtreme Performance applications, including films for heavy-duty sacks and thermoformed barrier food packaging.
- Information about a new Exceed XP grade of hexene LLDPE that delivers eXtreme Performance coextrusion films for sachets, lamination packaging, frozen products and barrier packaging.

For packaging, SABIC will highlight its Flowpact high-flow PP impact copolymers for injection molding containers (food ►

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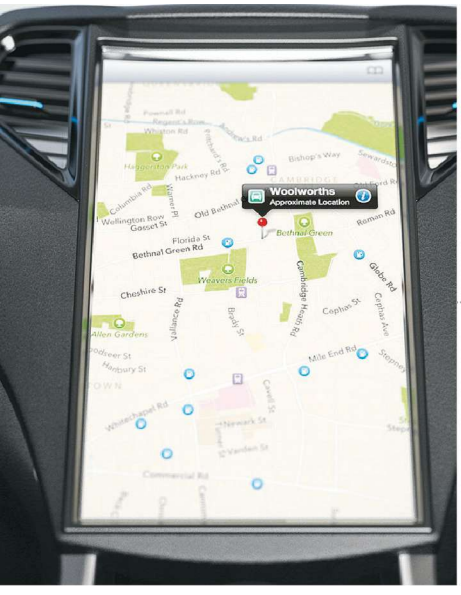
and non-food), caps and closures, as well as housewares and consumer goods. The newest addition is Flowpact FPC70 (MFR 70). Rigid packaging made with this resin, including applications that can be hot-filled, is said to have much higher topload strength than identical products made with benchmark materials. This results in better stackability for better transport and storage economics. FPC70 boasts polymer chemistry advances that yield a material with a balance of high stiffness, impact strength, and high HDT, unlike a standard PP impact copolymer. It is said to enable up to 10% thinner walls and fast injection.



Eastman's Treva cellulosic engineering bioplastic offers both excellent optical performance in electronic displays and excellent flow characteristics for filling thin walls and complex parts.

NEW SUSTAINABLE MATERIALS

Emerging applications such as office furniture, kitchen cabinets, bathroom toilets, sinks and lids, as well as automotive applications for a new engineering bioplastic will be highlighted by Eastman Chemical Co. (***eastman.com***). Last year, the company launched Treva, an engineering bioplastic that falls in the family of cellulose acetate propionate (CAP) but boasts a significantly higher HDT than standard CAP, making it more dimensionally stable and creep resistant.

Also key are low birefringence for excellent optical performance in electronic displays, and excellent flow in filling thin walls and complex shapes. It is said to be suited to structural applications with good aesthetics—from kitchen walls to home and office furniture—and to be durable for daily wear and tear. It can also address the needs of automotive interior designers seeking curved surfaces and shapes. Excellent chemical resistance and ability to withstand skin oils and sunscreens make it suitable for bathroom toilets and eyeglass frames, respectively.

Total Corbion PLA (***total-corbion.com***) will feature its Luminy PLA portfolio for the Americas. Included are a range of high-heat, high-performance crosslinked PLA homopolymers—PLLA and PDLA—which ►

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3D Printing Materials And Applications

Take a look at a sampling of new 3D printing materials and emerging applications at the big show:

• Techmer PM has collaborated with Oak Ridge National Laboratory (ORNL) and BASF to design two new 3D-printable engineering thermoplastic compounds, Electrafil PPS 3DP and Electrafil PPSU 3DP. Specifically developed for printing high-temperature autoclave tooling used in composite part production, the carbon-fiber-reinforced compounds come in pellet form for use in new pellet-fed 3D printers. Their versatility was proven by successful testing on two large-format additive manufacturing systems—Cincinnati Inc.'s BAAM and Thermwood Corp.'s LSAM.

Two new 3D-printed tooling projects will also be highlighted: Thermwood chose Techmer's Electrafil ABS LT1 3DP to 3D print a huge tool to make a marine boat hull on its LSAM system. Using a Techmer ABS compound reinforced with carbon fiber, ORNL printed a trim-and-drill tool that set a new Guinness Book World Record for largest solid item ever manufactured on a 3D printer.

• Lehvoss will highlight new Luvocom 3F products for filament-based 3D printing processes (FFF, FDM). The products are said to offer improved layer bonding and enhanced printability. Examples include modified PAEK materials free of warpage and with optimized z-direction strength.

• SABIC will feature some of its latest filament materials for FFF/FDM 3D printing, including Lexan EXL AMHI240F PC/siloxane copolymer, one of several new filaments with distinctive performance characteristics that SABIC plans to launch in 2018. Two new healthcare thermoplastic filaments will also be unveiled.

• BASF will highlight its partnership in plastics 3D printing with a creator of specialty filaments, Essentium Materials, College Station, Texas.

are targeted to applications requiring durability and/or high-heat resistance. Visitors will see several commercial applications, including coffee capsules, teabags, heat-stable bottles, and a thermoformed food platter that has a "stone-look" slate appearance.

PCR-containing products launched in the past year by Wellman Advanced Materials (*wellmanam.com*) include:

- EcoLon 3100-BK1 is a PCR nylon 6, with superior flow and performance properties and better cost efficiency vs. current EcoLon 2100, for use in automotive parts like fan shrouds.
- EcoLon GFT3040-BK1 is a first-of-its-kind, impact-modified PCR nylon 6 with superior low-temperature impact, minimum CLTE, and good HDT. It boasts performance comparable to a virgin nylon 6 with significant cost savings and sustainability.
- EcoLon 1619-BK3GB is a 20% glass/mineral-reinforced PCR nylon 6 said to offer a 19% density reduction, yet is comparable in cost and performance to equivalent virgin resin.

A new, highly heat-resistant acrylic is formulated specifically for long-path-length automotive applications, such as signature lighting and thick lenses.

Techmer PM (*techmerpm.com*) will highlight its collaborative project with plastics recycler Envision Plastics Industries, sustainability investors Primal Group, and blow molder Classic Containers, to overcome the challenges of creating a compound from 100% reclaimed ocean-borne plastics waste that would process successfully into a personal-care bottle with a silver metallic, pearlescent finish. Using its proprietary dispersion ►

technology, Techmer PM was able to meet Primal Group's requirements for a specific color and reflective finish on the bottle for its personal-care range called ViTA.

PURGING COMPOUNDS

Sun Plastech (*asaclean.com*) will launch its new UF2 purging compound for blown and cast film extrusion as well as injection molding. Like other Asaclean grades, UF2 is said to enable faster changeovers, resulting in increased productivity and cost savings. It can be purged through a die, effectively removes gels and color and carbon contamination that is not carbonized, and has excellent compatibility with PE. It's recommended for color and material changes, hot-runner cleaning and shut-down/sealing. As it does not work by chemical reaction, there is no soak time or hold-up time.

Asaclean's UF2 purging compound enables fast changeovers in blown and cast film extrusion, as well as injection molding.

Asaclean will also highlight its N-Series of chemical purging compounds from its 2015 acquisition of Novachem: NCR Grade (formerly Supernova Regular) is a versatile, high-performance chemical purging compound well suited for color and material changes for thermoplastic injection molding and extrusion machines. NCT Grade (formerly Supernova HT) is a chemical purging compound for high-temperature resins such as Ultem, PEEK and LCPs that can process at temperatures as high as 750 F. NCF Grade (formerly Supernova FD) is a high-performance chemical purging compound suited for color and material changes in thermoplastic film extrusion, including both flexible and rigid PVCs. And NCH Grade (formerly Hybrid 400) is a high-performance compound said to offer the benefits of both mechanical and chemical purging agents for color and material changes in thermoplastic extrusion and extrusion blow molding.

Shuman Plastics (*dynapurge.com*) will introduce Dyna-Purge F2, described as a "breakthrough technology" with proprietary agents formulated to flow naturally through a variety of processing equipment, including injection and extrusion

machines. This low-residue purging agent features one component formulated to flow to the boundary layer, flushing out the resin. Another component acts as a pressurizing agent, allowing the purge to reach into stagnation points.

This dual-action cleaning removes material and impurities from the screw, barrel, mold or die. With a temperature range of 320-625 F, it is reportedly effective at purging virtually all resins. This non-hazardous and FDA-compliant compound is suited to purging hot runners and other channels with tight clearances.

iD Additives Inc. (*idadditives.com*) will introduce two new single-dose purge compounds that come in individual packets—expanding its original QuickShots liquid-in-pouch product line. These compounds allow operators to purge their machinery by simply dropping the packets into the feed throat/hopper of their machine, and they work with all resin types on all plastics machinery. New QuickShots HD (heavy duty) has glass prills mixed in for extra cleaning strength, and SP (pellets in a pouch) includes an extra-small ½-oz version for lab lines and small runs.

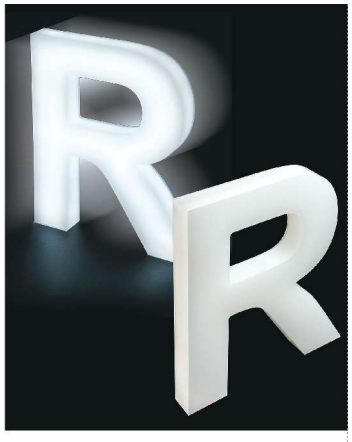
A unique modifier for PP impact copolymers has been shown to improve toughness and melt flow while maintaining stiffness.

OTHER MATERIAL NEWS

Two new families of flexible PVC compounds will be highlighted by Teknor Apex. Its Apex 1523-LG Series compounds for automotive window encapsulation are said to exhibit gloss levels similar to those of EPDM rubber beltline seals or glass-run channels, enabling manufacturers of PVC encapsulated windows to meet OEM demand for a closer match in the surface finish of these critical appearance parts. These compounds achieve a gloss level of 3 to 4 without need for surface treatment of the tooling. Compared with standard PVC window-encapsulation compounds in the 9 to 12 gloss range, Apex 1523 compounds eliminate the cost associated with tooling maintenance and repair to keep a consistent surface appearance from part to part. This series has several OEM approvals such as GM's GMW-16084 spec for quarter windows and sunroofs from Chrysler.

Apex 2324A2 Series compounds are made without ingredients listed under California Proposition 65 and are said to provide performance similar to standard compounds used in indoor and outdoor building products. The eight compounds in the series have Shore A hardness ranging from 55 to 90. These opaque grades are ►

said to extrude well across a wide temperature range, and in some cases are suitable for coextrusion with rigid PVC. Applications include gaskets, flexible glazing, weather-stripping, door sweeps, and other interior and exterior profiles.



Altuglas LED Bloc is said to be changing the face of store-front signage with its thin, modern profile.

Wellman Advanced Materials will highlight the latest additions to its specialty PP line geared to automotive. For example, Pret A422-G30, a 30% glass-reinforced PP, has had its first application in the U.S. with an automotive grille-opening reinforcement panel. It boasts excellent appearance and performance. Pret A422-LG60, one of the company's newest long-glass PP products, was used in the first instrument-panel substrate for a new BMW model produced here. Shanghai Pret Composites Co. of China has been an Asian leader in LFT long-fiber thermoplastic (LFT) compounding, and since its acquisition of Wellman has expanded into North American and European markets.

Arkema's subsidiary Altuglas (***plexiglas.com***) will showcase its new Plexiglas Sylk acrylic, which boasts a soft, smooth texture and an exceptional combination of diffusion and light transmission, with maximum LED hiding power for lighting and skylight/luminary applications, but also furniture, privacy partitions, and POP displays.

Altuglas will also highlight the expansion of its Plexiglas ELiT Series acrylics as a new option for larger edge-lit signs while maintaining a slim and modern appearance, as well as Altuglas LED Bloc which is changing the face of store-front signage with its thin, modern profile and ability to be used independently without the additional components previously required for signage.

For automotive, Altuglas will feature Plexiglas HT121-LPL, a highly heat-resistant acrylic formulated specifically for long-path-length (LPL) applications, such as signature lighting and thick lenses. In addition to the already robust optical properties, chemical resistance, and outdoor stability of Plexiglas resins, HT121-LPL is said to have much improved light transmission and heat stability, ensuring the polymer's water-white clarity is maintained after injection molding and in end use.

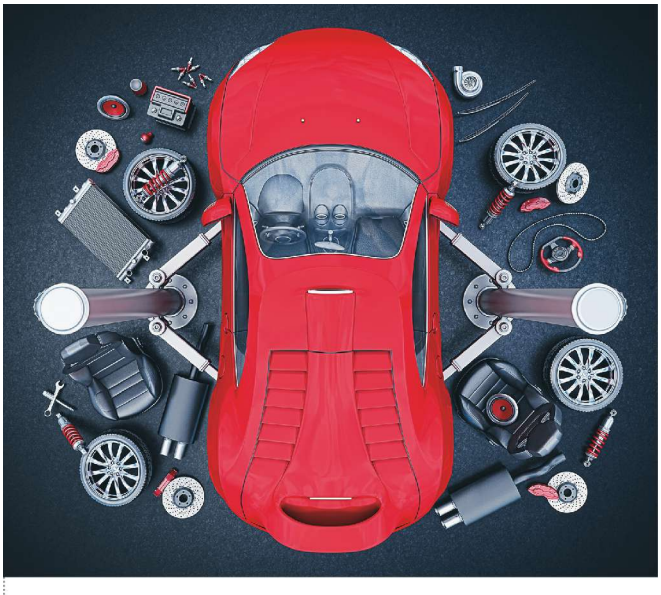
PolyOne will highlight new FireCon CPE, a flame-retardant CPE for wire and cable, said to resist acids, alakalis, oils, fuels, solvents, and extreme temperatures.

ADDITIVE NEWS

Milliken & Company (***milliken.com***) will launch two new products geared to injection molded PP impact copolymers. One is a unique modifier that has been shown to improve impact and melt flow of PP while maintaining stiffness and allowing for downgauging. The modifier also is said to enable recycled resin to deliver physical properties comparable to those of virgin materials. The other new product is the latest addition to the company's Hyperform HPN nucleating agents, said to be specifically designed to maximize stiffness in PP impact copolymers and enable thinner gauges.

Lehvoss North America will feature Luvobatch PA BA 1001/1002, a new endothermic blowing agent that makes it possible to reduce the weight of reinforced nylons in all common processing systems. Use of this agent reportedly reduces density by up to 30%, maintains mechanical properties with minimal compromise, and helps avoid sink marks and contraction cavities. Use of the product as the carrier system prevents delamination in components subject to high mechanical stress, which may arise during the addition of masterbatch based on PE or universal carriers.

Two innovative technologies for driving increased use of recycled polyester in nylon resins (creating alloys) and enhancing the benefits of recycled PET will be introduced by Vertellus (***vertellus.com***). One is a novel compatibilizer for creating alloys of recycled PET and nylon that enables these new materials to have performance properties comparable to those of virgin nylon, but with a significant cost advantage. The other is a novel, patent-pending technology for upgrading recycled PET and, potentially, bioplastics such as PLA. This new additive is expected to deliver higher clarity and better performance at lower dosages.



Vertellus' novel compatibilizer allows creation of alloys of recycled PET and nylon that have performance properties comparable to virgin nylon, but with a cost advantage.

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For PP impact copolymers, Milliken has a unique modifier that improves impact and melt flow, and a nucleating agent that maximizes stiffness.

Spain's Tolsa (***tolsa.com***) will present new technical developments for its Adins high-performance flame-retardant synergists—a range of additives based on a novel technology using natural silicates, offering tailored performance benefits and making it possible to replace part of highly loaded flame-retardant systems, allowing better processability. Adins Clay works with standard wire and cable formulations based on halogen and halogen-free flame retardants (HFFR). Adins synergists reportedly are very efficient in HFFR systems based on EVA/PE and ATH (alumina trihydrate) and/or MGH (magnesium hydroxide).

In the latest developments, Tolsa has confirmed key advantages in other polymers, including LSR and rubbers. Adins Clay 80T additive has shown strong impact on smoke and heat release and is marketed in rubber matrices for cable applications and also in plastic parts for trains. In LSR, strong inroads have been made with Adins Clay 15 for wire and cable in trains. Tolsa is also developing additives for CPE wire and cable. Preliminary studies show good fire retardance and reduced smoke. Tolsa expects to complete its formulation readjustments this year.

Holland Colours (***hollandcolours***) is highlighting two recently launched colorants. The Holcobatch Natural Collection palette is a 100% non-petroleum-based colorant option for use in bioplastics. These colorants boast both superior processing performance and material compatibility in commercial applications. They have been used successfully in polyesters like PLA and ►

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sugarcane-derived PET. The non-polymeric carrier system allows for potential use in other bioplastics as well.

Holcobatch Frost replicates the premium look and soft texture of frosted glass in a lightweight, less costly, scuff and mar-resistant material. The translucent effect is created with significant gloss reduction, regardless of orientation. The product is reportedly ideal for creamy, oily and high-alcohol applications. Dust-free microbead Frost can replace spray-on or painted frost effects, offering a cool, icy look and velvety, slip-resistant texture.

A developmental additive for CPE wire and cable shows good fire retardance and low smoke. Another version looks promising in LSR and rubbers.

PolyOne will feature "game-changing" OnColor Brilliant metallic colorants launched last year that mimic paint.

PolyOne will also show new Lactra SX UV-barrier additive in solid masterbatch form, said to provide high-level light blocking and protection for liquid dairy contents when added to mono-layer PET bottles.

AESSE Sales & Distribution, the sales, distribution and corporate development arm of AESSE Investments, Ltd., is exhibiting in the booth of its sister company, SACO AEI Polymers (***sacoaei.com***). AESSE S&D currently supplies impact modifiers, coupling agents and FR masterbatches made in the U.S. by SACO. AESSE S&D also distributes unique products manufactured by off-shore supplier partners. At the show, the company will spotlight new technologies from three Chinese suppliers of specialty additives and additive masterbatches that it now represents in North America.

From JavaChem, AESSE will show new products such as Javachem HG 600 for improving scratch and mar resistance in filled PP and TPO automotive components. Also new are silicone additive masterbatches, Javachem GT300 and 805—produced in situ with base resins such as PE, PP and TPU—which are designed for faster extrusion, reduction of die drool, and faster molding cycles. Also, Javachem PA1066 Black is said to allow coloring of glass-filled nylon with improved aesthetics while avoiding deterioration of properties associated with using carbon black as a colorant.

From Sundow Polymers Co. comes CPE impact modifiers for TPEs and other resins.

From Fine-Blend, a supplier of patented additives for engineered thermoplastics, AESSE S&D has three new products: SAG (styrene acrylonitrile glycidil methacrylate) additives improve thermal stability and provide chain extension for PC, PET, nylon, and PLA. SOG additives contain highly reactive epoxy groups that reportedly improve toughness and hydrolysis resistance of PET and PBT, including glass-reinforced versions, and serve as compatibilizers for recycled polyester in alloys such as PC/PBT, PET/PP, and PET/PE. They have also been shown to improve toughness and heat performance of PC/ABS. The company also has new EMI special carrier resins for colorants, specifically for PC, ABS and their blends; as well as flow modifiers for ABS, FR-ABS and ABS/PVC alloys.

Riverdale Global (***riverdaleglobal.com***) will feature its new GlobalTracker system—color-tracking software, available at no cost, that uses real-time, company-wide data from liquid-color metering devices to automate many of a customer's purchasing, production management, and compliance functions, and it makes remote troubleshooting possible. PT

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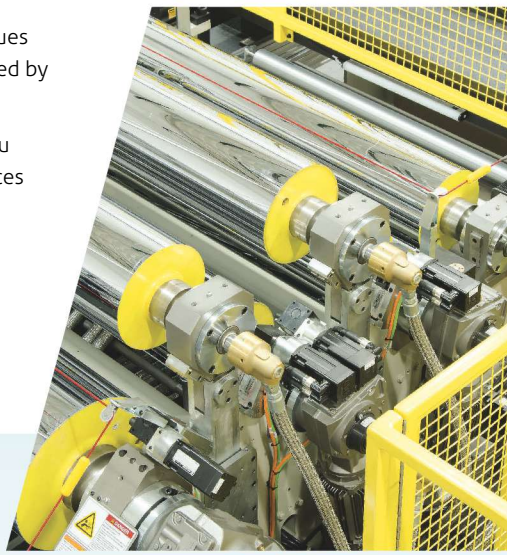

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AUXILIARY EQUIPMENT AT NPE2018

Packing More Functions in Less Space

Auxiliary equipment suppliers are building more and more technology into their products, packing more physical and virtual functions into the same or smaller footprints.

By Tony Deligio & Lilli Sherman, *Senior Editors*

In addition to combining utilities that you might expect to be co-located, like blending and feeding or drying and conveying, auxiliaries debuting at NPE2018 combine elements that heretofore have not shared the same housing, like process cooling and resin drying.

As reported in our March Close Up, Novatec (***novatec.com***) and Advantage Engineering (***advantageengineering.com***) collaborated to create the DryTemp+, a patent-pending machine that combines a portable desiccant-wheel dryer and a fluid temperature-control unit (TCU) in a single footprint. The product is aimed at processors that don't dry centrally.

Conair says its revamped Carousel plus platform is the first dessicant-wheel dryer that doesn't require water for the after-cooler throughout the entire size range.

The unit features a 7-in. touchscreen Siemens pendant PLC, which accesses both drying and mold-temperature-control parameters. The PLC can provide trending and data logging and will be Ethernet equipped so it can be used for QC logging of jobs with resin, mold temperature, and drying parameters recorded.

The DryTemp+ dryer is a NovaWheel desiccant dryer sized for 25 to 150 lb/hr, featuring Novatec's over-dry protection. The TCU comes with one or two circuits, a display screen, capacity of 30 gpm at 30 psi and 30 to 250 F temperature capability.

While a desiccant-wheel dryer normally requires a water utility for cooling, Conair (***conairgroup.com***) is launching a new generation of Carousel desiccant-wheel dryers featuring an air-to-air aftercooling option. That now frees up these dryers to be moved anywhere in a plant because they are self-contained without a water connection.

The air-to-air aftercooling option reduces the temperature of return air from the drying hopper, improving the moisture-absorption efficiency of the desiccant. Conair's Carousel PlusX series portable dryers and dX series mobile drying/conveying systems represent a complete redesign of Conair's Carousel Plus desiccant-wheel dryer and its former W series and MDCW series mobile drying/conveying systems for 15 to 400 lb/hr.

Processors can specify dryers equipped with either an optional air-to-water aftercooler or the new air-to-air aftercooler. The air-to-air unit can sustain drying efficiency while handling return-air temperatures of up to 375 F and dewpoints of -40 F. At the same time, it saves water, maximizes dryer portability, and makes installation and setup faster and easier.

MORE FUNCTIONS, MORE MOBILITY

Mobility and combined functions—drying and conveying—are also the emphasis for Motan (***motan-colortronic.com***) with its new line of mobile dehumidifying dryers for small throughputs or stand-alone applications. The Luxor E A and Luxor EM A dryers provide 60 to 150 liters of drying-hopper volume.

Luxor E A models can be integrated into existing conveying systems or equipped with a stand-alone material loader. Luxor EM A dryers with integrated conveying are self-contained mobile units. As standard, they have integrated drying and a side-channel blower, as well as a small, monitored cyclone dust-collection filter and bin. The Luxor EM A can control up to three Metro-G material loaders—one to supply the drying hopper and up to two more to supply processing machines. Optionally, Metro-G loaders can be equipped

Novatec and Advantage Engineering have teamed to create the DryTemp+, a machine that combines a portable desiccant-wheel dryer and a fluid temperature-control unit (TCU) in a single footprint.

with a Metromix proportioning valve, so that any regrind produced at the machine can be immediately returned to the production process. The dryers operate in a closed process in combination with temperature-controlled regeneration, or there's an option for dewpoint-controlled regeneration.

Both dryer ranges have the new LuxornetEM color touchscreen control. LuxornetEM controls drying and conveying for three material loaders, as well as recipe management, quality-assurance reporting, and enhanced service functions and trend charts. A weekly timer is also integrated.

INDUSTRY 4.0 MEETS RESIN DRYING

Dri-Air Industries (***dri-air.com***) is tapping into Industry 4.0 buzz at NPE2018, launching the Dri-Air Dryer 4.0. Dri-Air says the new line adjusts to conditions and changes in the operation autonomously, gathering information and adapting on its own. Connectivity is part of Dri-Air's 4.0 initiative, and for customers with multiple systems, a central dryer control can be installed in a convenient location displaying each dryer's operating parameters and other important data. When a dryer needs servicing, an icon flashes showing what needs to be done, with directions for service and the parts required. The dryer's control monitors motor performance, reporting this data to the main control.

As a new Dri-Air 4.0 dryer is installed, it is automatically added to the group display, and the list of spare parts required is updated. An inventory package that tracks and stores the spare parts is under development.

Wittmann Battenfeld's theme for NPE2018 is Pathways to 4.0 and one of the pieces of equipment on that path will be its new Aton H beside-the-press segmented-wheel dryer, which it describes as being "fully integrated with 4.0 capabilities." Wittmann Battenfeld (***wittmann-group.com***) says this is its first display of a 4.0-functional dryer.

In a "Wittmann 4.0" connected work cell, when a new mold starts up, all the equipment in the cell, including this new connected dryer, pulls up that part's setup recipe. The values are saved so operators don't have to go around to each piece of equipment and set up the TCU, dryer, robot, etc. Everything is controlled through the machine interface. Two Aton H dryers will be involved in active molding machine cells at the company's booth.

Collecting and sharing data are an integral part of Industry 4.0 connectivity and Maguire Products (***maguire.com***) will showcase an energy-monitoring capability on the newest member of its VBD line of vacuum dryers. The VBD-600 intermediate-range model has 600 lb/hr of drying capacity. The energy monitoring will be displayed on a new touchscreen controller.

Novatec will take collection and sharing of data a step further with the debut of DigiTwin, a virtual electronic twin of a physical machine that measures and follows every behavior of the physical machine and every key component. The key here is that it is not culling data from the machine-controller PLC, but directly from the multiple sensors located throughout the machine. Novatec calls DigiTwin the ultimate component and machine monitoring system that observes, tracks and predicts performance. At its booth, Novatec will show a physical dryer side by side with the digital model of that same machine next to it. Novatec compares DigiTwin to a "virtual x-ray or MRI" for the dryer, looking under the sheet metal and within the machine for its actual status.

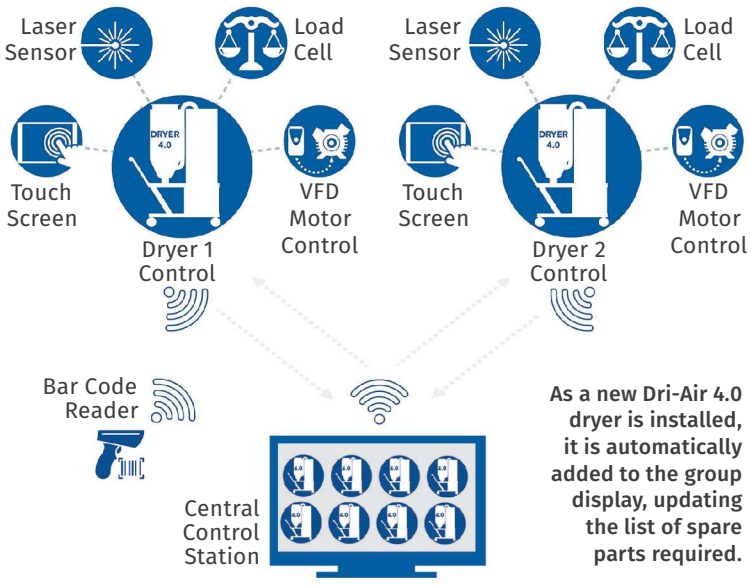
Novatec is also highlighting a new at-the-press drying product for molders tackling highly tailored nylons and other specialty materials. These specially equipped NovaWheel portable dryers have adapted two technologies established in Novatec's central drying offerings—Moisture Manager and OverDry Protection (see February Close Up).

Also on the 4.0 front, Piovan (***piovan.com***) will introduce FACS 4.0, an auxiliary-equipment control and monitoring system designed by Una-Dyn (***unadyn.piovan.com***) and based on Winfactory 4.0, Piovan's OPC-UA compliant supervisory software.

Motan's Luxor EM A dryers with integrated conveying are self-contained mobile units with a small, monitored cyclone dust filter and collector.

MATERIAL BLENDING, LOADING, DOSING

Consistent with the theme of more functionality from the same footprint, Maguire is introducing a compact system that combines loading, dosing, mixing and dispensing. The Micro Tower mixes up to three materials—such as virgin resin, regrind, and masterbatch—in 10-lb batches. Throughputs range up to 100 lb/hr for the compact tower, which mounts at the throat of the processing machine, with no floor space required for a vacuum pump. The loader and hoppers operate on a loss-in-weight basis under simultaneous direction by the controller for greater accuracy. ►



As a new Dri-Air 4.0 dryer is installed, it is automatically added to the group display, updating the list of spare parts required.

Mobility and flexibility are key to the latest iteration of Plastrac's (*plastrac.com*) cart-based blending systems, which are designed to be shared among multiple stand-alone processing machines. This new line can make additive changes, for instance, faster and simpler, particularly for shops handling short production runs.

Plastrac had supplied custom single-cart systems for years, before standardizing the offering and formally introducing it at NPE2015. The new cart systems are duplex and fully independent dual models. In the duplex-dual design, a single virgin feeder and two different color feeders have a shared controller and blower system, operating independently with either manual color filling or an automated color loader. The dual system can manage two different resins for double-shot machines; Plastrac notes that separate hoppers facilitate easy color changes, with a full dual able to accommodate two natural resins and up to two additives, using a shared blower system, with a control box that can manage up to six disc feeders, allowing operators to switch colors electronically.

New to the system at NPE2018 is a touchscreen control. The control offers a full virtual keyboard for recipe entry, while a USB port allows those recipes to be transferred to and from a thumb drive or software updates to be uploaded. The controller features wired Ethernet and allows setup parameters to be stored for later use.

Advanced Blending Solutions (ABS) is introducing its first automated, self-cleaning blender (*adv-blend.com*). The Chameleon Simplicity 3000 is a fully automated material-cleanout system that can complete a blender material change without operator assistance. Material is removed from the feeder tray using an automated vacuum system. From there it can be sent to a collection station or bin for later use. Compressed air then cleans the side walls of the component hopper.

Piovan is promoting its line of Quantum batch blenders, entirely U.S.-made, saying it has expanded the range to cover applications requiring a high degree of accuracy. These work in conjunction with its Easylink automatic coupling stations and Pureflo filterless receivers.

Moretto (*moretto.com*) is introducing a self-contained loader equipped with a single-phase vacuum unit, specifically tailored for North American custom processors. The Loader F24 offers high capacity (660 lb/hr) and features stainless-steel construction. Equipped with a wide signal lamp and a die-cast aluminum flange, the units have soft start, fabric filter, and automatic filter cleaning included as standard.

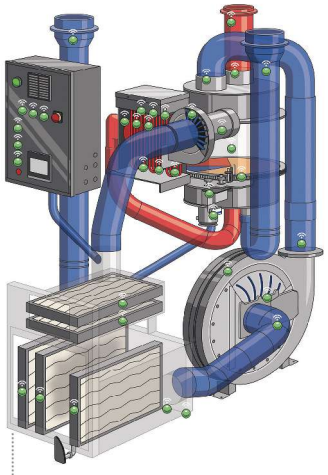
RESIN CONVEYING

Options for moving materials to blenders and processing equipment are also getting smarter at NPE2018. Motan's MetroConnect U/C manually operated coupling system for pneumatic conveying lines offers an RFID option for error-free connections. MetroConnect C (for "coded") represents an RFID enabled system. Motan notes that an uncoded MetroConnect U or legacy system (Motan or otherwise) can have the RFID capability added. Motan says that coded coupling stations not only prevent coupling errors, but in certain fields, they are necessary if material tracking, validation or certification is required.

The coupling system is controlled, monitored and configured with the MetroConnect controls. Up to eight blower lines can be set up with a maximum of 96 loaders and material sources. Up to 125 coupling points can be connected to each blower line. If required, an extension of up to 250 coupling points is available.

Maximum flexibility is the goal of a new discrete wired conveying controller that allows the number of pumps and receiver stations to be customized to fit processors' evolving needs. AEC's VacTrac Plus (*acscorporate.com*) can control vacuum receivers, vacuum pumps, remote proportioning valves, purge valves, knife gates, and pump or hopper blowback in any resin conveying application across any process. The control is fully configurable from one to 12 pumps and one to 44 stations.

The VacTrac Plus has a 7-in. color touchscreen, powered by an Allen-Bradley PLC. The graphical user interface with ►



Novatec will take collection and sharing of data a step further with the DigiTwin, a virtual electronic twin of a physical machine that measures (green sensors) and follows every behavior of the physical machine and every key component.

New Product Announcement

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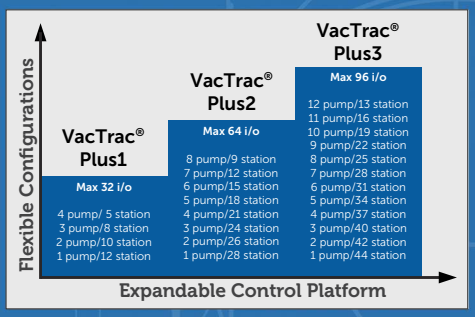

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a VNC server allows remote two-way communication on any PC, tablet or mobile device. The system offers Ethernet connectivity and can be networked to PCs anywhere.

Schenck Process (***schenckprocess.com***) will unveil a newly designed Plug Single Tunnel (PST30) diverter valve at NPE2018. The valve's new features include internally shim-able positive stops, inflatable pneumatic seals at each port, position indication from the tunnel itself, and external tunnel position indication. Additional features include 145° port-to-port rotation combined with the ability to switch between dilute- or dense-phase conveying. The housing, plug and endplates on the aluminum valve are hard anodized for wear resistance. A pneumatic actuator provides a 4-sec actuation time between ports.

MOVE WHAT YOU WANT, GET RID OF WHAT YOU DON'T

Dust, fines, metals and other contaminants are the target of multiple suppliers at NPE2018. Pelletron (***pelletroncorp.com***) will showcase two offerings on that front. Pelletron has completely redesigned its C-20 DeDuster. The dust-removal system can process up to 100 lb/hr of dry granular material and requires no additional floor space. New features include higher temperature capabilities, from 150 to 185 F. An integrated level sensor is installed in the glass tube hopper and can stop the material flow if needed. And the completely new feeder assembly features variable-speed paddles for finer control of solids feed rate. The system's flat disc-type filters have more surface area than previous closed-end cylinder-type filters, easing maintenance.

Pelletron will also introduce a completely new dedusting product based on a patent-pending technology. The company says the HR45 DeDuster's novel half-round cone technology allows the system to utilize a smaller air system, reducing the unit's footprint, initial cost, and operating costs. This new model will ultimately replace the XP45 DeDuster model. The company says the same size range that's available for the XP series will be developed for the HR in coming years.

Pelletron has completely redesigned its C-20 DeDuster, which can process up to 100 lb/hr of dry, granular material and requires no additional floor space.

The HR45 has an overall capacity of 10,000 lb/hr for materials of average bulk density, including PE, PET, PC, PMMA, and nylon. Pelletron says advantages of the new HR45 DeDuster include 40% less power consumption as well as reduced equipment costs, thanks to smaller filters and cyclones—700 ft^3/min vs. 1100 ft^3/min.

Bunting Magnetics Co. (***buntingmagnetics.com***) is introducing a drawer magnet rated for use at up to 350 F. The FF 350 Hi Temp drawer magnet can work with molding machines running at higher temperatures without affecting the unit's rare-earth magnets, which can be damaged by heat. The Hi Temp FF drawer is typically installed above the molding machine's feed throat, and resin passes through the drawer to remove ferrous contaminants.

For moving finished parts and assemblies rather than raw materials, Dynamic Conveyor (***dynamicconveyor.com***) will be presenting a variety of DynaCon conveyor systems. The company says its products permit customization using standard components and a variety of accessories

For materials handling, Rechner Sensors (***rechner.com***) will showcase the new Smart Paddle Level Sensor with a stationary electronic paddle and a new electronic design that simplifies installation. It detects a wide range of powders, granules and thin liquids with a dielectric between 2 and 80.

PROCESS COOLING

Efficiency, connectivity and transparency are also key themes in process cooling, with new units applying the most efficient technologies for operations while sharing performance data with users.

Thermal Care (***thermalcare.com***) is updating its central-chiller control systems with a new technology that continuously calculates the lowest allowable refrigerant pressure for any combination of operating conditions in order to maximize energy savings and provide more stable and smooth refrigerant pressure control, especially under varying load and condenser inlet temperatures.

Called Dynamic Lift, the technology also adds direct control of remote condenser fans or condenser water-regulating valves for added savings. According to Thermal Care, users will see an average 25% reduction in partial-load chiller energy use at a 50 F setpoint.

The company will also focus heavily on improved PLC controls, introducing its new Connex4.0 system, Thermal Care's Industry 4.0 software. With the new control, users can control and monitor any Thermal Care equipment from any Internet-enabled device.

Wittmann Battenfeld is showing the Tempro Plus D mold-temperature controller (TCU) with new energy-saving SpeedDrive option—a variable-speed pump and the ability to set either motor speed, pump pressure, or differential temperature (ΔT). Also, its Flowcon Plus unit for monitoring and controlling water temperature and flow in individual mold circuits is now available as a stand-alone unit for use with any brand of injection machine.

Delta T Systems (***deltatsys.com***) will show its new variable-speed, water-cooled chiller at the booth of thermoforming equipment supplier Irwin Research & Development.

Engel (***engelglobal.com***) is using NPE2018 as the North American ►

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launch of its iQ flow control software. Considered the next step in Engel's bid to eliminate cooling errors, which the company believes have a disproportionate impact on scrap, iQ flow control builds on the company's flomo electronic water manifold system and e-flomo, which automatically sets the required flow rate for each temperature control circuit. New iQ flow control software networks the temperature-control unit (TCU), e-flomo, and injection machine together. Based on the measured values determined by e-flomo, iQ flow software controls the TCU's pump speed on demand. While e-flomo increases the process stability and consequently reduces the risk of rejects, automatic speed adjustment means the temperature control will require substantially less energy.

An essential element of this system is Engel's new e-temp TCU with variable-speed pump. It is built for Engel by HB-Therm (***hb-therm.com***).

The entire temperature-control process can be set up, monitored and logged on the Engel press's CC300 machine control. The control determines the ideal operating point for the temperature-control unit and sets it automatically. The various devices are networked with the press via OPC UA protocol.

Burger & Brown Engineering Inc. (***smartflow-usa.com***) says its NPE2018 booth will focus on three main objectives for injection molders: cooling water efficiency, quick mold change, and tooling protection. Its newest items are focused on cooling-water efficiency. These new products use the TracerVM electronics platform. The TracerVM Bluetooth Interface collects, transmits and saves flow and temperature data from up to eight TracerVM Base flowmeters installed in mold-cooling circuits. TracerVM Base Flowmeters purchased separately can be connected via cable to the TracerVM Bluetooth Interface.

The interface wirelessly transmits data to a mobile device up to 20 meters away, and the mobile app can display data from up to 30 interface units at one time. The app can create flow-condition data files, which can be saved onto a USB flash drive to document mold cooling-water conditions for process traceability.

TracerVM can also communicate over an Ethernet connection with a local network. Data Logger PC software, which is included with the interface, displays and stores temperature and flow data. While saving data files, the software enables customizable visual alerts for low- or high-temperature and flow-rate limits. By installing economical non-display flowmeters in the cooling line instead of flowmeters with individual displays, processors can save money with the TracerVM Bluetooth Interface, according to Burger & Brown.

The TracerVMA with AutoReg is a new automatic flow regulator that automatically adjusts flow rate to the required user-selected volume, regardless of changes in line pressure. This results in a more consistent flow rate with more control over cooling-water conditions in critical molding situations. The electronic control communicates with the valve actuator, which adjusts the valve opening to maintain the correct flow rate. Local or remotely mounted electronic control allows for convenient positioning. Electronic control may be mounted up to 9.5 ft away from the flow sensor and regulator.

Also making a U.S. debut from Piovan's Aquatech brand of industrial cooling is the Easycool+ line of air- and water-cooled chillers; along with Aryacool, a dry cooler that can meet the needs of various industrial processes; and DigitempEvo, which Piovan describes as its flexible heating/cooling solution.

Engel's iQ flow control software networks the new e-temp TCU with energy-saving variable-speed pump together with electronic flow-control valving and the molding machine controller for optimal cooling flow.

Frigel's (***frigel.com***) line of Microgel machine-side chiller/TCUs with digital controls now lets users capture, display and record historical process-cooling energy data. In addition to energy consumption, the Microgel's digital controls allow processors to review temperatures, pressures and flow rates. All operating data is stored in a historical log and are accessible via touchscreen. Processors can use the information to adjust the unit for specific molding conditions and optimal efficiency.

Thanks to what it calls the most efficient fan technology in the industry, AEC says its new High Efficiency central chiller can deliver users up to 60% in average energy savings. The chiller utilizes electrically commutated (EC) fan motors, which AEC says are more efficient than variable-frequency drives (VFDs) and fan staging across the entire load spectrum. Compared with VFD-controlled compressors, AEC says the High Efficiency central chiller is more efficient and less complex, generating the biggest savings when running between 40% and 80% of capacity.

Through Ethernet communications, the chillers can expand up to 10 modules with individual units ranging in chilling capacity from 20 to 60 tons. This redundancy allows process cooling to continue uninterrupted, virtually eliminating downtime. Chilling capacity can be expanded up to 600 tons by combining 10 modules under the same control. Designed to grow with a processor, the line controls off-tank temperature ranges of 20 to 80 F. The system's control uses a 10-in. color touchscreen, and the chillers themselves communicate with one another via Ethernet to maintain tank temperatures. Pass-through communication allows the system to skip a unit that is down, while not interrupting the connection to the rest of the system. If a unit does go down, the others automatically begin compensating to maintain the setpoint temperature. Redundancy is inherent in the chillers, which all boast two compressors. ►

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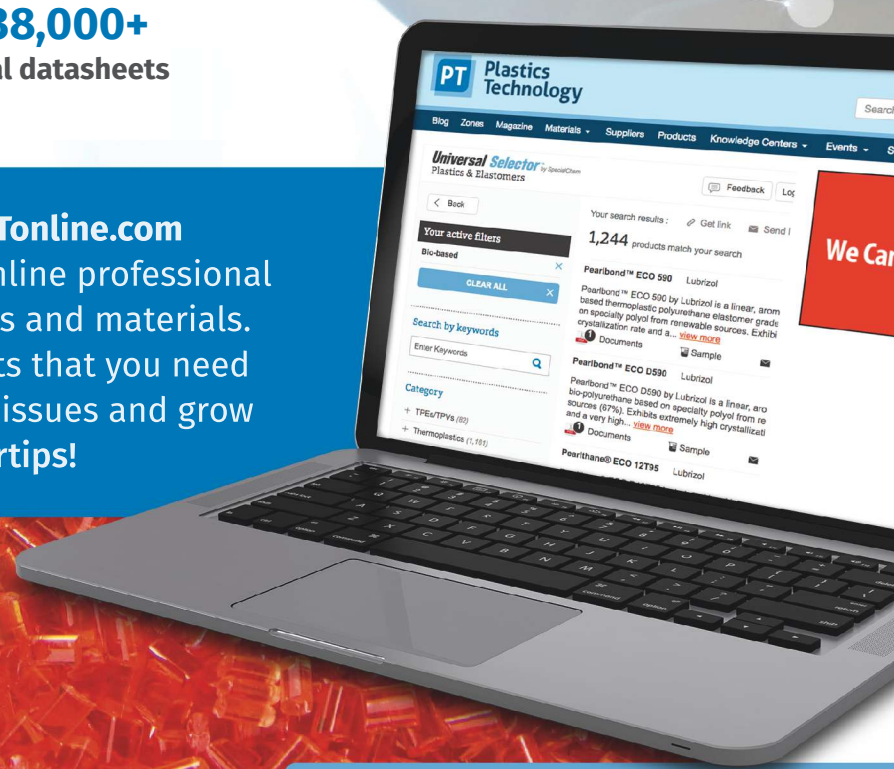

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AEC will also present a "Hybrid" freeze-proof adiabatic cooling system. This technology combines dry-air cooling during the cooler months of the year with fluid cooling during warmer months. AEC says the Hybrid adiabatic cooling system saves up to 95% in water use annually compared with a traditional cooling tower or a closed-circuit fluid cooler. Pulling outside ambient air across coils to remove heat when outside temperature is cool enough, the system only turns on fine misting nozzles when needed.

Maguire is introducing a compact system that combines loading, dosing, mixing and dispensing.

In addition to saving water, energy usage can be reduced by up to 86% versus packaged air-cooled chillers, according to AEC. Each fan of the system is cycled on and off to meet the cooling setpoint, using high-efficiency motors. Only the fans that are necessary to meet required temperature are used, which saves energy and also results in quieter operation and reduced fan maintenance. In cooler months, the system functions as a dry-air cooling system, operating a fan motor rather than a chiller compressor motor. A closed glycol loop means less maintenance for the freeze-proof system, reducing the amount of chemicals needed to run while also locking out dirt and dust.

Mokon brings an expanded line of its Iceman SC Series portable chillers to NPE2018, now offering units with cooling capacity up to 50 tons. Mokon says this larger size will allow customers to consider portable units for their cooling needs versus having to jump to larger, immobile central systems. The Iceman SC Series, which utilizes scroll compressors and air- or water-cooled condensers, now ranges in capacity from 0.5 to 50 tons. The fluid temperature range goes from 20 F to 65 F.

TESTING & MEASUREMENT

Elevating the process of materials testing will be the theme of Tinius Olsen's exhibit with the introduction of new scalable, fully automated robotic systems. According to the company (***tiniusolsen.com***), automation of materials testing is now viable for plastics processors who may have thought they needed a certain production volume to move away from manual testing. The company can deliver dedicated or combination systems that test tension, compression, flexion, or hardness.

A robotic system for materials testing can continue running all day and night, leading to gains against an operator of 59 hours a week, or 127 days over the course of a year. A scalable building-block approach allows Tinius Olsen to offer systems from very low-force applications, just a few newtons, to very high-force appli-

cations of a thousand kilonewtons or more. They can also use a single specimen-handling system with a robotic handling arm to feed more than one testing machine.

The company also has developed a streamlined design for its MP1200 melt indexer with selectable weights that reportedly makes the process of melt-flow testing a lot easier and quicker.

Mitutoyo's new hardness testers allow testing of an inside ring wall without cutting the ring.

Zwick USA (***zwick.com***) will introduce the Amsler HIT line of drop-weight testers, which feature an energy range of a few joules up to 100,000 joules, supporting tests on specimens as well as components. HIT1100F and HIT2000F units boast rapid change-overs through ergonomic features such as an integrated T-slot platform, which enables flexible fixture positioning to secure components and support a wide range of tests, often at angles smaller or larger than 90º.

The HIT600F tester addresses requirements for instrumented multi-axial puncture tests, according to ISO 6603-2 and ASTM D3763, but also a number of international specifications in the automotive industry that now stipulate slower speeds and call for relatively large drop weights. It also supports compression-after-impact (CAI) tests, Charpy, and Izod tests. Model HIT230F, with velocity of 4.4 m/sec and drop weights between 2 and 23 kg, is suited to puncture tests (ISO 6603-2) and CAI pre-damaging by a variety of standards.

A new series of hardness testers will be launched by Mitutoyo America (***mitutoyo.com***). The latest additions to the company's Rockwell hardness testers are the HR-530 (maximum specimen height of 8.46 in. and depth of 5.91 in.) and the HR-530L (specimen height of 15.55 in. and depth of 5.91 in.).

C.W Brabender (***cwbrabender.com***) will show its recently launched Meta Torque Plasti-Corder torque rheometer, which features Allen-Bradley PLC field technology, the RheoLink software program, and RFID self-recognition of attachments (e.g., mixers, extruders).

The latest addition to the MetaVue family of spectrophotometers from X-Rite Inc. (***xrite.com***) is said to be the first non-contact instrument for industrial applications that combines color imaging with spectrophotometry to characterize today's most complex materials, including plastics. MetaVue VS3200 is suited to lab or QC operations and offers high versatility and color accuracy for the measurement of plastic samples, liquids, powders and gels.

Konica Minolta Sensing (*sensing.konicaminolta.us*) will showcase its recently launched CM-25cG compact, hand-held spectrophotometer with specialized features for automotive interiors. The unit's circular optical system reportedly achieves the highest accuracy and repeatability levels, especially on textured or structured surfaces, regardless of measurement direction.

WELDING & SEALING

Rinco Ultrasonics USA (*rinco-usa.com*) will launch its new AGM Pro ultrasonic generator designed to be built into automation lines and special-purpose welding machines. The digital, Industry 4.0-capable device is an upgraded version of Rinco's current AGM ultrasonic generator and is reportedly well suited to semi-automated and automated applications in the automotive and packaging industries. Rinco will also unveil its Electrical Motion ultrasonic welder. Available in 20-kHz and 35-kHz, the new unit is said to move away from traditional pneumatic press systems to electrically driven machines. This system enables users to finely regulate the weld, using precise positioning of the horn, along with the applied welding force to the welding rate.

Emerson's Branson Ultrasonics Div. (*emerson.com*), will feature the latest addition to the Branson 2000Xc series ultrasonic assembly systems; it reportedly combines a small physical size, precise and consistent welds, and the process-control needs of today's manufacturing environment. The compact Branson 2000Xc 40-kHz MicroActuator measures only 2.76 in. wide × 25.98 in. high and provides 800W output. It locks in the welding process with electronic settings, hierarchical password protection, and Ethernet connectivity access.

Dukane (*dukane.com*) will highlight its newly introduced rotary infrared (IR) welding system that features multiple heating stations to reduce cycle time. The rotary IR welding system is designed for assemblies within a footprint of 7.87 × 9.84 in. that require a fast cycle. It provides non-contact IR welding and can produce welded assemblies as fast as 8 sec, compared with conventional IR welders that run on 30-40 sec cycles.

Herrmann Ultrasonics (*herrmannultrasonics.com*) will highlight the latest enhancements to its HiQ Vario series of ultrasonic welders, which boast significant reduction in setup and changeover times with features like the quick-change system (QCS), whereby the aligned weld tools can be changed to a new application in under a minute.

ITW Shakeproof (*shakeproof.com*) will feature its new Wercs Technology for design and manufacturing of threaded fasteners, allowing formation of unique geometries on the thread. Using the Wercs Technology, two new products have been created that increase performance of these fasteners: The BosScrew thread-forming screw for plastics is said to be the only screw specifically designed not to loosen in plastic applications; and GripTide insert, a low-cost steel insert for plastics that reportedly surpasses brass inserts in quality, cost and performance.

The Electrical Motion ultrasonic welder enables users to finely regulate the weld, using precise positioning of the horn, along with the applied welding force to the welding rate.

DECORATING, PRINTING, FINISHING

A versatile, high-performance, compact corona-treatment system will be showcased by 3DT Systems (*3dtllc.com*). PolyDyne Pro reportedly improves the surface tension on numerous materials resistant to printing, adhesive bonding and coating. The unit has multiple feedback devices for precise performance monitoring. Its generator and transformer are said to adapt to many applications, such as 3D plastic parts, cup treating lines, plastic sheets and foam.

Lectro Engineering (*lectroengineering.com*) will introduce the smallest Lectro-Treat open-air plasma surface-treating system. The unit is designed for applications where space is at a premium. The LT 2100VD surface treater is only 38 in. wide × 48 in. long, even smaller than a standard flame treater.

Matthews Marking Systems (*matw.com*) will exhibit seven marking systems: three laser inscribing units, one drop-on-demand (DOD) unit, and three thermal ink-jet units. All seven systems will be controlled by the company's MPREIA software.

Apex Machine Co. (*apexmachine.com*) and its sister companies Desco Machine (*descomachine.com*) and Capex Corp. (*capex.ink*) will showcase several of its popular and updated dry-offset printers including the C-400 cylindrical part printer, C-9 vertical syringe printer, DRCP-4 rotary closure printer, C-4000 sidewall printer, and S-11-C strap printer. PT

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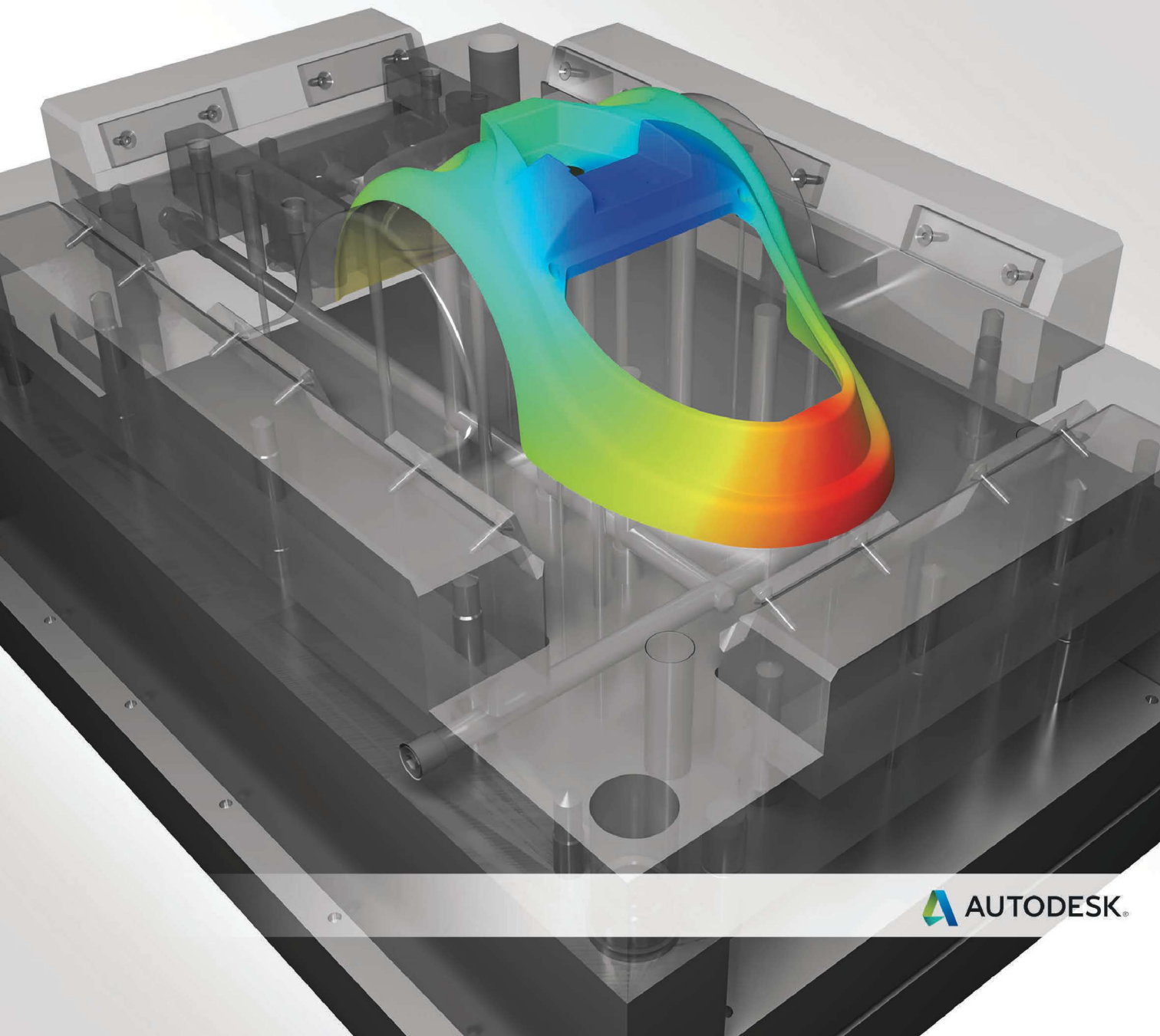

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INJECTION MOLDING AT NPE2018

A Showplace for the 'Smart Factory'

In Orlando, you'll glimpse the future, and it's automated and interconnected. But don't worry, there are plenty of ways for plants of all sizes to get in on these trends.

Processors will learn how the Industry 4.0 "smart factory" is a whole new ecosystem, as explained in this overview from the German machinery association (VDMA), which has been the driving force behind the trend.

By Matt Naitove
Executive Editor

You'll hear it over and over in Orlando next month. Exhibitors will say they're not selling products so much as *solutions*. By that they mean they're not there primarily to show you how to do what you're already doing today, just a little better or cheaper. Rather, their emphasis is on how to help you get where you want to be *tomorrow*.

Yes, there will be plenty of new injection machines that boast improvements in speed, energy efficiency, and versatility. But the main attraction at the show will be automated cells demonstrating advanced techniques suited to medical or automotive manufacturing, teletronics, packaging, and consumer products. And in many cases, the extra spice added to the recipe is elements of the evolving vision of the "smart factory" or "Industry 4.0."

NEW CROP OF INJECTION PRESSES

Before we get to the more elaborate demonstrations of automated manufacturing, let's look at some of the new machines at the show:

Four new models of economically priced machines from Absolute Haitian (***absolutehaitian.com***) boast enhanced clamp and injection specs, while also offering energy savings. Two of them are available now and two are still at the preview stage of development. Making its debut in the Americas is the Zhafir Jenius Series for large-part precision molding (506 to 3709 U.S. tons). Aimed particularly at automotive molders, the JE series combines an all-electric injection unit with a servo-hydraulic, two-platen clamp. Also new is a fast-cycling "2S" version of the Zhafir Zeres electric machine with integrated hydraulics for core pulls, ejectors and nozzle touch. The line extends from 44 to 1500 tons.

Arburg is launching its revamped machine design and Gestica controller in North America at NPE. First model is Arburg's largest ever, the 730-ton Allrounder 1120H.

The other two machines are previews of what's to come. There's a sneak peek at the third generation of the Haitian Mars servo-hydraulic line, the MAIII. The first model, a 192-ton MA1700 III, will become available in the Americas late in the year, with additional sizes available in 2019. Another preview is the third generation of the all-electric Venus Series. It boasts an upgraded clamp with "the industry's most generous tiebar spacing," according to the company, and increased injection-pressure capacity. On display will be the first model available later this year, a 101-ton VE900 III. The Venus III series will range from 45 to 899 tons (more details in Keeping Up).

U.S. molders will get their first look at Arburg's fully redesigned flagship machine series and its new controller (***arburg.com***). Introduced at K 2016 and now available here, the Allrounder 1120H is Arburg's largest machine ever, at 650 metric tons (730 U.S.), with 1120 mm tiebar spacing and 1050 mm stroke. Dry-cycle time is 2.4 sec. This hybrid press has an electric toggle clamp powered by twin servos, plus servo-hydraulic injection with a gas accumulator (see Jan. '17 K 2016 report). ►

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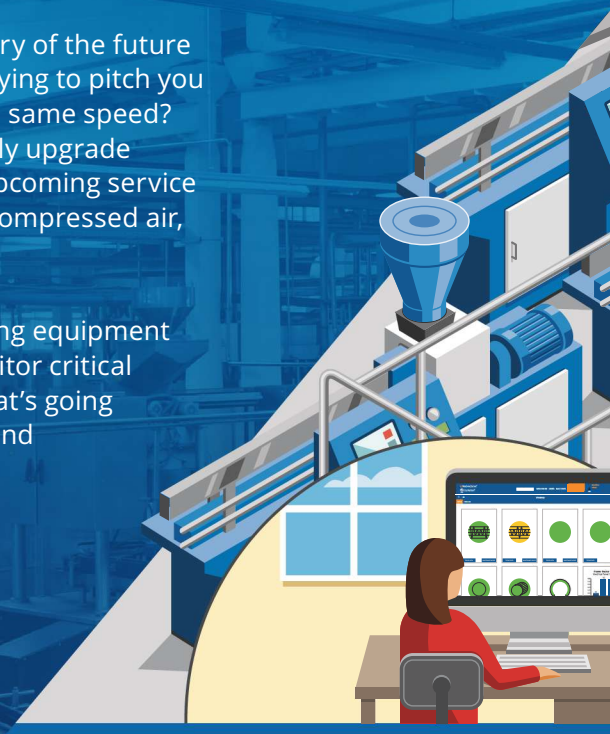

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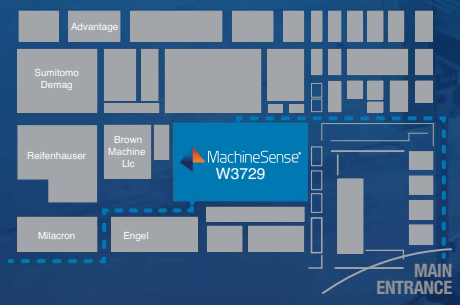

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This machine debuts the new Gestica control system, which will eventually replace the current Selogica controller. Its pivoting and height-adjustable operator panel has a smooth glass front that resembles a tablet computer and accepts multi-touch/gesture commands. The 15.6-in., full-HD screen has a new EASYslider element that allows fingertip dynamic control of machine movements during setup. Motions can be speeded up or slowed down with the swipe of a finger on the on-screen bar.

Two other models with the sleek new design and controller are already on the market, the Allrounder 920 H (500 m.t.) and 820 H (400 m.t.)—the latter will be unveiled at the Plast2018 show in Milan, Italy, in late May.

New presses will range from micromolders to 2250 tons, "the largest press ever run at NPE."

Bole North America (***bolenorthamerica.com***) will introduce two new series of Chinese-built machines. The FE full-electric, high-speed line comes in 110 and 180 m.t. and the servo-hydraulic EK series is available from 90 to 500 m.t. Both have a toggle clamp that applies force in the center of the platens rather than in the corners, along with floating tiebars, both of which are said to reduce deformation and wear. They also have KEBA touchscreen controls.

Chen Hsong of Hong Kong (***chenhsong.com.hk***) will be presenting two new lines of servo-hydraulic machines. One is the Supermaster two-platen series with fast clamp speed of 750 mm/sec, modular design, and Beckoff controls. A SM700 model will be shown, but the line ranges up to 7150 tons with 242-lb shot size.

The other new line is the Jetmaster MK6 toggle press with generous tiebar spacing, B&R controls, and "precision hydraulics," tuned for high accuracy without overshoots or fluctuations. Mold protection is reportedly so sensitive that it will not puncture a single sheet of letter paper. A JM208-MK6 will be displayed.

Asian Plastic Machinery of Taiwan, a subsidiary of Chen Hsong, is represented here by Cincinnati Process Technologies (***cinprotech.com***). CPT will be talking about (though not displaying) the new Super Master EV2 Series of servo-hydraulic toggle presses from 88 to 1099 tons (see January's Keeping Up).

Another new series of machines from Taiwan is the Rc-Series of two-component, servo-hydraulic toggle presses from Fortune International/Victor Taichung. In sizes of 180 to 450 m.t., they have a 180° rotating plate and either vertical or horizontal (L-type) second injection unit. The company also offers ES servo-hydraulic toggles from 50 to 1600 m.t. The new-generation V8800 control has a swivel-mounted, 15-in. touchscreen with internal memory for up to 1000 molds, USB port, and a single screen for setting clamp and ejector positions, screw retraction, injection, temperatures, and air eject. Data collection for production management and quality control is also provided.

A new "speed" option for medium-sized GX two-platen presses from KraussMaffei (***kraussmaffeigroup.com***) equips them for large packaging and logistics components. The GX-900 at NPE includes faster clamping speeds up to 0.45 sec. Injection speed can be up to 700 mm/sec. Faster cycles are assisted by an electric screw drive and the HPS high-performance barrier screw. The machine at NPE will mold two 5-gal paint pails with IML in under 14 sec.

Führung is a relatively new brand of Chinese injection machines from Ningbo Leadway Machinery Technology Co. (***fuhrung.com***). Its Blaze II servo-hydraulic toggle presses will be exhibited in Orlando. The line extends from 100 to 1300 m.t. Injection units ride on guide rails and have been strategically lightened to enhance acceleration response. The clamp has a wider and longer platen guide, T-slot platen for fast mold mounting, European-style ejectors, and three-color tower light with alarm.

Maruka USA will unveil two new servo-hydraulic presses from FCS in Taiwan. Making its North American debut is the GenII FA series (35 to 1565 tons) for fast-cycle precision molding. These toggle presses have increased injection pressures and larger tiebar spacing, as well as a KEBA i2880 touchscreen controller. Also new is the LA-SV two-platen series of 560 to 4070 tons. They boast increased clamp speed and the same KEBA controller.

Among five demonstrations of Toyo all-electric machines Maruka will provide an example of its new customization services. A recent project was the customized 150-ton Toyo Si-150-6 on display, which will mold golf tees.

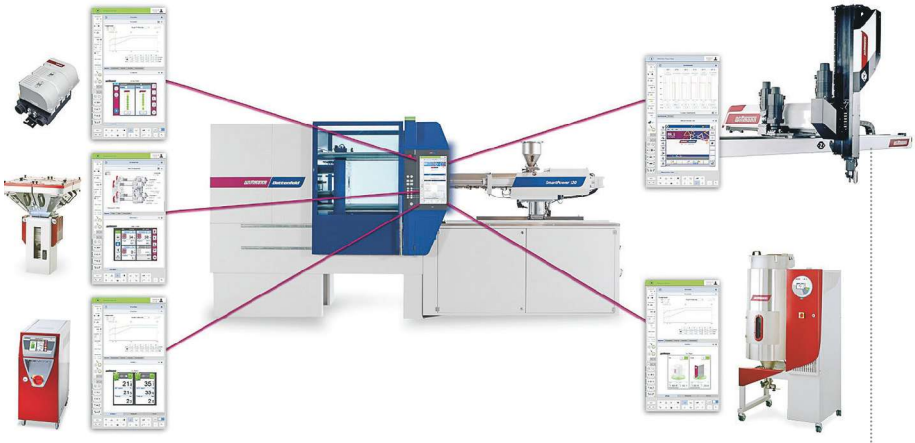
Milacron's theme is "going big" at NPE, emphasizing its expertise in high-tonnage presses—for example, it is building a 6600-ton Cincinnati two-platen behemoth for a North American molder. It will be hard to ignore another "beast"—a 2250-ton Cincinnati two-platen press that is claimed to be the "largest tonnage injection machine ever run at NPE." This new design is servo-hydraulic, with five servomotors controlling five gear pumps. This machine—sold to i2-tech Custom Injection Molders in Iowa—has an improved layout for enhanced access to eject and die areas. It will be molding a 10.5-lb ATV dashboard.

Milacron will debut the Quantum line of workhorse toggle presses with energy-saving servo-hydraulic pumps

Another example of "going big" will be the debut of the Milacron-Fanuc Roboshot 500—at 550 U.S. tons, it's the largest all-electric Roboshot machine yet. It has a tiebar spacing of 36.2 in. It will mold 24 detergent caps in 6 sec.

Meanwhile, Milacron will also introduce its new Quantum servo-hydraulic toggle line from 125 to 610 tons. This new "workhorse" series comes with Endura Touch control. A 260-tonner will be shown in a two-component application (details below).

NPE will be the U.S. debut of the high-speed Elios hybrid toggle line from Netstal (*netstal.com*). A 750-m.t. unit will mold 16-oz deli containers (473 ml) in an 8 + 8 stack mold on a 3.1-sec cycle. The new toggle clamp reportedly provides "the fastest dry cycle in its size class." It also boasts ample tiebar spacing and opening stroke, suiting it to stack molds. The clamp features electric traverse and hydraulic pressure buildup; screw drive is also electric, while injection is servo-hydraulically driven for speeds up to 2200 mm/sec, acceleration up to 20G, and reaction time of 11 millisec.



Among the many illustrations of Industry 4.0 at NPE, Wittmann Battenfeld will show this "Wittmann 4.0" cell in which control of numerous auxiliaries is thoroughly integrated with the injection machine's Unilog B8 controller.

Among seven machines on display by Nissei Plastic Industrial Co. of Japan (*nisseiamerica.com*) will be examples of two new lines. One is the servo-hydraulic FNX-IV series with the new TACT 5 controller. This new generation boasts "best-in-class" tiebar spacing and 100 mm greater daylight. The container mold running at the show in a 237-ton model would normally require a 386-tonner, Nissei says. The new control is designed for the "upcoming Industry 4.0 era"—it is reportedly compatible with communications standards for the IoT ("internet-of-things") enabled factory and it collects and analyzes quality- and production-management data.

Also new is the new-generation NEX-IV all-electric range from 33 to 397 tons. I has "one of the widest daylights in the industry" as well as the smallest footprint, Nissei claims. It has 100-mm longer daylight and a new toggle with linear guides that cuts mold open/close times by 5-20%.

Plustech, Inc. (*plustech-inc.com*) will show off its first Sodick all-electric machine, model MS100. This 100-ton, two-stage model uses the company's V-Line two-stage injection system A new toggle design is said to contribute faster cycles and energy savings.

Sumitomo (SHI) Demag (*sumitomo-shi-demag.us*) will bring 12 machines to NPE, eight of them in its own booth and four in others'. Seven of the 12 will be members of the latest SEEV-A all-electric toggle line, spanning the full size range (56 to 562 tons) of this platform. The larger models are aimed in part at automotive, due to their ability to carry larger, heavier and more complex molds. The company is also planning to introduce additional all-electric machines with mid-range clamp forces early next year.

Wilmington Machinery (*wilmingtonmachinery.com*) will be featuring its Lumina MP800 two-platen, 800-ton press with two-stage, screw/plunger injection and 44-lb shot capacity. With medium-pressure capability (10,000 psi injection), this machine offers flexibility for either solid or structural-foam molding (see Feb. '17 Keeping Up).

Wittmann Battenfeld (*wittmann-group.com*) is showing off a new machine, the EcoPower Xpress 400, a 400-m.t. all-electric press designed expressly for high-speed packaging and other thin-wall applications. It was previewed at K 2016 and became commercially available last fall (see more below).

Yizumi HPM (*yizumi-hpm.com*) recently revised several lines of machines specifically for the North American market (see Nov. '17 Close Up). NPE will feature three machines with "N" (for North American) designation: A 1200-ton, 240-oz DP-N series two-platen, servo-hydraulic model in a series from 550 to 3500 tons; a 360-ton, 34-oz A5-N series servo-hydraulic toggle in a line from 65 to 1125 tons; and a 65-ton, 2-oz model from the firm's newest all-electric FE-N series (65 to 290 tons).

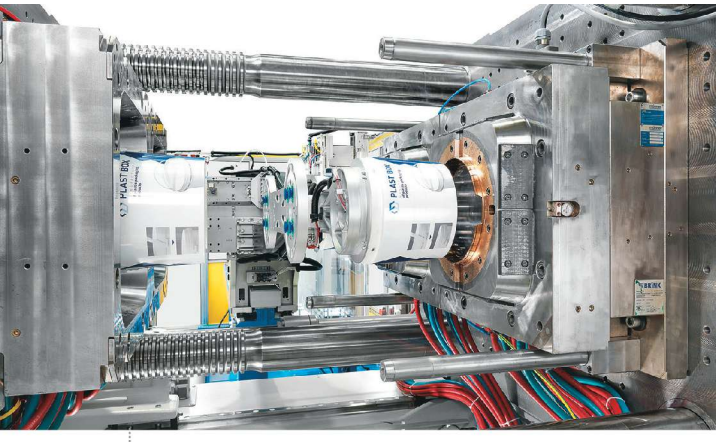
NPE is a prime opportunity for processors to find out what the move toward Industry 4.0 will mean to them.

SIZING UP THE '4.0' REVOLUTION

No single theme is likely to be more prevalent on the show floor than the "smart factory" movement known as Industry 4.0. NPE visitors are apt to be bombarded by messages heralding IoT (Internet of Things), Inject 4.0, Plastics 4.0, or any number of other "4.0" variants. North American processors, by and large, are expected to be still exploring what all this really means, and means to them, in terms of economic opportunity and technological risk. NPE will be the best opportunity yet in this hemisphere to find out.

Since makers of primary machinery, robots (see below), and auxiliaries are all eager to show how they are becoming "4.0 ready," only a few examples will have to suffice here. These examples address the three major elements of Industry 4.0: ►

- *Smart machines* capable of self-regulating processes.
- *Smart production*, in which machines and processes communicate and coordinate among themselves and communicate real-time data on production status to MES and ERP systems and production personnel. A key to this evolution is the widespread adoption of the OPC-UA protocol for data transfer between machines and auxiliaries and machines and MES or ERP systems.
- *Smart service*, involving 24/7 remote troubleshooting, online (and sometimes automated) ordering of spare parts, and new ways of monitoring machines—locally and remotely—for predictive/preventive maintenance.



Bucket makers, take note: KraussMaffei's GX 900 two-platen press with new "speed" option will mold two 5-gal paint pails with IML in less than 14 sec, using automation from Campetella.

In the "smart machines" category, KraussMaffei is featuring its APC+ adaptive process-control software that is intended to ensure consistent parts production by adjusting to changes in material viscosity and ambient conditions. The "plus" enhancement to the APC algorithm is the addition of a library of materials data—particularly melt density and melt compressibility, which are critical to consistent cavity filling and packing. KM is also highlighting its DataXplorer software that provides a nearly microscopic look at the process, enabling users to respond to unclear fault patterns.

In a similar vein, Engel will show off the capabilities of its iQ weight control (for uniform filling, regardless of viscosity changes); iQ clamp control (to save energy and mold wear by finding the minimal necessary clamp tonnage); and the U.S. debut of iQ flow control (ensuring optimum cooling in all mold channels without wasting energy). There is also iQ vibration control, which induces small counter-movements to balance robot shake and shorten cycles.

Engel is also emphasizing "smart service" with the North American launch of its e-connect customer portal for 24/7 customer service, and the newly developed e-connect.monitor predictive-maintenance program (see Starting Up).

Netstal will present its new e-service program for access to machine-specific documents and spare-parts ordering. Also on display will be the AnalytiX cloud-based production-monitoring system, accessed via an app for smartphone or tablet.

Wittmann Battenfeld will demonstrate its HiQ-Melt, HighQ-Flow, and HiQ-Cushion "smart machine" technologies as part of its "Wittmann 4.0" program. This firm is in the unusual position of making both injection machines and a full range of auxiliaries. It has therefore employed OPC-UA and other technologies to link all these devices with the aid of a secure Wittmann 4.0 router. This router is a key to Wittmann's "Plug & Produce" initiative, which makes it possible to store and recall all parameter settings for a particular job within the Unilog B8 machine control—everything needed to set up the molding machine, robot, dryer, chiller, TCU, and blender. This data also can be retrieved from an MES system.

Wittmann 4.0 integration will be demonstrated on six work cells at NPE, the most elaborate of them involving integration (via the Wittmann 4.0 router) of the robot, TCU, blender, Flowcon Plus electronic water-flow controller, HiQ-Flow and Cushion functions on the injection press, and two cavity-pressure sensors. Non-Wittmann units also integrated into the same network via the router and a Windows-based controller include a Gammaflux hot-runner controller, HRSflow servo controller for five valve gates, and Opti Check from Schneider Form, which measures the deflection of the mold during injection. This cell will also show the new CMS (Condition Monitoring System) for predictive maintenance.

As at the last NPE, Arburg will present its take on Industry 4.0 with a demonstration of individualized manufacturing that coordinates different machines and processes. Business-card holders will be molded and laser marked with a barcode label that provides access to production data for that part from a remote computer. Then the part is custom decorated by Arburg's freeformer 3D printer.

Industry 4.0 is not just a European or American phenomenon: Nissei will show off its "Visualization of Factory" program for using the injection machine to pull information from all connected devices, such as auxiliary equipment. An element of this system is the "PQ Manager," a quality- and production-management system that can monitor multiple machines.

In addition, Sumitomo has implemented myConnect internet access for customers to online support, machine documentation, spare-parts ordering, and management of service and maintenance.

Another new Industry 4.0 solution is Smart Attend production monitoring from a new company (***smartattend.com***) of the same name (see Close Up in this issue).

MEDICAL IS A MAIN ATTRACTION

Medical devices and disposables remain an especially attractive market for plastics—and plastics machinery. At least eight press makers will address this market with molding demos. Engel, for example, will repeat an impressive feat from K 2016 (see Sept. '16

feature) by molding eight interdental brushes, each with up to 500 tiny bristles, and a total shot weight of only 1.93 g. KraussMaffei will mold LSR medical parts (see below). Netstal will run pipette tips in 128 cavities at a cycle time of 5.6 sec. Sumitomo Demag will mold eight thin-wall medical dosing cups in 3 sec. Wittmann Battenfeld will mold PP pipettes in eight cavities on an EcoPower all-electric "cleanroom machine." And Absolute Haitian will run an in-dwelling needle body of cellulose acetate proprionate in eight cavities. Other medical molding exhibits will be presented by Arburg, Boy, and Yizumi-HPM.

HIGH-SPEED CAP MOLDING DAZZLES

A second area of market focus among the injection molding exhibits is high-speed packaging production—of caps, in particular, using beefed-up all-electric or hybrid machines. For example, Engel will mold 26-mm HDPE beverage caps with tamper-proof bands in a 96 cavity mold in 2 sec on its all-electric, 460-ton e-cap system. Wittmann Battenfeld will run a 96-cavity mold for still-water caps with an expected cycle time of 2.56 sec on its new 440-ton all-electric EcoPower Xpress (see above). Sumitomo Demag will run 72 high-precision water caps on its El-Exis SP 300 hybrid on a 2-sec cycle. And Jon Wai of Taiwan (***jonwai.com***) will run its "Cap Solution" on a 220-ton machine, producing 48 caps in 3.06 sec.

IN-MOLD LABELING & DECORATING

At least six machinery OEMs will highlight the growing popularity of in-mold labeling and decorating (IML, IMD). For the first time in North America, Engel will demonstrate the Decoject IMD process that was first shown at K 2016. Aimed at auto interiors, this automated cell feeds a thin TPO film from a roll into a mold, where it is back-injected with PP and punched out of the roll. The part gets a laser trim after demolding. The film imparts color, texture, gloss, and feel, so a variety of parts can be made simply by changing films.

Other exhibits will address IML for packaging, where speed is of the essence. Arburg will use a "packaging" version of its Allrounder 570 H designed for thin-wall molding to produce four PP tubs with IML in just 1.9 sec. The decorated parts have a wall thickness of 0.0126 in. and weigh 0.12 oz. Mold and automation are from Brink B.V. of The Netherlands (***brinkbv.com***).

Italian IML automation specialist Campetella will show IML capabilities at KraussMaffei and its other robots in three more booths at the show.

KraussMaffei's GX 900 two-platen press with new "speed" option (see above) will mold two 5-gal paint pails with IML in less than 14 sec, using automation from Campetella (see robot section).

A Netstal all-electric Elion 1200 (120 m.t.) will produce single-serve coffee capsules of PLA biopolymer (with PLA labels from Verstraete) in four cavities and in 6-7 sec, using robotics from Beck Automation, at whose booth the machine will be running.

Another Netstal machine (Elion 3200 hybrid) will produce four rectangular containers with IML in 3.9 sec, using robotics from CBW Automation, at that company's booth.

Sumitomo Demag will use injection-compression molding with IML to produce a thin-wall food-container lid on a 4-sec cycle.

Nissei's IML demo will label two-cavity drinking mugs using its new NEX-IV all-electric press (397 tons).

Asian Plastic Machinery will exhibit one of its top-of-the-line TSV servo-hydraulic toggles running IML.

LSR IN THE SPOTLIGHT

Undiminished interest in liquid silicone rubber will be evident in molding demonstrations by at least eight injection machine builders.

Arburg will show two examples of two-shot LSR/LSR molding—one producing a watch strap in two colors and durometers, and another making a dual-durometer membrane for valves used in medical and automotive applications. The latter will use Arburg's 0.1-oz micro-injection unit with a 0.3-in. screw diam. to produce one shot of 0.0018 oz, followed by a second shot from a servo-electric injector from Kipe Molds (***kipemolds.com***).

The largest press from Boy Machines, Boy 100E (110 tons) will produce LSR protective sleeves for cable ends in a 128-cavity mold from Elmet (***elmet.com***).

Engel is showing for the first time a particularly complex LSR application—automotive headlight lenses with light guides. They will run on a 120-ton, tiebarless, all-electric e-victory machine with a metering/pumping system and two-cavity mold from ACH solution in Austria (***ach-solution.com***). The mold uses a new ACH ServoShot cold-runner valve-gate system with valves that are pneumatically actuated but the pin strokes are set electrically. All the valve gates open together, but varying the pins' open positions adjusts the flow through each valve gate. Parts will be checked via integrated camera inspection and will be weighed individually. The ServoShot software then will adjust the pin openings to balance the fill and equalize the weights ►

in the cavities. The entire cell, including LSR dosing, is handled by the Engel CC300 controller.

KraussMaffei will mold LSR medical dosing caps, or "duckbills," on its PX 51-55 SilcoSet all-electric machine.

Maruka will mold LSR magnifiers on a Toyo Si-110-6.

Milacron will run LSR on a Milacron-Fanuc Roboshot 140. The retrofittable LSR package includes a special Milacron screw and barrel with water jackets, vacuum pump, and water regulator.

Nissei will team up two presses to mold a magnifier. The thermoplastic casing is made in a new NEX-IV all-electric press (121 tons), and then a robot passes the part to a FNX-II hybrid (121 tons) to overmold the LSR lens.

Meanwhile, CAE simulation software provider Sigma Plastic Services (***virtualmolding.us***) will demonstrate an unusual two-color LSR molding application with cooperation from Arburg, material supplier Momentive (***momentive.com***), tooling and dosing equipment supplier Elmet (***elmet.com***), and fluid mold-temperature control from Conair (***conairgroup.com***). In a demo previously run at K 2016, white and yellow LSR are run in a 4 + 4 cavity Elmet mold using that company's new TOP5000 dosing system. Its closed-loop controls document the amount of colorant used, which is particularly relevant to the healthcare industry. The remarkable hardware system allows for two-component molding on a one-component injection press with only one LSR dosing system. (To find out how it's done, see it at NPE and Feb. '17 Starting Up). In this project, Sigma used its Sigmasoft Virtual Molding software to determine the filling time, injection pressure needed, and the optimal material grades. Sigma's LSR simulation can show air temperature at the vents, flow lines during fill, and percent cure to indicate when parts can be ejected.

MICROMOLDING IS BIG

The ongoing trend to miniaturization in medical, electronic, and micro-mechanical devices is increasing the demand for micromolding. At least six machine builders are responding to that demand at NPE.

Arburg is doing so with an LSR micromolding demonstration, noted above. Boy Machines is showing its new Boy XXS micromolder, introduced at K 2016, with 7-ton clamp and shot capacity up to 9.3 g. This all-electric, tabletop unit permits off-center gating, adjustable vertically by up to 25 mm. Integral sprue and parts pickers are mounted under the safety gate.

A new generation of its M3 micromolding system will be launched at NPE by MHS Mold Hotrunner Solutions (***mhs-hotrunners.com***). The new model M3-D08 is a compact, self-contained electro-pneumatic molding cell for molding direct-gated parts from 0.001 to 0.400 g with a gate diam. as small as 0.5 mm (0.0197 in.). Clamp force is 4 m.t. Valve gating allows molding of two different parts with different weights at the same time. Integrated automation provides hands-off parts handling and takeout.

Nissei will show a 7.8-ton NPX7 servo-hydraulic micromolder; and Plustech's flagship micromolding machine, the Sodick GL30A-LP (30 tons), will be running in the booth of hot-runner supplier Technoject. Sumitomo Demag plans a micromolding demonstration of a DNA-free sample collection tube with a wall thickness of 0.250 mm. And Wittmann Battenfeld will show for the first time in the U.S. its two-shot MicroPower 15-ton electric machine (see last month's Keeping Up).

Medical applications will be a major focus among molding exhibits. Engel may claim the trickiest application—this interdental brush molded in eight cavities, each brush with up to 500 tiny bristles, with a total shot size less than 2 g.

MULTICOMPONENT DEMONSTRATIONS

NPE will also reflect the trend to combining different colors and materials in the mold. Among the multicomponent demos running at the show will be LSR/LSR applications at Arburg and Sigma Plastic Services; and two-component micromolding at Wittmann Battenfeld (see above). Fortune/Victor Taichung is introducing a series of two-shot presses, noted above.

KraussMaffei is enhancing its FiberForm thermoplastic composite technology by overmolding composite sheets with both a rigid thermoplastic and soft-touch TPE, producing an auto armrest on a GWX 450 press with a swivel plate.

Use of retrofittable secondary injection units to convert standard machines to multicomponent molding will be shown by Boy Machines. A Boy 60 E will produce a wine-bottle spout by overmolding NAS styrene-acrylic with TPE using a Boy 2C S auxiliary injection unit. And Milacron will run one of its new Quantum toggle presses with a Mold-Masters E-Multi auxiliary injector to make a two-color, double-walled drinking cup. E-Multi also figures in Milacron's new Kortec Connect program, which allows running Kortec co-injection hot-runner systems on a standard press with a secondary injector added. Kortec technology produces three-layer barrier containers or preforms for stretch-blow molding.

Two other firms highlighting barrier co-injected preforms at the show are Netstal and Husky Injection Molding Systems (***husky.co***). At a second booth in the Bottle Zone, Netstal will show off the Prelactia system for three-layer light-barrier PET preforms for UHT milk (see Sept. '17 Keeping Up). And Husky will be talking about its multi-layer co-injection technology that made a big splash at NPE2015.

SPECIAL PROCESSES

Apart from KraussMaffei, mentioned above, one other composite molding demo will be run by Arburg, which is showing off its Fiber Direct Compounding (FDC) system, which feeds continuous glass rovings into a side feeder on the injection barrel with an integrated cutter. This allows direct control over fiber length and concentration, and costs less than long-fiber pellets. Arburg says some of these systems have been sold in Europe and the U.S. for automotive use.

Physical foam molding, also seeing increased attention in the marketplace, will be running at several booths in Orlando. New developments include the U.S. debut of the Plastinum foam injection molding process from Linde LLC (***lindeus.com***). This process, seen first at Fakuma 2017 (December Starting Up), involves impregnating plastic pellets with carbon dioxide gas in a pressurized chamber, or autoclave. Gas-loaded pellets can then be conveyed to the hopper of one or more molding machines. The hopper is not sealed or under pressure, since gas will remain in the pellets at ambient conditions for 4-6 hr. No modifications to the injection press are required, except for use of a shutoff nozzle.

New technology for physical foam molding will be announced by Trexel (***trexel.com***), which will unveil new dosing equipment that allows thin-wall molders to lightweight products more than ever before. The new MuCell P-Series delivers nitrogen under pressure as a supercritical fluid; it is able to do so at ultra-fast cycle times not previously possible with Trexel's T-Series dosing equipment. Now, thin-wall packaging molders can achieve 6% lightweighting, 7% faster cycles, 30% lower clamp tonnage, and 12% lower injection pressure, according to Trexel. Other benefits are increased L/T capability and ability to fill from thin to thick in order to produce a stiff rim for sealing. Trexel will demonstrate molding what it calls a "groundbreaking" 6-oz (200-ml) yogurt cup with IML Using StackTeck TRIM technology (***stackteck.com***), it will have wall panels only 0.008 in. (0.2 mm) thick.

Trexel will also announce what it calls "the first-ever design service dedicated to foamed components." 2Limit is a joint venture of Trexel and GK Concept of Dresden, Germany (***gkconcept.de***). This venture is intended to fill a gap in the marketplace, making it easier to find design engineers skilled in foamed part design and its departures from conventional design for injection molding.

MuCell microcellular foaming will be seen at several more booths besides Trexel's: Engel will use MuCell together with its DecoJect IMD process (see above) to provide uniform low-pressure packing to reduce stress on the thin in-mold TPO film and avoid sink marks and read-through of mold features.

Milacron will use MuCell to mold an SUV door panel using its "Core Back/Reverse Coining" technique, whereby the mold is closed and then opened to a predefined position to allow foam expansion. And Yizumi-HPM will use MuCell to mold a protective briefcase with Yizumi's FoamPro technology, which combines MuCell with rapid-heat/cool mold technology. This part will show a range of surface textures, from leather-grain to high gloss, with the aid of a hot/cold TCU from Single (***single-temp.com***).

Milacron will achieve a Class-A surface on its MuCell foamed part using Roctool Heat & Cool technology. Roctool technology (***roctool.com***) will also star at KraussMaffei's booth, where heat/cool molding with induction mold heating on a 16-cavity tool will produce plaques with 16 different surface qualities—glossy, matte, hologram, etc.—in a single shot. (In its own booth, Roctool will mold a complex 3D housing with very high surface quality.)

ROBOTS & AUTOMATION IN STARRING ROLE

The networked "smart factory" of the future would be nowhere without the aid of robotics and other automation. So expect to see hundreds of these devices put through their paces at every injection molding demonstration and at the booths of robot vendors. You'll find top-entry and side-entry models; three-, five- and six-axis types; plus SCARA and collaborative versions. Servo drives will be the rule, even for many sprue pickers.

Yushin's new FRA servo robots have active vibration control and new E-touch V controller that accepts gesture commands like a tablet or phone and also sends production data to the cloud.

One area of emphasis will be in-mold labeling (IML). Absolute Robot Inc. (ARI) will take its first step into IML with a side-entry system from Well-Lih in China, running a four-cavity PP yogurt-cup mold. According to ARI (***absoluterobot.com***), its IML systems perform in the same league as industry-leading competitors, but at 20-30% lower price. ARI is offering top-entry and side-entry IML systems for overall cycle times down to 3 sec and with mold-open times as short as 1.8 sec. This IML demonstration is meant to show that ARI can handle complete turnkey systems with robot, EOAT, label magazine, height-adjustable frame, and options like vision and stacking parts either bottom-up or bottom-down.

Another new name in IML to most U.S. molders will be Campetella Robotic Center of Italy, represented here by Hunter ►

Automation & Robotics (***hunterrobot.com***). Campetella specializes in IML with high-speed side-entry robots. In Europe, it has collaborated in IML projects with machine suppliers such as Arburg, Engel, KraussMaffei, Netstal, Toyo, and others. It has supplied a complete lights-out IML system in Italy for 5700 food trays/hr, molded on a 550-ton press in 5 sec, with secondary automation for checking label position, barcode verification, and stacking in boxes with protective PE film. At NPE, Campetella will provide the Maxi Modula side-entry robot for an IML demonstration at the KraussMaffei booth, molding two 5-gal paint pails in under 14 sec.

Beck Automation of Switzerland (***beck-automation.com***) will show for the first time in the Americas an IML system for single-serve coffee capsules. Both the capsules and the labels (from Verstraete) are of PLA biopolymer. The four-cavity mold will run at 6-7 sec on a 120-m.t. Netstal Elion 1200 all-electric press.

CBW Automation (***cbwautomation.com***) will supply robotics for molding four IML rectangular containers in 3.9 sec on a Netstal Elion 3200 hybrid press.

Ilsemann Automation of Germany (***ilsemann-automation.com***) will apply IML to a yogurt cup at the Trexel booth in a demonstration of a new thin-wall foaming process (see above).

Made in USA: Sepro America will show one of its first domestically built large robots, this five-axis 7X-45 model with Stäubli servo wrist.

'COLLABORATIVE' GAINS MOMENTUM

"Collaborative" robots, or cobots, that can operate safely in proximity to humans are gaining applications in plastics. One pioneer in this category, Rethink Robotics (***rethinkrobotics.com***), will show off its one-armed Sawyer cobot with two recent enhancements. One is the ClickSmart gripper kits that can be switched out and automatically sensed by the robot in seconds. Second is Intera 5.2 software with Intera Insights, said to be the first cobot software to display real-time manufacturing data such as cycle time, part count, speed and force on a customizeable dashboard.

A new addition to the growing ranks of cobots is the OB-7 seven-axis model from Productive Robotics (***productiverobotics.com***). Like others of its ilk, it requires no programming, as it "learns" by lead-through teaching. See it at the booth of Yushin America (***yushinamerica.com***), the new exclusive distributor for the OB-7. The cobot has an 11-lb payload capacity and 1-m reach with 0.1-mm accuracy. It is available on a rolling stand and is suited to loading, unloading, part removal, packaging, palletizing, QC measuring, testing and inspection.

Other suppliers of cobots at the show include Universal Robots (***universal-robots.com***), Fanuc America, and Stäubli.

MORE NEW ROBOTS

Arburg's newest robot (also seen at K 2016) is the Multilift V 40 top-entry linear servo model with 88-lb payload capacity.

Boy Machines will be showing for the first time in the U.S. its LR 5 top-entry servo robot. It's integrated into the Procan Alpha machine control, which is said to make it easy to move the robot program from one press or robot to another. It comes with a rotating and swiveling gripper hand and safety enclosure. Payload capacity is 11 lb. Boy will also show its three-axis pneumatic picker, also programmable through the Procan Alpha control.

As noted above, U.S. molders will have a chance to acquaint themselves with Campetella Robotic Center in Italy, and not just for IML automation. Campetella offers a full line of top-entry and side-entry, all-servo linear robots with three or five axes, and servo sprue pickers, for machines from 30 to 5000 tons. Its robots are said to be very quiet, greaseless, and low-vibration, as well as universal—their modular design can be switched from operator side to non-operator side or T-beam mounting in just 2 hr, the company claims. They also can be moved easily from machine to machine. In addition, these robots are compact: A side-entry model reportedly takes up the same space as a top-entry model from other suppliers. Prices are said to be competitive, but Campetella models are described as "fully loaded" with features that are normally options. The company notes that its servo systems use about 10% less energy by recovering kinetic energy during braking of each axis.

Campetella will have its own booth with an Engel machine molding four airline cups in under 3 sec. An SM2 side-entry robot with servo wrist and vision capability will demold the parts. Also on display will be the new Spin X-Series four-axis SCARA robot for stacking parts. It has payload capacity up to 110 lb and vertical z-axis up to 3300 mm.

There will be Campetella robots at two other booths: JSW will use a new X-Series Gunshot ultra-high-speed, top-entry model to demold two food containers with lids in under 3 sec. And Maruka will run a Toyo press molding flowerpots in four cavities with an X-Series MC-2 HS high-speed top-entry robot.

CBW Automation will introduce two side-entry robots that allow users to change quickly from one product to another in as little as 10-30 min. CBW has changed the way the vacuum system is connected and added new programming that allows processors to store the recipe for

each mold. These features are said to help users automate lower-volume jobs and reuse automation for multiple applications.

One system on display uses a BeeLine B-Series robot to demold parts from a 2 × 4 injection-compression stack mold. The press will run a 4.5-sec cycle with a 0.6-sec robot intrusion time. Like a top-entry robot, the B-Series has a strip stroke with high-vacuum part removal and "part missing" vacuum sensing. The robot also has an adjustable centerline height to accommodate different molding machines. A universal "pick" allows the robot to demold parts from either face of a stack mold.

A CBW Advantage robot will be running at the KraussMaffei booth on a Netstal Elios 7500 machine running a 2 × 8 stack mold for 409 containers in under 3 sec.

Engel will highlight its self-contained automation module, dubbed easicell, which is an enclosure with an easix six-axis robot, ready to interface to a molding machine or downstream units.

For assembly, testing, inspection and packaging, Fanuc America (***fanucamerica.com***) will debut two new SCARA robots. They boast an ultra-compact, lightweight design and are said to "represent the next level of speed and precision for assembly and material-handling applications." The two models are SR-3*i*A, with 3-kg payload and 400-mm reach, and SR-6*i*A, with 6-kg payload and 650-mm reach. Both utilize the new R-30*i*B Compact Plus controller and the new web-based *i*RProgrammer user interface for easy robot setup and programming on a tablet or PC (teach pendant optional).

The LRX 150, one of a new generation of linear robots, will be shown by KraussMaffei. It has 33-lb payload capacity.

Sepro America (***sepro-america.com***) is marking a new phase of its business growth with the display of one of the first Sepro robots "made in America." Sepro America is now building large Cartesian robots in Warrendale, Pa. The five-axis 7X-45 model on display (equipped with a Staubli servo wrist) is one of the first of 40 large robots planned to be built there this year.

Other news from Sepro includes retrofittable apps for its Sepro Visual controls, such as OptiCycle, a "plug-in" that uses "expert logic" to help users optimize robot and machine cycles, achieving up to 40% faster robot in/out cycles and 5-10% shorter overall molding cycles. Another new app is Live Support, which links robots with remote troubleshooting assistance.

Sepro will also show six-axis articulated-arm robots, including a 6X-170, one of the smaller Yaskawa-Motoman units added to Sepro's line last year.

The highlight of Stäubli's booth (***staubli.com***) will be a fully automated demonstration cell for quick mold change. Networked Industry 4.0-compatible components coordinate the robotics, sensors, magnetic clamping, rapid connection devices, robot tool changers, trolleys, and electrical connections. The system detects the condition of the mold, the force of the magnetic clamping, and numerous other factors; so that any fault, such as failure to reach correct operating temperature, is recognized early.

Wittmann Battenfeld will be showing two new robots: At the high end is the new X Series, which are essentially the company's previous top-of-the-line pro series with the addition of the R9 control introduced last fall. The R9 retains programming look and feel of the preceding R8 model, but the pendant has a larger screen, is lighter and easier to handle, accepts gesture commands like a tablet or smartphone, and has membrane keys for essential inputs. The R9 is now standard on all Wittmann robots, including the new Primus 14, one of a new economical series of servo robots for relatively simple pick-and-place applications. Primus 14 carries 4.4 lb.

Testimony to the growing role of "collaborative" robots, Yushin has become exclusive distributor of the OB-7 cobot from Productive Robotics.

"More agile, smarter and faster" are said to describe the new top-of-the-line FRA series linear servo robots from Yushin. Three models are suited to presses from 50 to 600 tons. Their brand-new E-Touch V controller accepts tap and swipe gestures. It has a dual screen that splits the information content for greater convenience in programming without the need to switch screens. Frequently used functions are grouped in one main screen, while users can assign certain I/O signals or buttons to the sub-screen.

The FRA is equipped with new patent-pending features such as Active Vibration Control, which actively dampens vibrations based on sensor signals, as well as Arc Motion Control and Adaptive Motion Control. It also comes with DeviceNet, EtherCAT, and EtherNet/IP protocols to interface with and control all downstream equipment. Available on the FRA series is Intu Line, a cloud-based service that collects and communicates production data from the molding cell, along with real-time video footage of part takeout and handling. A production manager can connect to the FRA robot via Intu Line anywhere and anytime to monitor production. Production reports for a day, week, or month can be downloaded with one click. The same information can be accessed remotely by Yushin technicians to monitor and diagnose problems. Yushin will demonstrate Intu Line by accessing production data from all FRA robots running at the show on a smartphone. Two FRA robots will be running at Yushin's booth and others at Maruka/Toyo, Nissei America, and Toshiba. Yushin says Intu Line adds to the Industry 4.0 features of its robots—remote troubleshooting, predictive maintenance, integrated controls, and smart sensor protocols. PT

EXTRUSION/COMPOUNDING AT NPE2018

More...More...More!

More speed, flexibility and robustness. Across a gamut of extrusion applications, machine builders are introducing new machinery, components, and systems to dramatically raise the bar on productivity.

Windmoeller & Hoelscher's TurboClean quick-product changeover technology is now retrofittable to certain other of the supplier's Varex blown-film systems.

Extrusion processors want more. That's evident by what suppliers of extrusion and compounding systems and equipment are bringing to NPE2018. Here a guide to what's new in extrusion and compounding at the giant show, divided by product and process type.

By Jim Callari,
Editorial Director

NEWS IN SINGLE-SCREW EXTRUDERS

Davis-Standard (***davis-standard.com***) says the star of its NPE booth is a running TPE tubing line that shows the benefits of preventive and predictive maintenance as part of a global trend toward the "smart factory." Davis-Standard (D-S) will provide real-time examples of the advantages of this technology, including direct e-mail notifications to customer PCs, tablets or smart phones during the show. The line will be processing TPE tubing for industrial applications and will feature the company's newest Thermatic extruder design along with the DS eVUE II controller.

Examples of preventive-maintenance monitoring include vibration, oil composition, motor parameters, heater status, screw wear and energy consumption. As part of this package, the line will feature Davis-Standard's latest drive technology to provide notification of potential drive issues. The 2.5-in. Thermatic is an upgraded model with enhancements in gearbox design, barrel cooling and vent-diverter geometry.

Davis-Standard will be operating a TPE medical tubing line at its booth.

D-S will also be showing a next-generation 2.5-in., direct-drive, grooved-feed extruder featuring its proprietary Helibar design. This machine has a grooved intake zone and helically grooved barrel, along with new barrier-mixing screw technology. This barrel and screw combination offers increased processing flexibility due improved pressure stability and tolerance for higher regrind levels. It also enables processing of a wider range of polymers at lower pressure and with improved energy efficiency.

The Helibar design is also said to be advantageous in terms of higher throughput, improved melt-pressure buildup, lower melt temperatures, improved melt homogeneity, reduced barrel wear, and shorter residence time. This extruder is said to be suited for pipe, profile, sheet, and blow molding.

The Super Blue extruder line will also be featured at the show. D-S says this extruder series offers processors the ability to switch among D-S feedscrews while offering a low-noise, a double-reduction gearbox, minimal maintenance, and consistent production rates. It is available in sizes from 2 to 4.5 in., each with the option of a 24:1 or 30:1 L/D. At NPE2018, the Super Blue will be equipped with the DS-eTPC II, the second generation of Davis-Standard's touch-screen control.

This controller is aimed at pipe, profile, tubing, elastomer, wire/cable, sheet, and reclaim extrusion. Notable enhancements include a larger, 15-in. viewing screen with multi-touch capabilities for zoom-in and out, control of up to three extruders, and real-time and historical data trending.

Graham Engineering Corp. (***grahamengineering.com***) will be displaying a 2.5-in. (63.5-mm) American Kuhne Ultra extruder with XC100 Navigator control, and a 3.5-in. (99-mm) extruder with XC200 Navigator control. Graham has made improvements to its Ultra extruders to simplify maintenance. Examples are newly designed barrel covers that allow for quick and easy access to barrel heaters

and thermocouples, and an automotive-style wiring harness with quick-change plugs for routing wiring and thermocouples from the electrical cabinet to the barrel-heater/cooling zones.

Navigator controls were originally developed for Graham Engineering extrusion blow molding systems and then adapted for Welex sheet extrusion lines. There are three levels of functionality: XC100 for stand-alone extruders; XC200 for one or more extruders in simultaneous operation; and XC300 for integrated production lines with the extruder and downstream components such as a puller, water bath, or winder. All three controls will be shown on American Kuhne extruders.

New pellet dryer meets the challenge posed by steady growth in use of glass-filled and other abrasive materials by substantially reducing the time and cost associated with replacing wear parts.

Graham will also display an American Kuhne three-layer medical tubing line, consisting of modular micro extruders, an American Kuhne AKcent coextruder, and XC300 Navigator with integrated TwinCAT Scope View high-speed data-acquisition system. This versatile customized system is available in fixed horizontal versions or units that can be fully tilted from horizontal to vertical. An EZ-Tilt feature makes angular adjustments quick and easy. The control panel is on located on an arm mounted to a ground post allowing the panel to swivel around the post for flexible positioning.

At its first-ever NPE, US Extruders (***us-extruders.com***) is showing a new generation of highly engineered, custom single-screw extruders. On display will be 2.5-in., 24:1 and 3.5-in., 24:1 extruders, as well as a compact custom medical extruder. The 2.5-and 3.5-in. extruders feature a unique heater-shroud design made of individual stainless-steel shrouds that provide quick access to each zone. Dual-layer stainless steel keeps the exterior relatively cool to the touch. Thermocouples go through the side for easy replacement. Each shroud includes an adjustable exhaust deflector. Integral wireways are also built in to provide a clean look and easy access to wires.

Machines on display at US Extruder's booth will have a C-clamp with an easy-open, over-center lever and thumb-release safety lock.

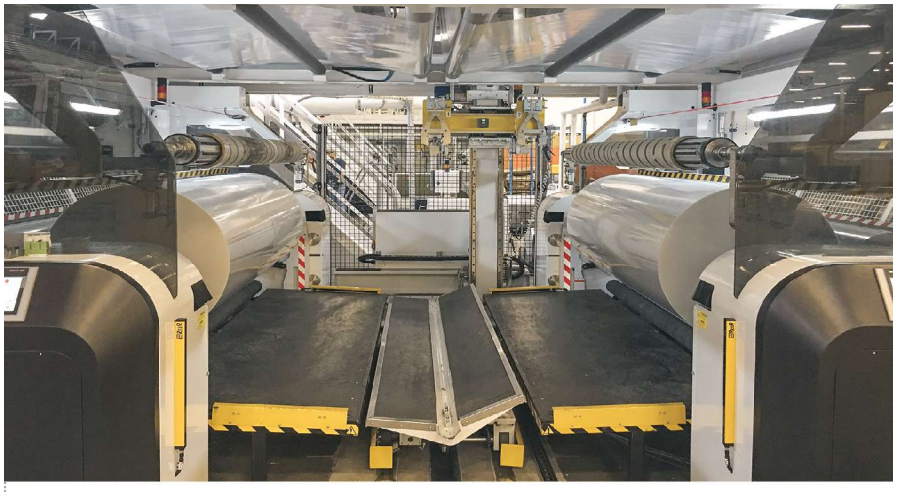
The machines on display will also have a C-clamp with an easy-open, over-center lever and thumb-release safety lock. The lever-action swing bolt needs no wrench adjustment once the position is set. Durable aluminum heaters allow for consistent heating throughout clamp. A linkage counterbalances the two halves, so they open together. Moreover, on this extruder the motor is mounted on a pivoting base. This unusual design provides auto-adjusting tension on the V-belts. The motor mount's pivot location is determined by the motor weight and torque reaction to constantly provide the correct tension. The feed throat is integral to the barrel with an air/water-cooled, jacketed feed area. The one-piece feed section eliminates alignment and step/mating issues that can be found in conventional cast-iron feed sections with bolt-on barrels. The bimetallic feed area provides maximum wear resistance.

The 2.5-in. model at the show will be equipped with ProControl Deluxe from ProSystems Integration. This is a comprehensive operator interface to control the entire process. It offers recipe management, data acquisition, reporting and alarm analytics. The 3.5-incher will be furnished with ProControl DCR, a cost-effective alternative to discrete controls. It includes basic extruder control along with recipe and alarm enhancements.

The compact custom medical extruder at the booth includes a servo drive, swappable barrels, washdown design, integrated control cabinet with special die-wiring management, and other special features designed for the medical and pharmaceutical industries. The machine has swappable barrels in 0.50-, 0.75-, and 1-in. sizes. This machine also has the medical version of ProControl touchscreen control.

New from Milacron Extrusion Technologies (***milacron.com***), the SV350 is billed as a robust and flexible extruder suited for processors of profile, tubing, sheet, fiber, wire and cable. The SV350 is available in sizes from 2 to 4.5 in. with 24:1 L/D. As a stock machine, it is available for quick delivery.

The solEX NG from Battenfeld-Cincinnati (***battenfeld-cincinnati.com***), is a single-screw extruder for high-performance applications that offers up to 20% higher outputs, up to 15% lower energy costs, and approximately 15-20° F lower melt temperatures, the machine builder says. Lower melt temperatures allow polyolefin pipe producers to either shorten the length of their downstream cooling system or maintain the same length to boost output by as much as 20%. Lower melt temperatures at a consistently high level of melt homogeneity also result in better product quality through reduced sagging, for example, which is particularly important for thick-walled or large-diameter pipes.



For the third straight NPE, Macchi will be operating a blown-film line, this time a five-layer system for stand-up PE pouches.

FILM & EXTRUSION COATING NEWS

At one time, many blown-film machinery suppliers ran full-production lines at NPE, much like they still do at the K Show. Nowadays, most NPE exhibitors have decided that's no longer necessary. But NPE2018 will mark the third straight show that Macchi will buck the trend. The Italian machine builder (with U.S. offices in Dalton, Ga.; ***macchi.it***) will run a five-layer POD (polyolefin-dedicated), high-output line producing PE film for stand-up pouches. During the five-day show, Macchi will demonstrate the line's capabilities to downgauge by up to 30-40%.

In blown film, two issues are crucial: faster changeovers and higher throughputs. Concerning the former, Windmoeller & Hoelscher (***whcorp.com***) has made its TurboClean automation module retrofittable to some existing W&H lines. The TurboClean system purges resin from all extruders and gravimetric hoppers simultaneously, dramatically decreasing the time required to change materials. It was introduced at K 2015, at which time it was only available on new W&H Varex II systems. Now, existing W&H Varex II and Varex I lines built in or after 2010 can be retrofitted with the module, allowing blown film processors to benefit from significant cost savings from faster job changes. With TurboClean, material changes are almost completely automated. Operators no longer need to manually purge resin one extruder at a time. Instead, the work steps are automated and run simultaneously, requiring the operator only to change the suction wand from one resin port to the next.

TurboClean system purges resin from all extruders and gravimetric hoppers simultaneously, dramatically decreasing the time required to change out material.

Speaking of fast changeovers, Hosokawa Alpine American (***halpine.com***) will be touting the benefits of its X die, billed as the fastest-purging die on the market. It is offered for up to 11 layers.

Also in blown film dies, Germany's Kuhne Anlagenbau GmbH (***kuhne-group.com***) will be showing a concept Mo-Con die that is modular, streamlined, compact, and expandable.

The stackable Layer Sequence Alpha Dual Spiral Systems (LSADSS) blown-film dies from Alpha Marathon (***alphamarathon.biz***) reportedly provide superior streamlining and mixing of melt flow as well as interlayer temperature isolation. The addition of the new patented Feed Block System allows film processors to extrude two different materials in the same module to either duplicate the number of layers or introduce new materials to the film structure.

On the matter of throughput—that other big issue in blown film—Addex Inc. (***addexinc.com***) is showcasing its latest Intensive Cooling technology at NPE2018. The company will launch its "Height-Adjustable" Intensive Cooling Twin-Stack system, which is designed to optimize performance when processing both high- and low-melt-strength resins.

Addex offers an enclosed, two-level, stacked, Intensive Cooling system featuring a lower cooling element that mounts flat against the die, and a second, height-adjustable cooling element just below the air ring. The system is highly adaptable to changes in materials and supports fast changeovers, Addex says.

The fully enclosed Intensive Cooling Twin-Stack elements can be separated by 1 to 16 in., allowing the operator to change the height between the cooling elements to control the amount of cooling. For super-low-melt-strength materials, a short distance between the elements is ideal. For high-melt-strength resins, the cooling zone can be extended to its maximum by the push of a button. The Height-Adjustable Twin-Stack system can be fine-tuned across a broad range of products without time-consuming equipment changes—and while the line is running.

The original fixed-height Twin-Stack system has proven in the field to increase output by 15% to 20% for very low-melt-strength materials, and up to 40% or even 50% for high-melt-strength materials. The Height-Adjustable version of the Twin-Stack is expected to produce even greater gains. The system operates over a wide range of configurations and materials, while also enhancing bubble stability. These retrofits are aimed at blown-film lines designed for higher outputs and with sufficient extruder and blower capacity to handle the output gains from the Intensive Cooling Twin-Stack. ►

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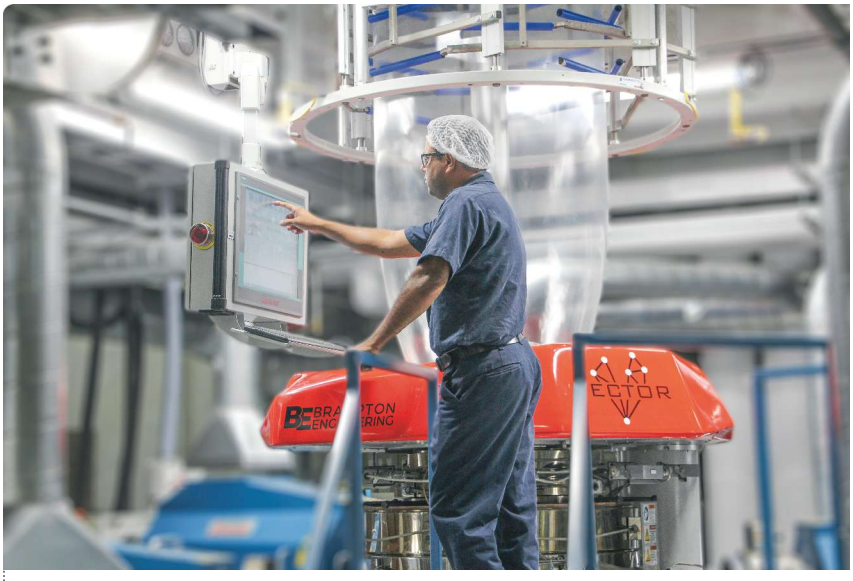
Also in the area of blown-film cooling, Brampton Engineering (*be-ca.com*) announced the launch of the new Vector S air ring. Vector S offers an auto-gauge option utilizing segmented air.



As a result of extremely uniform airflow around the lip, Brampton's Vector S air ring reportedly offers the best startup gauge in the industry by reducing variability by up to 80% compared with conventional air rings.

Thanks to extremely uniform airflow around the lip, Vector S reportedly offers the best startup gauge in the industry by reducing variability by up to 80% compared with conventional air rings. Vector S also boasts the highest resolution in the industry because it has 180 digital control points adjacent to the lip, vs. 60-80 in typical conventional air rings. Vector S is also said to be "smart": It offers a digital setup memory and automated monitoring for repeatable quality.

Brampton has also announced that its pancake-style Streamlined Coextrusion Die (SCD) 4.0 will be available for retrofit on existing lines regardless of age, model and machinery manufacturer.

D.R. Joseph (*drjosephinc.com*) will be exhibiting a new control feature for non-IBC blown-film lines—neck-height control for medium- or high-stalk bubbles. It's a new option on the company's LF-Sizer product line, which manages layflat width for non-IBC blown film lines. The control system uses an ultrasonic sensor facing the

bottom of the bubble flare to measure neck height, then maintains the setpoint to within ± 0.25 in. It also coordinates the competing tasks of managing layflat width and neck height during startup, hole recovery, and normal production. This coordination reduces time to production and improves production rate. Integration with the air-ring blower (varying blower speed to control neck height) is via standard serial data communication to a Yaskawa A1000, P1000 or V1000 inverter. The feature also includes an inverter programming function that reduces initial setup time.

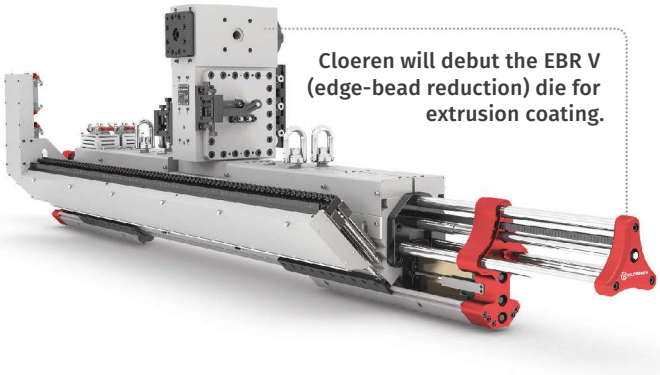
Controlling and maintaining neck height on high-or medium-stalk bubbles correlates directly with improved consistency in HDPE/MDPE film dart-impact strength and other properties related to neck height. Other benefits processors can expect include increased production rate, tighter layflat control, and elimination of dart-impact failures.

D.R. Joseph will also be unveiling a new generation of radial roll cages that it says completely address the shortfalls of traditional radial sizing cages. Mechanical linkages and moving parts are greatly reduced, as is overall footprint (like iris-style cages), and the total investment cost is comparable to iris-sizing cages. The unit offers processors higher precision in diameter adjustment, complete stability and bubble support at all diameter ranges, extreme rigidity with zero play or backlash, and improved IBC control with the DRJ IBC control system. With axial-roller diameter adjustment, IBC sensors are always placed perfectly perpendicular to the film surface to ensure that ultrasonic signals are ideally sent and received.

The new radial cage maintains the same soft rollers as previously offered, plus protected ball bearings and a variety of roller styles and covers to accommodate any type of film surface and eliminate marks common with segmented fluoropolymer rollers.

New surface winders from Macro Engineering and Technology (*macroeng.com*) feature a face width of 69 in. and maximum roll diameter of 3.3 ft. They offer gap winding, reverse winding, zero-fold transfer, tapered pressure and tension control, shaft extraction, electrical shaft loading, and ability to handle a wide range of film thicknesses from 15 to 300 microns. The winder is said to be suitable for high-barrier coextrusion and lamination.

On the flat-film side of things, Cloeren Incorporated (*cloeren.com*) will be displaying the world's widest nanolayer system, comprised of a 55-layer NanoLayer feedblock paired with a 5435-mm Epoch III die. This system is intended for third-generation (G3) nanolayer stretch films. According to Cloeren, nanolayer films have become a mainstay in cast stretch film because they offer enhanced performance in high-speed power pre-stretch applications. Second-generation nanolayer stretch films reportedly provide measurable reductions in shipping losses through their enhanced performance ►



Cloeren will debut the EBR V (edge-bead reduction) die for extrusion coating.

over conventional stretch films, and G3 films have been developed for further enhancements in packaging integrity.

Cloeren will also show for the first time the EBR V (edge-bead reduction) die for extrusion coating. This is the latest and most advanced design in its EBR series. Over the past five years Cloeren has installed more than 50 EBR V dies worldwide, and reports that the new design has reliably demonstrated increased operational robustness over any other edge-bead reduction die in the market. EBR dies are aimed at extrusion coating and lamination, which require great flexibility for frequent web-width and formulation changes. Being able to reliably minimize the volume of material at the edge bead with the EBR V deckle system has economic and environmental advantages, says Cloeren. Cloeren will also show its moebius-manifold die. The innovative internal geometry of this die has proven to be particularly suited for processing polymers sensitive to residence time, including PVC.

SHEET EXTRUSION NEWS

In sheet, machine builders at NPE2018 will be meeting the need for speed. Plus, the latest Super-G HighSPEED Extruders from Processing Technologies International (PTi) have a significantly reduced footprint, resulting in the highest extrusion output/ft² in the industry, the company claims. This compactness is made possible by introducing an optional tuck-under motor on these models, which are used for processing PP and HIPS for packaging. Several machines have already been installed in the U.S.

PTi's Super-G SGHS3000-36D model on display features a vertical U-configuration and tuck-under motor to reduce the machine's footprint by more than 33% to 12 ft, 8 in., vs. 17 ft, 7 in. for the original model. The Super-G SGHS3000-42D model is also offered with the tuck-under option and shows a comparable footprint reduction and similar output gains.

The Super-G SGHS3000-36D has a 500-hp motor and runs at a maximum speed of 1000 rpm, while the Super-G SGHS3000-42D has a 600-hp motor and runs at up to 1200 rpm. For processing PP, the Super-G SGHS3000-36D has a production output of approximately 3000 lb/hr.

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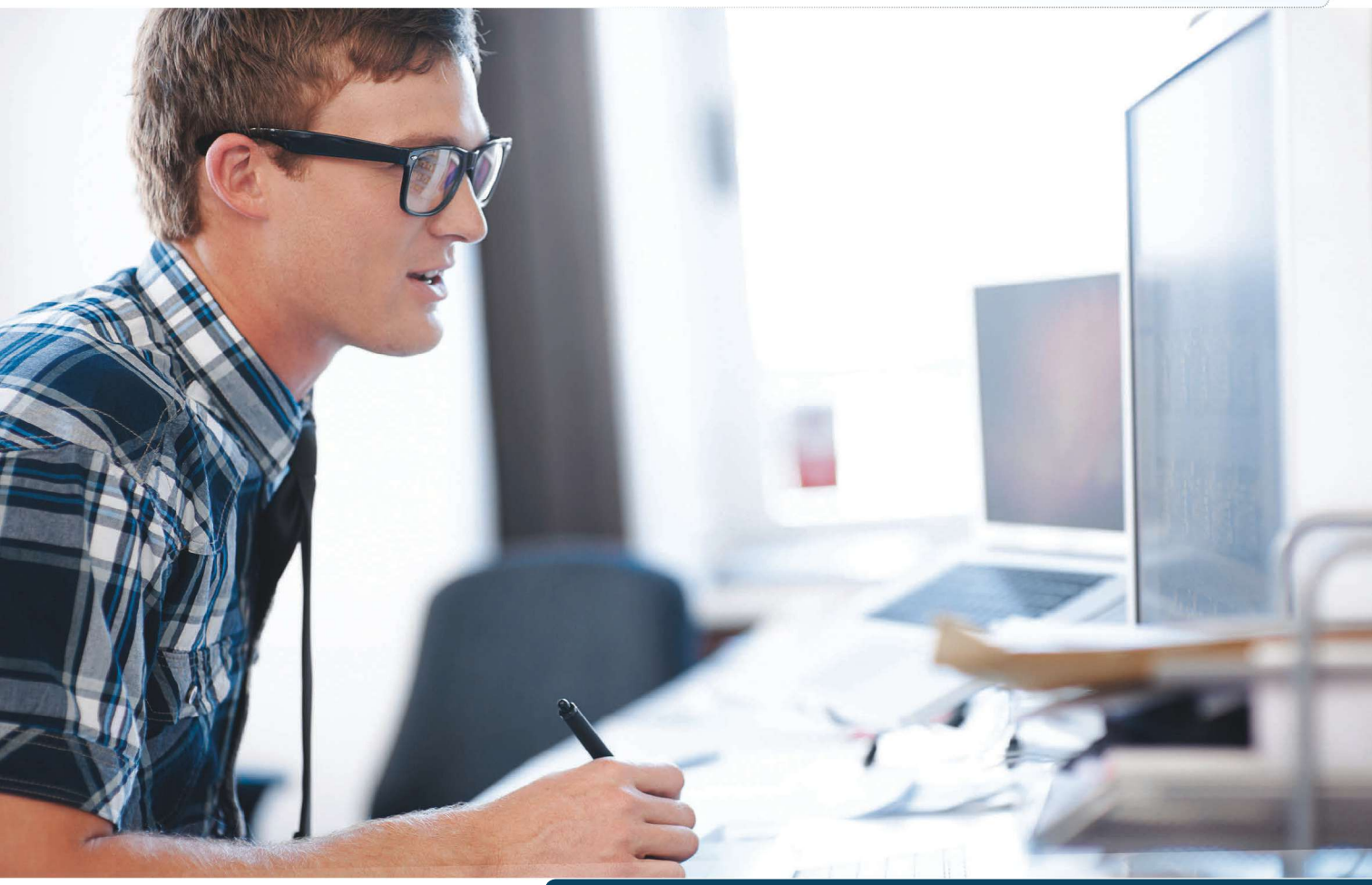

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Choosing The Right Vacuum Technology For Extrusion Processes

Extrusion is a continuous process of forming plastics into various shapes. An extruder screw draws raw material from a hopper, passes the material through various zones as it turns into molten form, homogenizes the liquid then forces the molten plastic through a die. There are many vacuum applications in plastics processing. Two of the most prominent are degassing the molten material in the extruder before the die, and calibrating plastic profile shapes after the die. This presentation covers the points to be considered in selecting vacuum technologies and vacuum systems for extruder degassing and calibration tables.

PRIMARY TOPICS:

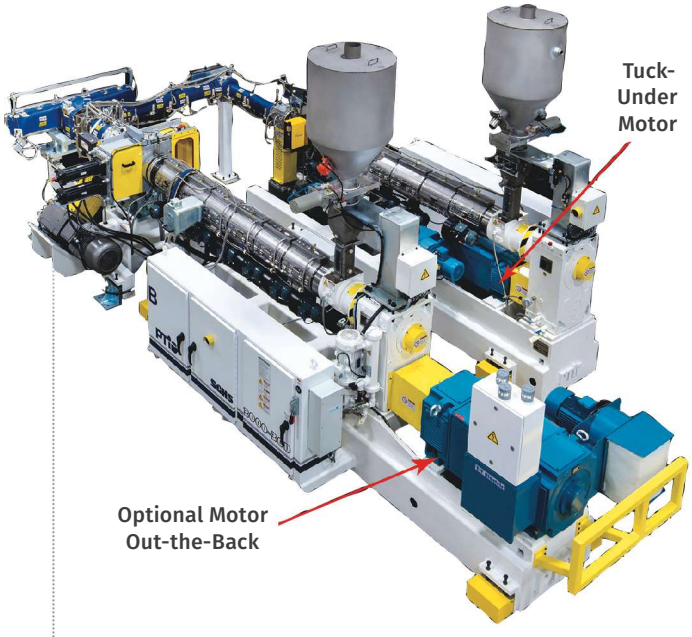
- Filtration technologies for extruder degassing
- Pump technologies for extruder degassing
- Pump technologies for vacuum profiling tables

PRESENTER

Benjamin Cameron
Systems Manager

BUSCH
Vacuum Pumps and Systems

Ben Cameron has been with Busch LLC for over ten years, previously working for Mitsubishi Chemical and Nova Chemical. He holds a Bachelor of Science degree in Chemical Engineering from Virginia Tech, and an MBA from Old Dominion University.



Thanks to a vertical U-configuration and tuck-under motor, PTi has reduced the footprint on its high-speed sheet extrusion line by more than 33%. The company says the line offers the highest output/ft² in the industry.

PTi (*ptiextruders.com*) entered the high-speed extruder segment with the launch of its Super-G High-Speed Extruders, which deliver significant performance advantages and overcome the limitations of competing machines. PTi's high-speed solution reportedly delivers improved melt quality because of its Super-G Lobe screw technology and is offered integrated with all of its advanced G-Series Configurable roll stands. PTi's high-speed extruders also feature carbide-lined barrels and Colmonoy hard-faced feed screws vs. case-hardened screws on competing models.

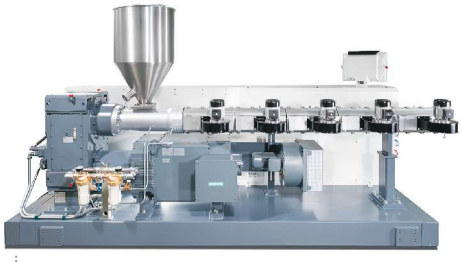
There is a new option for "no dry" PET sheet systems. The STARextruder series from Battenfeld-Cincinnati features a three-part processing unit: a single-screw zone for material plastication; a planetary-roller section for degassing under high vacuum; and an optimally dimensioned discharge zone. The planetary-roller degassing zone reportedly offers highly efficient degassing of the melt. The melt is rolled out in very thin layers, creating an extremely large surface area. Both effects are said to counteract degradation of the materials and significantly contribute to product quality.

Sheet processors can switch from PET to PP or PS processing on this extruder without a screw change. PET bottle flakes can be processed without pre-conditioning. The process has recently been issued a letter of non-objection by the FDA. The STARextruders are available in sizes of 3.5, 4.75 and 6 in., with output ranges from 1300 to 2600 lb/hr.

Gneuss Extrusion Technology (*gneuss.de*) is showing a complete Gneuss Processing Unit (GPU) comprised of a Multi Rotation System (MRS) 130 extruder, a fully automatic melt-filtration system (RSFgenius 150), and a VIS online viscometer. The line is made for processing undried, uncrystallized PET at up to 2000 lb/hr.

Gneuss now offers a new foam module that permits processors to quickly switch from solid to physically foamed PET sheet. Foam sheet with a weight reduction of 50% can be extruded (depending on the process) with a consistent cell structure and mechanical properties from up to 100% post-consumer material.

Graham will display a Welex Evolution sheet line, a complete production line for sheeting, winding, and in-line thermoforming, equipped with XSL Navigator control. While the equipment on display at NPE2018 will be for thin-gauge PP, the Evolution system can be customized for widths from 36 to 90 in., gauges from 0.008 to 0.125 in., and throughputs to 10,000 lb/hr. Monolayer or coextrusion systems are available, with up to nine extruders.



The conEX NG from Battenfeld-Cincinnati is a conical twin-screw extruder for processing PVC pipe and profiles.

PIPE, PROFILE, TUBING NEWS

The conEX NG from Battenfeld-Cincinnati is a conical twin-screw extruder for PVC pipe and profiles. The screw core fits all screw tempering systems, and the gearbox design allows several different motor positions (U or Z version). Processors can also choose between different barrel tempering and dosing systems, allowing a wide range of outputs to be covered with one machine. The machines can work with process pressures up to 520 bar (7500 psi), which are required when producing small or thin-walled profiles or when using regrind and recycled materials in coextrusion. Thanks to minimized residence times and quick cleaning, color changes can also be done much faster, which saves material, the company says.

Complete thermal insulation of the barrel minimizes radiation losses, and by using reluctance or synchronous motors, the conEX NG offers reported energy savings of up to 20%.

The conEX NG extruders are available in three sizes (42, 54 and 65 mm), with outputs from 80 to 550 lb/hr for profiles, and 100 to 1000 lb/hr for pipe. Several different space-saver or column designs are available for coextrusion. These can be adapted to every main extruder through improved height- and tilt-adjustment facilities.

KraussMaffei Berstorff (*kraussmaffeigroup.us*) is demonstrating its response to demands by processors for conical twin-screws that can be used both as main extruders and as part of a coextrusion system. The KMD 73 K/P conical twin at the show reportedly offers just that—high outputs and pressure stability in a robust machine design. The optional bimetallic barrel lining paired with a tungsten-carbide welded screw—a requirement of the North American market—also enables it to be used in pipe extrusion. Space-saving and customer-specific coextrusion models can also be installed in tight quarters for efficient production.

Downstream, the company will demonstrate its flexible calibration basket, the QuickSwitch system, which has an effective diameter range from 11.023 to 19.685 in. The system is of interest particularly to processors that run large pipe, because a diameter change is said to generate very little waste. All process parameters can be set and stored in the all-in-one control system.

KraussMaffei Berstorff's KM-VT 250/1/6 vacuum tank for pipe extrusion features integrated vacuum control and frequency-controlled pumps that are fully integrated into the C6 line control system. This is said to provide for energy savings and uniform product quality.

Milacron will display its TC conical twin-screw extrusion system, which has a wide range of options and customized screw designs matched specifically to the process requirements.

Leistritz is displaying a ZSE 50 MAXX twin-screw that includes a modular design for barrels and screws and insulated barrel covers. The machine will be furnished with two LSB XX series side stuffers.

Guill Tooling & Engineering (*guill.com*) will show the latest generation of its Series 800 two- to six-layer extrusion tooling for tubing ODs from ⅛ to 6 in. Aimed at automotive, medical, appliance, and industrial applications, the redesigned Series 800 is said to produce flawlessly smooth extrusion and layer definition of tubes from fluoropolymers and other materials for multi-layer, multi-lumen medical tubing, as well as fuel-line constructions, multi-layer PEX pipe and drip-irrigation applications.

COMPOUNDING NEWS

Leistritz Extrusion (*leistritz-extrusion.com*) will be displaying a range of new systems for compounding, including complete twin-screw extrusion lines. The ZSE 18 system on display will consist of loss-in-weight feeders, a co-rotating twin-screw extruder, gear pump, and die to produce 1- to 5-mm 3D-printing filaments. Downstream, the line is equipped with a custom air rack for air-quench cooling and sizing of the filament, plus a belt puller, laser gauge and winder. The control system will integrate closed-loop pressure control to ensure a tight-tolerance product.

With the ZSE 18 system, formulations can be modified "on the fly" for rapid sampling of filaments with different formulations. A sample can be produced every 10 min. The ZSE 18 system is rated to run at up to 797 F, suitable for high-temperature engineering polymers, and can run at rates from 2-44 lb/hr.

Leistritz is also displaying a ZSE 50 MAXX twin that includes modular barrels and screws and an insulated barrel cover. Extended length facilitates multiple downstream operations, including multi-stage venting, liquid injection, and up to two LSB 50 XX side stuffers for filler/fiber introduction into the melt stream. The ZSE 50 MAXX can be equipped with a 600-hp AC motor to produce more than 2200 lb/hr at 1200 rpm.

The LSB XX series side stuffer is supplied with a high OD/ID ratio of the screws (2.0:1) and can also convey materials with very low bulk densities. The screws can be segmented so they can be configured for a particular material. The LSB XX can be adapted to the processing unit via tierods. Its barrel can be jacketed for cooling or heating. Internal screw cooling is optional.

Leistritz will also show a ZSE 27 MAXX co-rotating twin-screw with an air-quench pelletizer. Various control architectures will be displayed, including Allen-Bradley and Siemens PLCs and operator interfaces. Both types are equipped with remote VPN accessibility for process analysis and troubleshooting. The company will also debut its ►

Elongational Rheometer. This device mates to an extruder; a small amount of the melt flow is diverted, measured and returned to the extruder to facilitate on-line analysis and adjustment of shear and elongational viscosities.

Entek Extruders (***entek.com***) will be displaying two machines in its booth: a new QC³ 33-mm twin-screw extruder, introduced in 2017 and being shown publicly for the first time; and a high-output 73-mm twin-screw. Entek is also featuring two interactive work stations showing the company's screw-layout software.

The newest size in Entek's QC³ (Quick-Change, Quick-Clean, and Quality Control) twin-screw, co-rotating compounding series is a 33-mm machine aimed at small-lot compounding.

The Entek QC³ 33-mm co-rotating twin-screw is a new size. It's designed for compounding small lots and includes all of the company's latest QC³ (Quick-Change, Quick-Clean and Quality Control) features. The 33-mm unit joins Entek's other QC³ models, which include 27-mm, 43-mm, and 53-mm co-rotating twins. New mechanical design features in the 33-mm model include self-aligning screw-gearbox couplings to facilitate fast and foolproof installation of screws; lock-and-key feature on splined shafts to prevent screw timing errors; conveniently located gauges for quick monitoring of lube and cooling-system conditions; quick-change strand die; and enhanced controls.

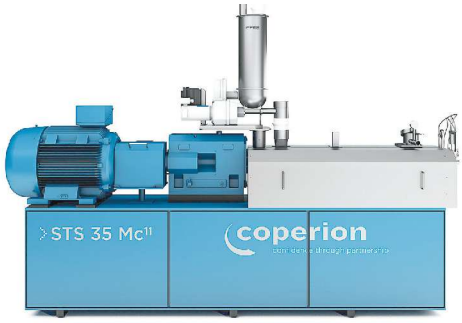
Entek will also feature a 73-mm twin geared for high-output custom compounding. It's available with a 600-hp motor and screw speeds up to 900 rpm. Entek will have two interactive work stations at its booth where visitors will be encouraged to see how easy it is to quickly design screw and barrel layouts for their specific applications.

With color masterbatch in mind, Coperion Corp. (***coperion.com***) has equipped its STS Mc¹¹ twin-screw with features that significantly improve the system's handling and ease of cleaning. A new base-frame design allows for integration of the water manifold and wiring connections for better cleanability without sacrificing accessibility.

Operations around the machine are reportedly simpler since Coperion reengineered the extruder covers to enable easy access to the process section and at the same time reduce dust contamination. The unit also includes a smoother surface for easier cleaning.

The barrel heater shells are equipped with insulation plates to minimize the temperature on the surface of the process section. The barrel feed opening is fitted with a removable sleeve, which facilitates simple cleaning and therefore quicker color changes. A tray has been added to the vent port to collect drippings or vent flow. And the die head has been redesigned so it can now be quickly opened by simply loosening swing bolts for faster color changes.

The STS 35 Mc¹¹ exhibited at NPE2018 will be equipped with a Coperion K-Tron K2-MV-T35 volumetric twin-screw feeder—billed as an economical and reliable solution for metering color premix batches. The T35 feeder handles free-flowing to very poorly flowing powders (e.g., lumpy, moist or bridging materials) as well as fibers, flakes and other bulk materials. The T35 has interchangeable feeding tools and is easy to disassemble. All parts in contact with the raw material are stainless steel. A horizontal agitator gently moves the bulk material to the large feeder throat and then into the screws. The feeder comes with a Coperion K-Tron SmartConnex control system, which allows individual or multi-component control. Rate range (depending on material) is 0.04 to 88 ft³/hr.



With color masterbatch processing in mind, Coperion has equipped its STS Mc¹¹ twin-screw extruder with features that improve handling and cleaning.

Coperion will also display its ZRD rotary valve—now manufactured in the U.S. The valve is engineered for heavy-duty industrial service with pressure differentials up to 21 psig and temperatures up to 212 F; higher temperature options are available. The ZRD is often used as a discharging and metering valve for conveying products in powder and granular form.

Coperion will be showing a mechanical bulk-material mixer called Mix-A-Lot. The unit reportedly provides efficient, high-speed, and gentle homogenization. It's available in three sizes for throughputs up to 5 tons/hr. The surface of the mixing chamber can be electro polished.

The combination of an outstanding mixing effect and extremely short mixing time is due to the optimized design of the mixing rotor, Coperion says. Its low circumferential velocities and the optimum design of the gap to the housing permit gentle handling without particle destruction or heating of the product. The large inspection door on the front of the ►

mixer provides easy access to the entire process chamber. An additional opening at the discharge flap also facilitates inspection and cleaning of this section.

Up to now, it has generally been standard practice to feed each individual component to the extruder through a separate differential loss-in-weight feeder with a buffer hopper. However, the new Mix-A-Lot first produces the specific pellet mixture, for which *one* single loss-in-weight feeder is then sufficient. The weighing function of the mixer ensures accurate recording of the weight of each component, to guarantee correct dosing according to the recipe. As the Mix-A-Lot is vacuum and pressure resistant, direct pneumatic feeding is possible without the need for a separate reception bin for pneumatic conveying. This simplified concept reportedly allows reduction of investment and maintenance costs. Cleaning effort during product changes has been greatly reduced, and much less space is required above the extruder.

Nordson Corp.'s new pellet dryer—for use with its BKG pelletizing systems—reportedly meets the challenge posed by the steady growth in use of glass-filled and other abrasive materials by substantially reducing the time and cost associated with replacing wear parts. The design (***nordsonpolymerprocessing.com***) reduces the number, complexity, and cost of dryer components that are subject to abrasion and makes them more accessible for maintenance or replacement. The new design reduces production downtime by simplifying maintenance.

MELT FILTRATION & PUMP NEWS

High-Technology Corp. (***screenchanger.com***) will be introducing its next-generation Model DP-XL fully automatic screen changers. They feature significantly enhanced performance and ease of use for a variety of applications. The DP-XL can advance the filter screen at twice the rate of previous models, thereby allowing filtration of higher percentages of contamination than previously possible. The new design is capable of leak-free processing up to 650 F and generates a polymer seal that results in smooth, uninterrupted screen advancement cycles.

In addition, new high-strength filter media enable the unit to operate reliably even under ►

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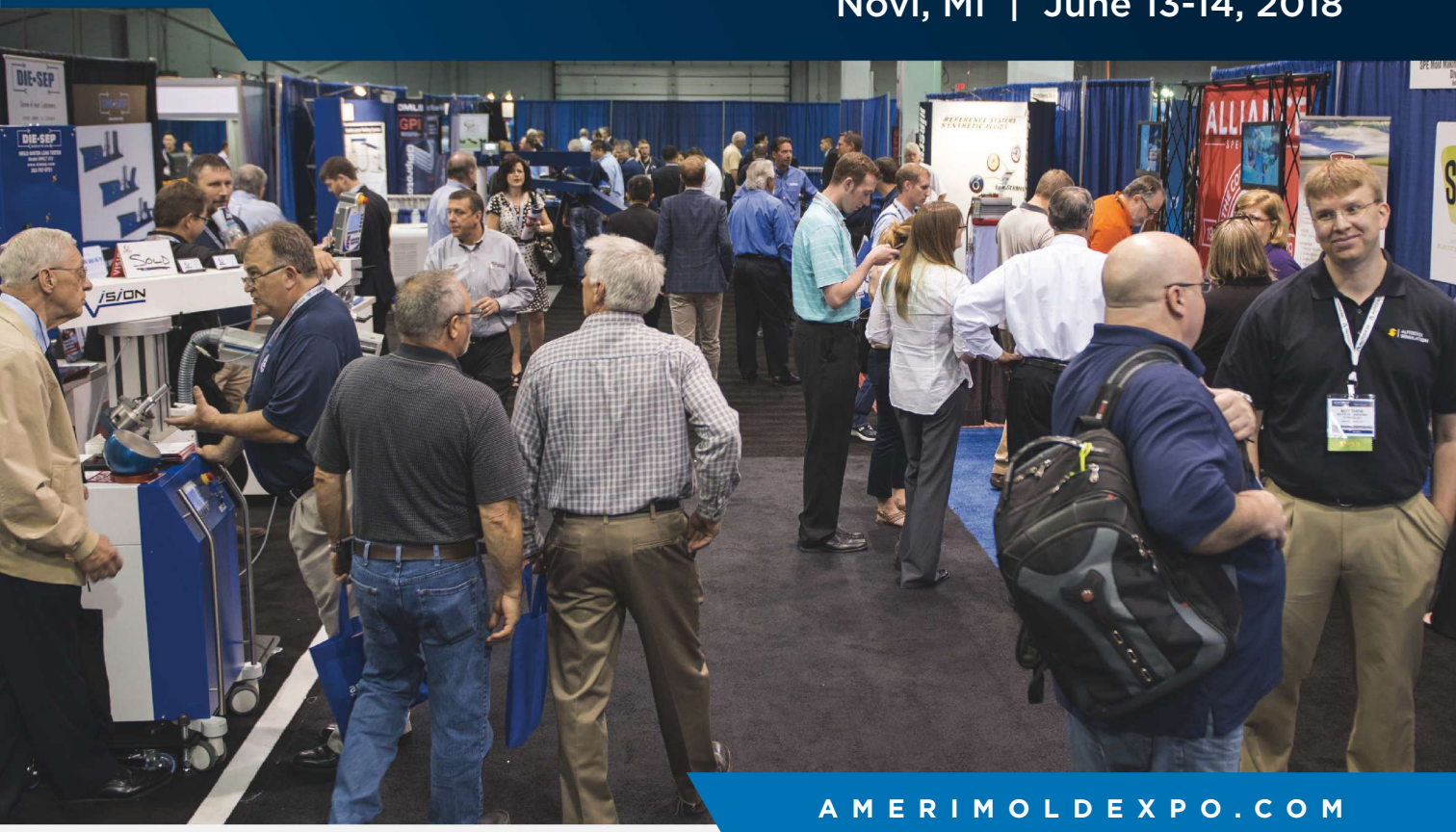

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constant differential pressure across the screen of up to 2000 psi. Multilayer filter-media combinations can filter down to 50 microns for a wide range of polymers, both high and low viscosity.

PLC color touchscreen controls and descriptive graphics allow for full custom integration of the screen changer into the most complex lines. Both operating parameters and hardware conditions (such as heaters and sensors) are continuously monitored, enabling fast response. The controls, including 20 discrete alarms, detect real-time processing conditions and automatically adjust the rate of screen advancement, at intervals from 5 min to 8 hr, to maintain the highest degree of continuous production, even with uneven levels of contamination.

The ILF-55 in-line filtration system from PSI-Polymer Systems (*psi-polymersystems.com*) is a discontinuous, high-capacity filter that is aimed at long production runs where the extrusion process cannot be disturbed and where ultra-high filtration levels must be continuously maintained. ILF filters are typically used where screen changers are either too large for the application or otherwise cannot satisfy the filtration requirement without incurring an unacceptable pressure drop.

These new filtration systems feature a canister housing into which the filter pod assemblies are inserted. Vessel size and filtration media are selected according to application-specific data and are designed to minimize pressure drop for optimal flow and run time.

ILF vessels with three or seven filter tubes can be fixed in-line or can be interchangeable. The interchangeable vessel option accommodates quick changeouts. Standby vessels can be preheated to minimize downtime. Vessels can be arranged for electric heat or jacketed for steam/oil heating.

Filter tubes offer micron ratings from 0.5 to 250 and can be reusable (pleated filters) or single-life (slip-on wire-cloth tubes). All pleated filters are bubble tested for pore-size verification. All models are designed for operating pressure up to 4500 psi and process temperatures to 750 F.

Gneuss Filtration Technology (*gneuss.com*) is exhibiting several different models of its patented rotary filtration systems. Their screen cavities are arranged in a ring pattern encapsulated by two filter blocks. Screens can be inserted into the cavities by opening a small hatch-door without interrupting production.

Modifications to the screen-changer housings permit operation on a wider range of applications at higher pressures, while offering larger active filtration areas. Components and modules have been standardized to offer shorter delivery lead times and lower costs.

The SFXmagnus series operates automatically and keeps process and pressure constant. The series is characterized by an extra-large active screen area, compact design, and easy operation. Screen changes reportedly do not affect product quality. An SFXmagnus 60 with an active filtration area of 23 in.^{2} will be displayed.

Gneuss' top-end model, the RSFgenius, will also be on display. It operates with an integrated self-cleaning system for very demanding applications and highest quality requirements. Screens can be automatically reused up to 400 times; filtration fineness below 10 microns is available.

Gneuss will also be exhibiting a KF 150 screen changer with an active screen area of 28 in.^{2}. The KF range of continuous filtration systems is designed specifically for applications with frequent material or color changes, as well as for high-pressure applications like blown film. The KF screen changers are said to be very compact and to permit simple and quick screen changes on the fly.

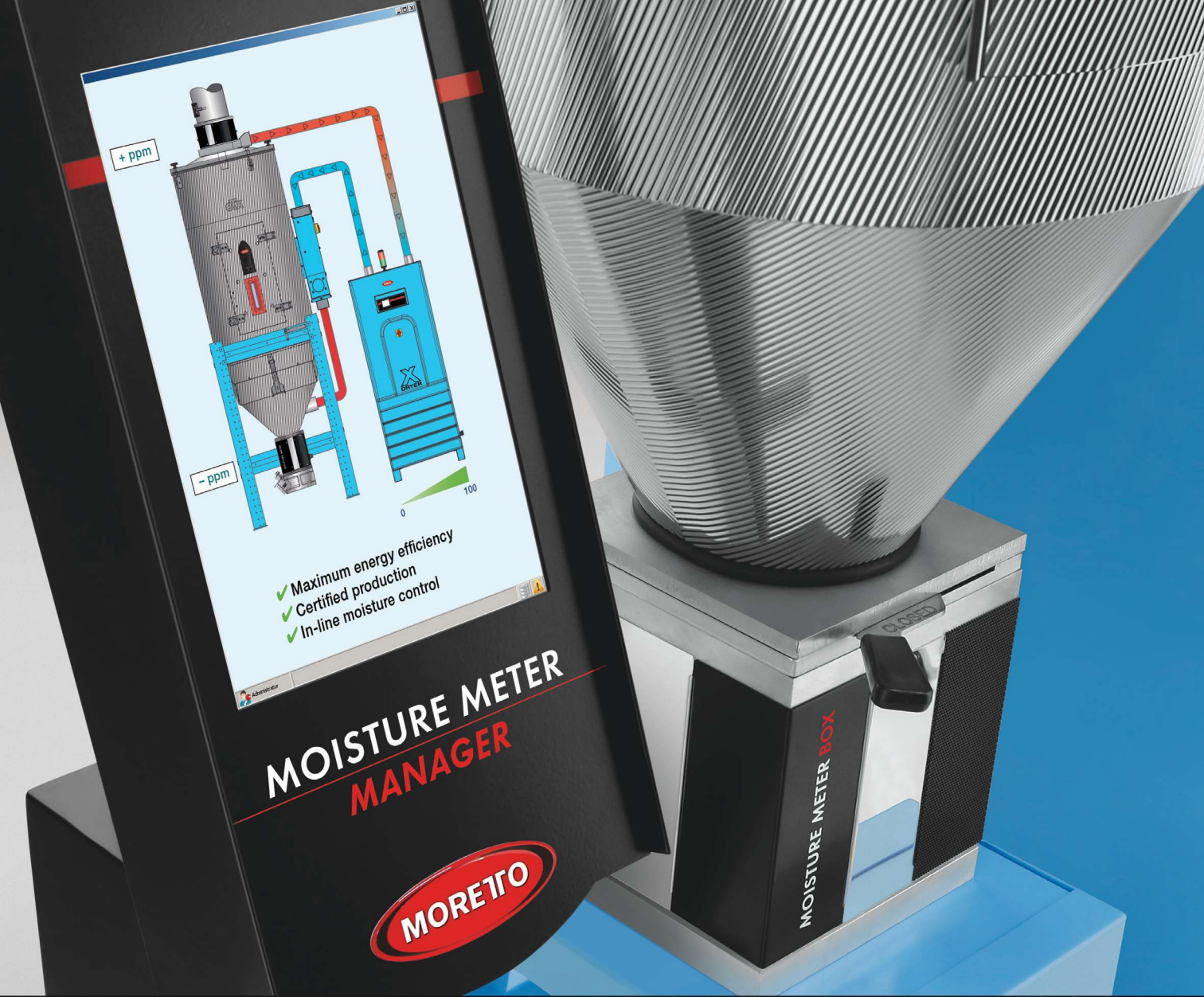
PSI-Polymer Systems' first Vessel Gear Pump is used beneath polymer reactor/devolatilization vessels or after large twin-screw compounding extruders for discharging a steady volumetric output direct to the pelletizer.

In melt pumps, PSI-Polymer Systems will introduce its first Vessel Gear Pump (VGP). This product is used beneath polymer reactor/devolatilization vessels or after large twin-screw compounding extruders for discharging a steady volumetric output direct to the pelletizer. The VGP series accommodates pilot operations to full production up to 20,000 lb/hr.

These high-efficiency pumps generate high discharge pressures while accommodating very low-pressure infeed of high-and low-viscosity materials. Typical inlet pressures are under vacuum or up to 145 psi. A choice of feed openings optimizes flow even under conditions of very low vessel fill levels and high vacuum. For higher viscosities, to avoid cavitation and ensure positive fill of the gear teeth, PSI offers 170° of gear opening.

The new VGP features a small footprint and all stainless-steel construction. Housings (forged or cast) contain internal flow passages for steam or oil heating. Models accommodate discharge pressures to 4350 psi and a temperature range to 500 F with an option for 660 F.

Shaft sealing is accomplished using single or double mechanical seals or standard visco seals. Seal design accommodates fast, easy replacement, with off-the-shelf seal availability from PSI. The company says this is an important feature, as a common problem with these types of products is availability of replacement seals. PT



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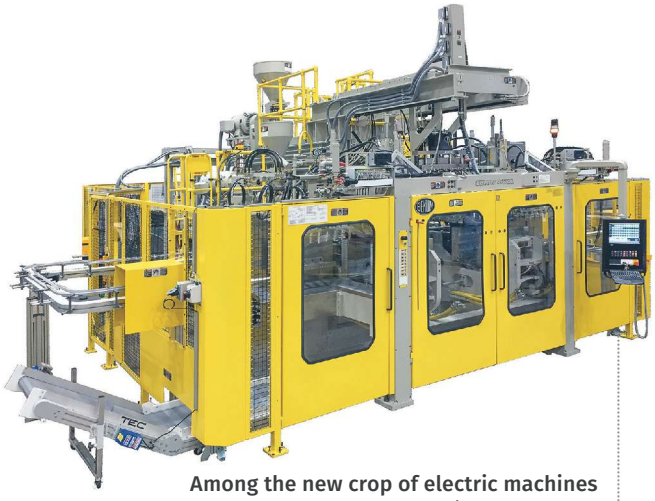
BLOW MOLDING AT NPE2018

Blow Molding Systems Run the Full Spectrum at NPE

Machines for every process—shuttle, wheel, reciprocating-screw, accumulator-head, suction-blow, injection-blow, compression blow, and one- or two-stage stretch-blow molding—will be running in Orlando. There will be a host of new models, including electric and servo-hydraulic types.

By Matt Naitove
Executive Editor

This year's show will be unusually well populated by blow molding systems providers—more than 20 of them, plus suppliers of components and tooling. Not all of them would talk about their exhibits ahead of time, but those who did make it clear that there will be something at the show for almost all blow molders of packaging and industrial parts. What's more, this show includes two new features: a dedicated Bottle Zone of 65,000 ft^2 and 80+ exhibitors in the South Hall, and a Bottle Zone Technical Forum covering topics from materials and additives to blow molding techniques, preform and closure manufacturing, filling and inspection, and downstream packaging and recycling.



Among the new crop of electric machines is Bekum's EBlow 407DL (double-sided, long-stroke) shuttle machine, to be shown with a special quick-mold-change upgrade (15 min without tools).

ALL-ELECTRICS MULTIPLY

All-electric machines continue to make inroads, as indicated by several new models on display. Bekum (***bekumamerica.com***) is introducing the electric EBlow 407DL (double-sided, long-stroke) shuttle machine, to be shown with a multi-layer, spiral-mandrel extrusion head, special quick-mold-change upgrade (15 min without tools), and a very compact layout. This U.S.-built machine has the company's patented C-frame clamp (22.4 tons) and is aimed at cost-efficient production of smaller bottles. Due to modular design, it is also available in a hydraulic HyBlow version, two of which, with 16 cavities and three layers, have already been installed.

Kautex Machines (***kautex-group.com***) will not be introducing any new models, but it will show its all-electric KBB40D (sold to Amcor), as well as its Virtual Trainer, which is like a "flight simulator" that allows operators to learn how to use an exact replica of the machine controls to run the machine in a virtual environment.

Milacron (***milacron.com***) will exhibit one of the third generation of its all-electric shuttle machines in the booth of its representative, FGH Systems (***fghsystems.com***). From this M-Series, introduced in late 2016, FGH will have the M12.52ED, a double-sided press with 12-metric-ton clamp, and 520-mm shuttle stroke. At the show, it will be equipped with a 4 × 100-mm extrusion head producing 14-oz personal-care bottles in eight cavities. FGH designed and built the mold and conversion package to accept existing "blow-and-drop" molds for in-machine deflashing.

Hesta of Germany (***hesta.de***) is showing off its newest and largest all-electric shuttle, the double-station Hesta900. It has a 900-mm mold stroke, opening stroke of 240 mm, and 44-ton clamp. Dry-cycle time is 3.3 sec. It can handle up to 16 cavities per side and makes containers up to 5 L (10 L optional). Hydraulic and hybrid versions are also available. Jackson Machinery (***jacksonmachinery.com***) is a representative for Hesta in the U.S. and Canada.

Electric servo drives are also penetrating injection-blow molding. Pet All Manufacturing in Canada (***petallmfg.com***) will display one of its new range of CanMold injection-blow machines, an all-electric IBM 300/700 (also available in hydraulic and hybrid versions). Besides saving energy, it is said to be faster than hydraulic models and is suited to clean rooms. This 88-ton, three-station machine is aimed at small containers (2 oz to 1 L) for pharmaceuticals and cosmetics with very high neck tolerances.

Pet All Manufacturing is exhibiting for the first time its new ISBM-180E all-electric, four-station rotary one-stage PET stretch-blow machine with a 15-ton clamp and six to 10 cavities for containers from 10 to 100 ml.

Milacron is exhibiting in its own booth a Uniloy IBS 85 (81 tons) injection-blow system that is available in electric, hydraulic, and hybrid versions. The news here is that this machine is equipped to mold three-layer barrier containers. Up to now, Milacron's Kortec co-injection technology has been used on injection molding machines to produce barrier preforms and the Klear Can for food. An injection-blow machine outfitted with Kortec hot-runner co-injection technology and a Mold-Masters E-Multi electric servo-driven secondary injection unit (to deliver the barrier layer) is a new variation. The IBS 85 will mold a 7.5-g, four-cavity pill bottle in 12 sec.

Jomar Corp. (***jomarcorp.com***), which has experimented with all-electric drive, has concluded that most cost-effective energy-saving option is its IntelliDrive Series with a servo-hydraulic pump. Jomar will be running the IntelliDrive Model 85S (72 tons) that was first introduced at K 2016, but the IntelliDrive system has been extended to its two largest machines, 135 and 175 tons—in fact, the conventional hydraulic version of the Model 175 has been discontinued. Intellidrive machines reportedly save up to 50% in energy consumption and use 40% less tower water, at only 10-15% higher cost than standard IBM presses.

Jomar has extended servo-hydraulic drive to its three largest injection-blow machines, including this 135-tonner. Its Intellidrive system saves up to 50% of energy consumption and speeds dry cycles.

Jomar also has upgraded the clamp with a closed-loop system that shortens dry-cycle times. And it is preparing its machines for Industry 4.0. They are now being outfitted for remote monitoring and diagnostics by Jomar's service personnel. The machine at the show will be collecting data on machine operations for display in a "dashboard," either locally or remotely via internet. That data will help identify problems and ultimately even predict them, Jomar says.

MORE PACKAGING & INDUSTRIAL MACHINES

Besides standard shuttles, there will be a number of other styles of machines at the show. For example, Rocheleau Tool & Die (***rocheleautool.com***) will bring out its largest reciprocating-screw extrusion machine yet, the RS-90. It has a 90-mm extruder capable of more than 750 lb/hr of HDPE and can produce six-cavity gallon jugs or up to 16 cavities of smaller items. Its hydraulics have variable-frequency drive. The clamp has extra-thick, nickel-plated platens 16 in. tall × 48 in. wide. Options include parison programming, pull-up or ram-down neck calibration for handleware, or spin trimming for non-handled bottles.

The RS-90 can be integrated in line with Rocheleau's new VT-3 automated deflasher. The VT-3 transfers parts upright to the punch station. It can accept up to a triple-station nest and punch die.

SACMI of Italy (***sacmiusa.com***) will exhibit its unique high-volume, rotary compression-blow forming (CBF) system. This machine continuously extrudes "hockey-puck" blanks that are sliced off and placed in compression molds to produce preforms, which are then blown into finished bottles. CBF produces a precision-molded neck, as does injection-blow, but without any gate mark on the bottle and reportedly with greatly reduced melt stresses, more uniform bottle weights between cavities, and substantial energy savings.

Wilminton Machinery, Wilmington, N.C. (***wilmingtonmachinery.com***) will be talking about its all-electric wheel-type and reciprocating-screw machines. And Graham Engineering (***grahamengineering.com***) will display a modular clamp station for its Revolution MVP wheel-type blow molder (also shown at NPE2015).

For industrial parts, Graham will also show for the first time its Mini Hercules accumulator-head machine. This small-shot system (2.5, 5, or 8 lb) has a small footprint (15 × 11 ft × 15 ft high). It was previewed at NPE2015, and the first several units are now in the field. Graham's XSL Navigator touchscreen control has been adapted for this machine like others in the company's line.

The Mini Hercules comes with single or dual heads and bottom or side discharge. Graham's spiral-flow diverter head is said to allow for color and material changes in 1 hr. The diverter head also provides continuous internal cleaning during production, so there is no need to disassemble the head for cleaning.

Another industrial machine at NPE comes from S.T. Blow Moulding of Italy (***st-blowmoulding.com***), which is exhibiting its ASPI 400 accumulator-head model with variable-frequency-driven ►

hydraulic pumps. The ASPI series was developed for 3D suction blow molding of complex parts like automotive ducts and appliance piping; but a main feature of this model is said to be its versatility for both 3D and conventional 2D molding. It has a 40-ton clamp and 4 L accumulator head (6.5 lb max. shot weight).

Mini Hercules from Graham Engineering is a new small-shot (2.5 to 8 lb) accumulator-head machine that can perform color or material changes in 1 hr.

The ASPI 400 machine being shown has a 70-mm extruder capable of up to 375 lb/hr of HDPE or 286 lb/hr of nylon 6 with the same screw. The platens (35 x 43 in.) reportedly can accommodate larger molds than most parison suction machines. A new heater control is said to reduce power consumption during startup. A new controller has a 21-in. multi-touch screen.

This machine is also said to be ready for Industry 4.0. It has the OPC-UA standard communication protocol. Predictive-maintenance tools are available to schedule "on-demand" maintenance steps and prevent unexpected downtime. A new web application allows remotely monitoring the machine's production, maintenance and quality data. And using the new ST app, one can check production data anywhere and anytime from remote devices (tablets or smartphones).

FOAM BLOW MOLDING ADVANCES

W. Muller USA (*mullerheads.com*) will be talking about the first commercial success for its foam blow molding technology. This technology, which was announced at NPE2015, utilizes a special head with two small vertical extruders for the solid

S.T. Blow Moulding of Italy is showing its ASPI 400 machine that has the flexibility to mold complex ducts via 3D suction blow molding, as well as more conventional shapes by standard 2D blow molding.

Rx FOR INJECTION-BLOW HEADACHES

Mold maker and designer R&D/Leverage (*rdleverage.com*) claims to have overcome longstanding problems with injection-blow tooling, with the result that molders can benefit from quicker and easier setups, reduced maintenance, and improved bottle quality. The firm has filed 15 patents on its Liberty IBM System, which was introduced commercially last year.

Some of the problems inherent in a conventional IBM tool that the Liberty IBM System reportedly solves include the following:

- It eliminates thermal-expansion related problems like bowing of the die set and wear at the nozzle tip and gate area, which also eliminates frequent nozzle replacements.
- It enables process technicians to do "cold starts" without having to torch the nozzles.
- It eliminates the need to engage and disengage the manifold from the injection cavity for startup and shutdown.
- It enables easier achievement of a high degree of manifold balance.
- It minimizes temperature bleed-over between neck insert and cavity.
- It offers a solution to the galling and wear of traditional bottom-mold retract components by utilizing a new retract system.
- It minimizes parting-line mismatch.

A major improvement claimed for the Liberty IBM System is its ability to achieve thermal isolation between the neck insert and the shoulder of the bottle. Unlike traditional IBM tools that use key stock and all-thread to locate and clamp the mold inserts onto the die set, the Liberty System uses dowels to locate the mold inserts. This allows gaps between the mold inserts, which negate the effects of accumulated horizontal thermal expansion.

The Liberty System also incorporates a new, patent-pending Self-Alignment System that is said to ensure optimal cavity alignment in the parison and blow stations. These new technologies reportedly allow fast and trouble-free startups, improved bottle quality, and reduced tool wear. The new system can be designed to change out damaged cavities without removing the tool from the machine.

R&D/Leverage currently has 16 Liberty IBM Systems running in the field with up to 38 cavities. "The higher cavitation tools will have the highest return for our customers, based on ease of start-up and tool maintenance," says Bruce Wardlow, dir. of product development. Another benefit of the Liberty IBM System is that it helps bridge the skills gap. "By making the tool more predictable, a process technician with less experience can run the system," says Wardlow.

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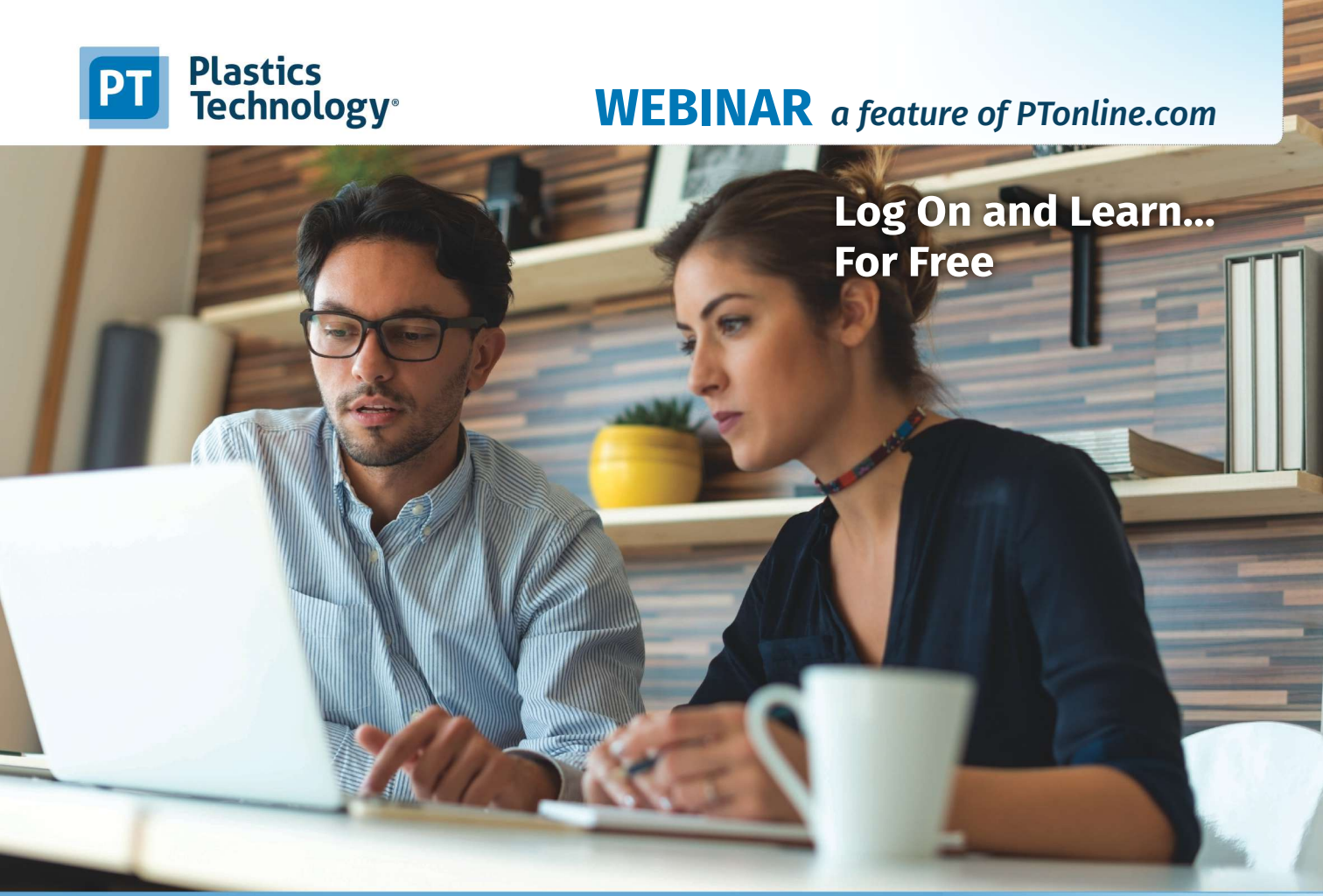

Wednesday, April 18th

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Processing Nylons on Blown, Cast And Bi-ax Equipment

Nylons (or polyamides) are important thermoplastic materials, which are commercially produced and processed for many applications. Some of the different Nylons are: Nylon 46, Nylon 66, Nylon 6, Nylon 6/66, Nylon 69, Nylon 610, Nylon 612, Nylon 11, Nylon 12, Terpolymer, Aromatic, Slow Crystallizing, and Amorphous Nylons. This presentation focuses on processing of Nylon 6, Nylon 6/66, Nylon 612 and their blends on different equipments such as Blown (air or water cooled), Cast or Bi-ax annular processes. Properties of single & multi-layer film, methods of annealing and applications are also presented.

PRIMARY TOPICS:

- Fundamental properties of Nylon 6 with comparison to other Nylons (46, 66, 6/66, 11, 612...)
- Annealing: Correlation of the Equipment and Process (Temperature and RH) to molecular orientation in the Nylon film during Annealing
- Nylon film fabrication by Blown (air or water cooled), Cast and Bi-ax annular processes
- Applications: Thermoforming, Non-Forming, VFFS, HFFS, High barrier shrink films (meat & cheese), Vacuum bags, Sausage casing and Lidding film

PRESENTER

Harinder Tamber
Director

Dr. Harinder Tamber is the Director of Polymer Resin and Film Extrusion Consultants Inc. He did his PhD from SUNY, PRI, Syracuse NY and M. Tech from IIT Delhi. He has over twenty years of experience in blown, cast, bi-ax, lamination and extrusion coating equipment, process and film structures. He is member of ACS, TAPPI, SPE and CanSIA. He has six US patents and five patents (pending), presented over twenty-five technical papers in US, Canada, Germany, Switzerland, Brazil and India.

inner and outer skins of the three-layer structure; the blow molding machine's main extruder provides the center foam layer. A special feature of this process is that nitrogen gas is injected into the head, rather than the extruder barrel.

Muller's news is that it has sold its first foam coextrusion head; the customer is Cimplast S.A.C.I. in Paraguay, which plans to use the head to mold 20 L agrochemical containers. Advantages of the foam-core process are not only lightweighting but also faster cycles, according to Muller.

PLENTY OF NEW PET SYSTEMS

PET stretch-blow systems will probably be the largest single category of blow molding machines at the show. In one-stage injection-stretch-blow (ISBM) systems, Pet All Manufacturing is exhibiting for the first time its new ISBM-180E all-electric unit. The four-station rotary unit has a 15-ton clamp and handles six to 10 cavities for containers from 10 to 100 ml.

Pet All is also showing the new CPSB-1000 LLE all-electric reheat stretch-blow (RSBM) machine from Chum Power in Taiwan. This linear unit molds containers of 10-20 L.

KHS Group (***khs.com***) has developed a new version of its high-output InnoPET Blowmax rotary RSBM system to meet rising demand for single-serve beverage bottles in the 250- to 800-ml size range. The system is more compact, but its small mold carriers process up to 2500 bottles/hr per station. Its modular design allows to be integrated in line with other KHS systems, such as the Innosept Asbofill unit for hygienic filling of sensitive products.

At NPE, KHS plans to show off its Factor 100 PET bottle that debuted last fall at the Drinktec show in Germany. At 5 g, it's said to be the lightest known half-liter PET bottle for still water.

The company will also tout its preferential-heating technology for oval containers and for wide necks (up to 70 mm), both of which are said to be gaining in market importance. A third area of development on show is FreshSafe PET, which provides barrier protection for sensitive juices and carbonated soft drinks by covering the inside of the bottle with a wafer-thin layer of silicon oxide (glass). The coating is applied by KHS's Plasmax machine.

SIDE S.A. of Spain (***sidemachines.com***) will present its new generation of linear RSBM machines. They employ ABB variable-frequency drives, improved heating controls (Siemens), reduced mechanical movements to minimize wear, and easier access to the preform loader. These machines include the model 2006e, which takes up to six cavities for products from 250 ml to 3 L and output up to 10,000 bph. Model 2003eG is a two-cavity unit for up to 10 L containers and outputs from 2200 to 2600 bph.

SIDE will also feature its T-handle technology (also shown at NPE2015), which produces PET jugs with a pinched handle up to 36 mm deep through compression molding in the tool. It reportedly can make PET handleware competitive with HDPE, owing to higher throughputs for PET.

1Blow of France (***1blow.com***), which supplies extremely compact RSBM systems, will highlight its next-generation Model 4LO for makers of custom PET bottles. This all-electric system is labeled "O" for "oval" bottles and runs up to four cavities and bottles up to 2.5 L. It is distinguished by its ability to accommodate all five of the company's Key Technology Kits—for preferential and offset-neck heating; neck orientation for flip-top caps (without requiring a tab or notch in the preform neck); heat setting; base inversion for hot filling (allows for base push-up in the blow mold in two or more increments and for diaphragm bases); and Sure Grip—using a multi-stage mold insert system that imparts a deeper grip into the bottle than can be produced in standard stretch-blow systems, the company claims.

New 4LO all-electric reheat stretch-blow system from 1Blow of France is optimized for custom PET bottles with complex shapes.

And Terekas UAB of Lithuania will present the newest version of its highly versatile FlexBlow RSBM system (***flexblow.com***). The FlexBlow 2 WM is able to produce both wide-mouth (110-mm) and narrow-neck (28-mm) containers. It can mold up to 73-mm necks in two cavities and wider necks in one cavity. Bottles from 1.5 to 3 L can be molded at 700 to 750/hr. A neck change—including the mandrel head and molds—takes 22 min. Changing just the mold requires loosening four bolts and takes only 5 min.

A number of upgrades on this model include expanding the oven pitch from 63.5 to 91 mm, improved reflectors for more uniform heating, and more robust transport of the preforms through the system. Preform handling has also been adjusted to handle very small support rings (down to 0.8 mm) for cosmetics jars and complex-shaped containers. And both air and water cooling are now available to cool the neck inside the oven.

Another new feature is customized preform grippers made by 3D printing. This allows for very precise detailing for custom designs and allows for quick changes, too. One FlexBlow customer ordered grippers for five different neck sizes, so Terekas color-coded the grippers in anodized aluminum.

(Late news received from Nissei ASB Co. and Amsler Equipment appears in the Keeping Up section.) PT

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THERMOFORMING AT NPE2018

Meeting the Need for Speed, Flexibility, Quality

In thermoforming for packaging, it's all about higher speeds, more flexibility to swap out tools, less waste, and a higher degree of automation.

By Jim Callari,
Editorial Director

In thermoforming, NPE2018 will be mostly about packaging. While the Thermoforming Zone in the South Hall will be a showcase of technology for both thin- and heavy-gauge forming, the machines running throughout the show will focus mainly on new developments in packaging, where faster cycles, quicker tool changes, and automation will be emphasized as formers look to raise the bar on efficiency.

The new M100 from Gabler Thermoform GmbH (*gabler-thermoform.com*) is billed as a revolutionary new tilt-bed machine, offering output increases of up to 50% compared with current industry standards. The machine will be forming a transparent PP drinking cup with a 69.5-mm diam. and height of 96 mm using a 90-cavity tool supplied by Marbach. A completely re-engineered forming station with the latest drive and guide technology provides a forming area of 1130 x 550 mm.

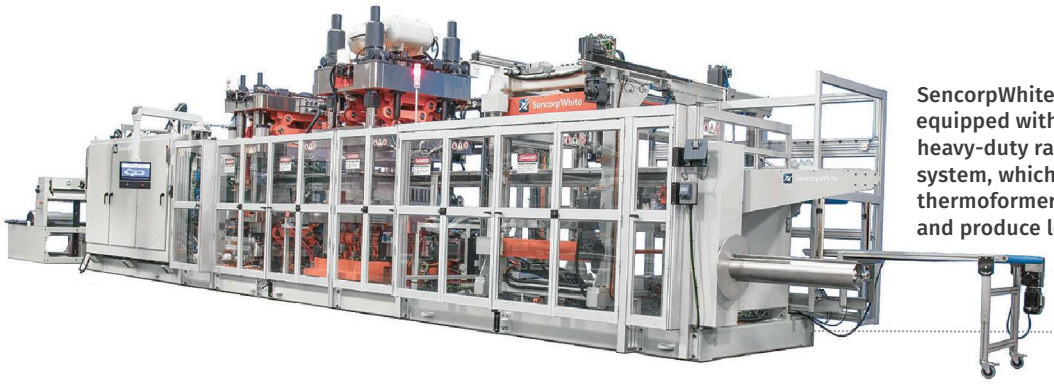
Gabler's new M100 is billed as a revolutionary new tilt-bed machine, offering output increases of up to 50% compared with current industry standards.

The M100 reportedly combines both performance and high-end technology while reducing energy consumption. Other machine features include a user-friendly touchscreen, reverse-stacker automation, Gabler's SpeedFlow forming-air system, and improved production-monitoring and process-optimization features.

GN Thermoforming's GN800 is designed to work with minimal sheet thicknesses. This, combined with the common-edge-cut-tooling system, is said to significantly increase finished-part output per pound of material.

GN Thermoforming Equipment (*gnplastics.com*) will showcase its GN800 machine for the first time in North America. Standard features include forming capability of 5 in. above and below the sheet line, in-mold-cut capability, auto-grease, heavy-duty bearings in the toggle system, and high-efficiency heaters.

Among GN's top priorities are improving productivity and ensuring that processors produce the most finished parts per pound of sheet. To that end, the GN800 is geared to work with minimal sheet thicknesses, and the company has developed common-edge-cut tooling technology for its contact-heat thermoformers. Common-edge tooling offers the ability to form a series of square or rectangular trays in a row or multiple rows while eliminating all web between the edges of the products. Besides improving materials utilization, it fits with sustainability goals of many consumer packaged-goods companies.



SencorpWhite's Ultra 2 is equipped with a more robust, heavy-duty rail transport system, which reportedly lets thermoformers use less material and produce less waste.

At NPE2018, GN will demonstrate a common-edge-cut tool that was developed for the GN800 thermoformer in collaboration with Gravolab, a toolmaker from Romania. GN will run a meat tray in PET/PE laminate with a 12-cavity mold while maintaining a reduced scrap rate of 18%.

SencorpWhite (***sencorpwhite.com***) will take the wraps off the Ultra 2. Designed for more precision and control of form and trim—along with efficiency—the Ultra 2 is equipped with a more robust, heavy-duty, rail-transport system said to be unmatched in the industry. This new system allows processors to use less material and generate less waste. The Ultra 2 utilizes a proprietary off-load system that's claimed to be up to 70% faster than previous designs. It also uses inline steel-rule tools that cost one-tenth as much as standard punch-and-die tooling and reportedly can be changed in hours, not days.

Illig (***illigusa.com***) will display its RKDP 72 thermoformer running a six-up tool for PET tray production at 42 cycles/min.

Kiefel (***kiefel.com***) will form PP coffee K-cups on its KTR-6 thermoformer equipped with new tooling from Bosch-Sprang.

WM Thermoforming (***wm-thermoforming.com***) will showcase its FC 780 IM thermoformer with a six-up tool from Kiefer to produce tamper-evident PET clamshells, while OMG (***omgitaly.com***) will run a six-up tool.

Interestingly, all these machine builders will reportedly be using Hytac syntactic-foam plug-assist materials furnished by CMT Materials (***cmtmaterials.com***). The company says studies on the economic impact of plug-material selection show that Hytac plug assists help processors manage wall-thickness variation, reduce starting gauge, and improve cycle times.

CMT's Hytac syntactic-foam plug-assist materials will be shown at its booth as well as in action on numerous thermoforming machines at the show.

"We continue to enjoy strong growth for copolymer and thermoplastic plug materials as the global plastics packaging market continues to evolve and grow," says Conor Carlin, CMT's sales and marketing manager. Carlin notes that CMT's growth can be traced in part to material shifts away from PS to PP to new multilayer films. "These more complex polymers require more sophisticated plug assists beyond our basic epoxy-structured materials," he notes. The main driving trends are growing popularity of ready-to-eat meals, changing consumer habits, and growing disposable income in emerging Asian economies, Carlin adds.

"More complex polymers require more sophisticated plug assists beyond basic epoxy-structured materials."

North American processors also show continued growth in areas such as large bakery items, tamper-evident clamshells, and medical device packages. "The pace of product and package design is speeding up, with custom formers moving from prototype to production sometimes in less than four weeks," states Carlin.

Ranger Automation's (***rangerautomation.com***) new TR Series robots increase productivity and save labor on thermoforming lines and other packaging applications. Ultra-high-speed servo drives allow part extraction and stacking at cycle times as fast as 3 sec. The controls feature convenient templates to create stacking patterns for organized product flow, which can eliminate two-thirds of labor requirements on the line. TR robots can fit any new or existing thermoformer, with configurations available to stack parts off the side or at the end of the line, or with the downstacker option, to stack directly under the line onto indexing conveyors. PT

RECYCLING/SCRAP RECLAIM AT NPE2018

Technology Focuses on Boosting Regrind Consistency, Pellet Quality

There will be no shortage of new technology and highlights of the latest trends in recycling and sustainability at NPE2018.

The potential of plastics recycling in the U.S. is massive, thanks to several factors, including the reduction of post-consumer plastic waste imports by China and pledges from brand owners to increase the amount of recycled material in their products. With all that in mind, expect recycling to make a big splash at NPE2018, with plenty of new technology developments, a first-hand demonstration of recycling in action, and a summit dedicated to recycling and sustainable practices.

By Heather Caliendo, *Senior Editor*

RECYCLING SYSTEMS

Erema North America (***erema.com***) will showcase an Intarema 1108 T live at the booth, processing clean LDPE production waste direct and without pre-shredding to make high-quality regrind. The company will also provide details on what it claims is the world's first R-PET inline preform system at its booth. SIPA, an Italian manufacturer of PET packaging machinery (***sipa.it***), joined forces with Erema to develop a flexible, direct method to make food-contact-compliant preforms from recycled PET flakes in a continuous process.

Clean LDPE film waste will be processed live at the Erema booth on an Intarema 1108 T to make high-grade scrap.

Erema's new business unit, Powerfil, which is responsible for the company's filtration products, will be represented at NPE for the first time. The filtration systems are now also available as individual components for extrusion lines from other suppliers.

Starlinger will present its woven packaging for consumer goods from R-PET flakes.

Starlinger will set up a "smelling table" where visitors can smell the difference between input material and "smell-improved" granulate.

The WKS shredding line from Weima America (***weima.com***) will make its North American debut; it can process everything from bulky objects to tear-resistant fibers and film. A swing ram on rolls inside the cutting chamber provides for consistent infeed of materials. An inspection flap inside the chamber allows easy access for maintenance and to clear any foreign objects. These shredders come equipped with hydraulic drives or power-belt drives, depending on the application. The rotor type also depends on the application—a V-rotor for lumps and large objects, or an F-rotor for fibers and film.

In addition, the large Weima WLK 30 Super Jumbo will be on display. It is sized for large pieces of scrap or large throughput quantities. The WLK Super Jumbo features a rotor diam. of 700 mm and more than 80 optional features.

Weima, in partnership with the Plastics Industry Association (PLASTICS) and Commercial Plastics Recycling Inc. (CPR), is one of the Official Recycling Partners of NPE2018. CPR will have a team on site to collect and remove plastic scrap from the show floor and transport it to a parking lot. There, Weima will have a WLK 15

Ettlinger's ERF350 melt filter can achieve a maximum throughput of 8300 lb/hr.

single-shaft shredder to process the plastic waste on the spot. Size reduction will reduce the number of trucks CPR must use to haul the scrap from the show.

New technology developed by Austrian manufacturer Starlinger & Co. GmbH (*starlinger-sahm.com*) can produce woven-tape fabric directly from PET bottle flakes. With Starlinger's "bottle-to-bag" technology, no virgin material is needed. Current applications are large FIBCs (Flexible Intermediate Bulk Containers) and PP*STAR pinch-bottom bags for packaging products such as dry pet food, fertilizer, sugar, flour or rice. At NPE, Starlinger will exhibit an rPET FIBC.

Starlinger will also highlight its odor-reduction technology that reportedly produces a "smell-improved" granulate that can be used in a wide range of applications. The three-step procedure (material preparation, degassing and post-treatment) eliminates even deeply embedded odors, according to the company. The method works without additives. At NPE2018, a "smelling table" will allow visitors to smell the difference between input material and smell-improved regranulate.

MELT FILTER FOR RECYCLING

Ettlinger (*ettlinger.com*), now part of the Maag Group, will present its newest melt filter, the ERF350, which it claims can raise throughput to a new level. The ERF350 is the first model in a new, performance-enhanced generation. Depending on the type and level of contamination in the melt and the selected screen size, it achieves a maximum throughput of 8300 lb/hr. This represents an increase of around 28% over the ERF250, using the same filtration surface at the same small footprint with high energy efficiency. Ettlinger ERF filters are suitable for filtering all standard polyolefins and polystyrenes as well as numerous engineering plastics, TPEs and TPU. Foreign particles such as paper, aluminum, wood, elastomers, or high-melting polymer composites can be removed from materials containing up to 18% contaminants.

Ettlinger will also bring its newest ECO continuous melt filter to the show. Whereas the ERF series is optimized for separating foreign particles from heavily contaminated polymers, the ECO series filters very easy-flowing materials such as PET, super-high-flow PP, or nylon containing up to 1.5% contaminants, as well as polyolefins and PS for extrusion of film, sheet, and other semi-finished products. The ECO series is offered in two sizes, the ECO 200 and ECO 250, with screens from 80 to 1000 µm and a max. throughput of 3900 or 6600 lb/hr, respectively

All Ettlinger filters are self-cleaning with a rotating, perforated drum, through which there is a continuous flow of melt from the outside to the inside. A scraper removes the contaminants that are held back on the surface and feeds them to the discharge system. This enables the filter to be used fully automatically and without any disruptions over a period of weeks and months without having to replace the screen. The advantages are ultra-low melt losses and good mixing and homogenizing of the melts.

NEW GRANULATORS, GRINDERS

Conair (*conairgroup.com*) will launch a new portfolio of granulators with standard features that reportedly include improved sound insulation, hardened and water-cooled cutting chambers on most models, and bigger screens for increased throughput compared with the company's previous offerings. Seven models will be on display, in configurations for injection and blow molding and pipe/profile and film/sheet extrusion. The new line includes 14 models with rotor diameters of 6 to 23 in. and maximum throughputs from 80 to 3800 lb/hr. Tangential-feed cutting chambers are standard on smaller grinders, while large units come in a super-tangential configuration to facilitate feeding of large, bulky scrap. Three-blade open rotors are also standard, and other rotor designs are available.

Special features include cutting chambers of abrasion-resistant steel, hardened to 550 HV, water cooling on machines with 12-in. diam. and larger rotors, and screen areas equal to 50% of the rotor diameter, or 180°, for higher throughput without added horsepower. Larger granulators and specialty units will be added to the line in the future.

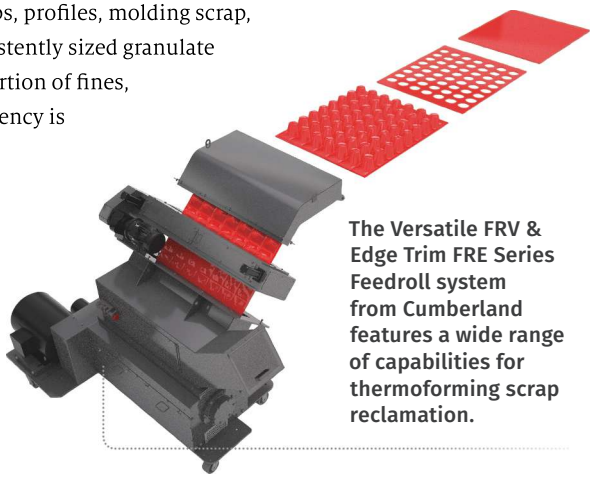
The new 12 Series granulators are part of an entirely new portfolio of granulators from Conair Group.

Wittmann Battenfeld (*wittmann-group.com*) will introduce its new S-Max screenless granulators and also show G-Max conventional granulators and below-the-press auger-feed granulators. Regarding S-Max, Wittmann says the company refined the stationary cutting block and the rotary blades to produce more uniform regrind and fewer fines/longs. Recently developed G-Max granulators have a control pendant on a cable that can reach outside a safety enclosure and communicate with the machine control so that the granulator shuts down when the press is off to save energy.

Cumberland (*acscorporate.com/cumberland*) will showcase its T50 Series central granulators, which come in a full range of size and design options and are built for applications ranging from large injection or blow molded scrap to furniture components, and appliance parts. They have precision-tolerance cutting chambers to create regrind consistency and Twin Shear knife design that reportedly reduces energy consumption. Rotating knives are fixed, allowing adjustment to take place at the bed knife. A new linear-actuated rear cutting-chamber door offers easy access for bed-knife maintenance. Another part of the "wide-open" design is a new rear hopper door with a zero-speed locking mechanism and improved seal. Locking the rotor is now as simple as the push of a button and access for cleaning is only possible when the rotor stops spinning.

In addition, Cumberland will showcase a new Versatile FRV & Edge Trim FRE Series feedroll system to feed thermoforming scrap to a granulator. Versatile FRV Series feedrolls up to 56 in. wide come in two versions to run thin film or deep-draw parts up to 8-in. tall. The unit is said to reduce jams during startup of a thermoformer.

Vecoplan (*vecoplanllc.com*) will introduce the VTH 65 Grinder for single-stage size reduction of plastic scrap. It handles production waste such as sheet strips, profiles, molding scrap, and pipe. It produces a consistently sized granulate with an extremely low proportion of fines, Vecoplan states. This consistency is achieved through the interaction of the VTH 65's patented infeed system with Vecoplan's exclusive geometric cutting sequence.



The Versatile FRV & Edge Trim FRE Series Feedroll system from Cumberland features a wide range of capabilities for thermoforming scrap reclamation.

Top and bottom feed rollers grip long scrap as it enters the VTH 65. Clamped between the two rollers, material is stabilized and fed it into the grinder's rotor at a precise cutting angle. These rollers also make subtle adjustments to feed speeds via automatic frequency controls. This assures that material enters the cutting process at optimal rates to achieve consistently sized particulate.

RE|FOCUS ZONE AND RECYCLING SUMMIT

The Re|focus Zone stems from the Zero Waste Zone that was introduced by PLASTICS at NPE2015. This year it will feature 56 exhibitors that will explore actionable steps toward incorporating sustainable practices into plastics manufacturing.

The 2018 Re|focus Sustainability & Recycling Summit (Tues., May 8 to Thurs., May 10) is co-located with the expanded Re|focus Zone. Oliver Campbell, director of worldwide procurement & packaging at Dell Technologies, headlines the summit, where he will deliver the keynote presentation on Tuesday at 1:30 pm, about how Dell launched a program to create a commercially scalable supply of plastics recovered from the ocean that can be used in product packaging.

The sessions are:

TUESDAY: Recycling Game Changer: Moving Beyond Mechanical Recycling (3:15-4:45 PM) This will explore cutting-edge technologies that expand the boundaries of traditional recycling and allow the industry to profitably use more recycled materials. It will be moderated by Robert Render, commercial manager at Ravago Recycling Group.

WEDNESDAY: Advances in Composite Recycling (1:15-2:45 PM) This will feature successes in recycling composite materials, which may eventually be one of the most valuable recycled feedstreams. The session will be moderated by Chris Surbrook, new business development at Midland Compounding Co.

Under One Roof: Investing in Onsite Plastic Reprocessing at MRFs (3:15-4:45 PM) The session uncovers the steps to upgrade and enhance plastic reprocessing capabilities at material-recovery facilities (MRFs) in order to keep up with rapidly changing global markets. Moderator: Jim Keefe, executive v.p. & group publisher at Recycling Today Media Group.

THURSDAY: Biobased Bioplastic Polymers and the Future of Bottling (9:00-10:30 AM) This session will highlight recent trends in the booming bioplastics industry, including new polymers, products and production techniques. Moderator: Patrick Krieger, assistant dir., Regulatory and Technical Affairs at PLASTICS. Featuring Michael A. Saltzberg PhD of DuPont Industrial Biosciences, John Bissell of Origin Materials, and Jose Augusto Viveiro of Braskem.

Additives for Upcycling (10:45 AM–12:15 PM) This session will explore the latest in additive compounding, which has the potential to turn recycled plastics back into materials with near-virgin properties. Moderator: Mark Richardson, engineering consultant at Series One.

Something new to look for in the Re|focus Zone is the Sustainability Lounge, a space to learn about PLASTICS and how companies can get involved in the sustainable initiatives it offers. There will also be meeting spaces, demonstrations, and a cash bar. PT

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ADDITIVE MANUFACTURING AT NPE2018

Lots of Prototyping ... and Some Manufacturing Too

As a growing industry, there will be lots of 'firsts' at NPE, including a new zone and workshop.

Forecast 3D invested in 12 HP Multi Jet Fusion 3D printer systems to target production, not prototyping. The company will discuss this during the 3D Printing Workshop.

By Heather Caliendo, *Senior Editor*

Additive manufacturing (AM) technology—also referred to as 3D printing—continues to make its mark in plastics, with more in the industry turning to the process to accelerate product development and even produce final parts. New to NPE2018 is not only a focus on 3D printing but also "4D printing." This is where an object is 3D printed using a programmable material that enables the part to adjust its appearance or shape over time (the fourth dimension) by using internal or external stimuli, according to the business consulting firm Grand View Research, San Francisco.

Stratasys, Eden Prairie, Minn., is working on this new process with MIT's Self-Assembly Lab, which focuses on developing self-assembly technologies for large-scale structures. Their approach involves printing a multi-material composition and using the different moisture-absorbing properties of the materials to activate the self-assembly process.

Parts made from Proto Labs' Multi Jet Fusion system. The company will exhibit at the 3D Printing/4D Printing Zone.

The show will feature the 3D/4D Printing Zone, located in the South Hall, which will feature ways that AM technology is revolutionizing new-product creation. The zone features 30 exhibitors dedicated to the latest 3D/4D printing trends and technologies. Expect to see exhibitors representing three countries and a range of industries, from automotive to healthcare, all putting on display the wide variety of uses for AM in today's rapidly digitizing world. Here show attendees will see the technologies enabling many companies to produce prototypes, mold components and finished parts directly from digital files.

At NPE2018, Forecast 3D (***forecast3d.com***) will present how to use 3D printing for production manufacturing. The company claims that its AM technologies can can compete with injection molding in high-volume part production. The technology that empowers them to do this is HP's Multi Jet Fusion 3D printers—the company has 12 of them and will be getting more soon. Its display at the show will include samples and its booth will focus on how 3D printing can be used for production.

Proto Labs (***protolabs.com***), a digital manufacturer of custom prototypes and on-demand production parts, will exhibit in the 3D printing pavilion and will also display custom parts made using its quick-turn injection molding, CNC machining, and sheet-metal fabrication services.

Arburg (***arburg.com***) will bring two of its freeformer 3D printers to NPE2018, demonstrating how it's suitable not just for prototyping, but also for manufacturing functional parts. Attendees will be able to handle parts to see their functionality and quality for themselves.

Freeformer customers can qualify their own materials for the printer and optimize the freely programmable process parameters specifically for the application at hand. The machine builder believes it is an advantage that certified original materials can be used, for example, for medical technology or the aerospace industry. In addition to amorphous standard granules such as ABS, PC and nylon 12, Arburg's continuously expanding range of qualified materials now includes TPE, medical-grade PLLA, PC approved for the aerospace industry, and semi-crystalline PP.

Arburg's freeformer is designed for industrial additive manufacturing of functional parts using standard injection molding pellets. Arburg will also give a presentation on this at the 3D Printing Workshop.

On the metal side, Plustech Inc. (***plustech-inc.com***) will introduce the OPM250 metal 3D printer, which combines laser sintering of metal powder and high-speed milling in the same machine. This can speed production of tooling components, such as cores and cavities with conformal cooling channels. Additive manufacturing reportedly can produce one-piece components that would normally be assembled from multiple parts.

3D PRINTING WORKSHOP

The 3D/4D Printing Zone will feature a new 3D Printing Workshop on the afternoon of Wednesday, May 9 presented by *Additive Manufacturing* magazine and *Plastics Technology*, sister publications within Gardner Business Media. The workshop will examine everything related to 3D printing from a plastics-processing perspective. Topics include short-run production, conformal cooling, end-of-arm tooling, bridge tooling, and material advances. At press time, the scheduled sessions are:

Plustech's OPM250 metal 3D printer combines laser sintering of metal powder and high-speed milling in the same machine. It can make mold components with conformal cooling built in.

Multi Jet Fusion vs. Traditional Mass Production Methods (1:00-1:45 PM) Forecast 3D has been providing 3D printing services for more than 20 years and currently has 30+ printers—SLA, FDM, PolyJet, MJF and SLM. Forecast3D invested in 12 MJF systems to specifically target production, not prototyping. This presentation will be about the company's experience in the industry and why it has invested heavily in the future of production with MJF. Presenters: Ken Burns, technical sales director of Forecast 3D, and David Tucker, market development manager for 3D printing at HP Inc.

The Greatest Impact of AM: Conformal-Cooled Inserts (1:45-2:15 PM) Conformal cooling achieved with metal additive manufacturing and used in injection moldmaking is where traditional manufacturing will be most impacted by additive manufacturing. To successfully execute the merger of those two disciplines takes planning and a solid process. This presentation will walk through the key elements of this process and address the challenges that arise with each step. Presenter: Lou Young, president of Linear AMS.

New Composite Materials Make 3D-Printed Molds More Efficient and Affordable (2:15-2:45 PM) The presenter will introduce a new class of composite materials for 3D printing of injection molds that utilize carbon nanotubes and demonstrate how it can dramatically reduce the cost of producing molds while improving performance through shorter cycle times and extended mold life. Attendees will get detailed information on how to address design, printing, post-processing and mold operations relating to 3D printed molds. Presenter: Robert Zollo, president and founder, Avante Technology LLC.

Specialized Materials for Functional Prototyping and Low Volume Production (3:15-3:45 PM) Arburg's freeformer can run specialized materials to create fully functional components, such as true living hinges from PP. Interfacial Consultants, a contract R&D firm that has been actively developing new materials for additive manufacturing, will share how it can create customized materials for the freeformer at low volumes. Interfacial Consultants will talk about printing PP and Ultem as well as purge compound. Presenters: Thomas Raymond, manager of additive manufacturing, Arburg Inc.; and Philip Brunner, director of strategic accounts, Interfacial Consultants.

Influence of 3D Printing on Safety-Critical Performance Properties (3:45-4:15 PM) UL will share its latest research findings on the impact of 3D printing on safety-critical printed part properties, such as flammability, ignition, and electrical properties that were investigated for different 3D-printing parameters. Results were compared with conventional injection molded samples. Based on these new findings, and combined with known mechanical behavior, UL will highlight an approach for acceptance of 3D-printed materials and components in end-use products. Presenters: Thomas Fabian, R&D manager, material science, UL; and Kenneth R. Vessey Jr., staff engineer, UL Performance Materials Division. PT

HOT RUNNERS & TOOLING AT NPE2018

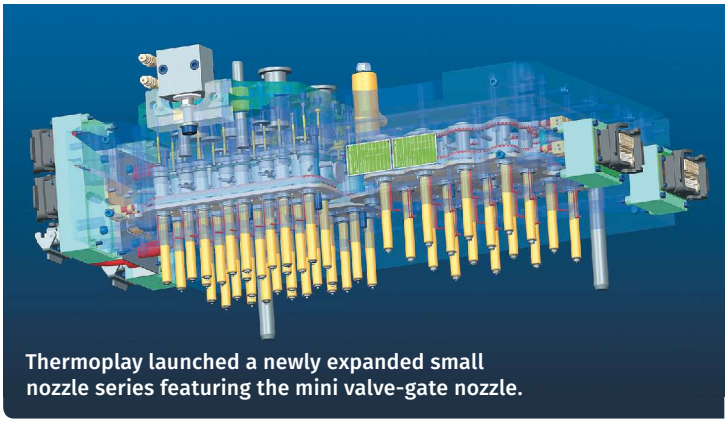
Hot Runners: Smarter & More Specialized

Hot-runner technology, like the companies utilizing it, is becoming highly specialized, building in focused functionality for the application to be molded. Like most of the equipment in the cell around it, it's also becoming smarter, sharing data and reacting to feedback from the press and more.

By Tony Deligio
Senior Editor

Hot-runner technology is increasingly being tailored to the very specific requirements of the end markets and applications it will be serving. That fine tuning is very much on display at NPE2018. For example, Milacron's Mold-Masters (***milacron.com***) is introducing additions and enhancements to its Fusion-Series G2 hot-runner line, which is geared towards large-part production where high-end quality is required. Delivered completely pre-assembled and pre-plumbed, the line features field-replaceable heater bands for quick maintenance and shot sizes that range from less than 15 g to more than 3500 g.

New at NPE2018 will be Mold-Masters F3000 and F8000 nozzles. The F3000 has a shot capacity of approximately 15 g and targets smaller under-hood parts, technical automotive components, and price-sensitive packaging and consumer goods. The F8000 increases the top shot capacity to 5000 g via runner diameters as large as 28 mm, with nozzle lengths that can exceed 1 meter. Target applications include bumper fascia, instrument panels, door panels and large white goods.



Thermoplay launched a newly expanded small nozzle series featuring the mini valve-gate nozzle.

Mold-Masters is also introducing a second generation of its Melt-Cube side-gating hot runner. This system is said to provide vestige control, low pressure drop, and precise cavity-to-cavity rheological balance. Melt-Cube allows simultaneous direct side gating of up to eight cavities per Cube for high-cavitation molds. Tips are clamped by a single bolt in sets of two, greatly reducing assembly/disassembly times. Manifolds can be accessed from the parting line, and the system uses brazed heaters for a more precise thermal profile and superior reliability. Show attendees can experience assembly-time reduction first hand with a hands-on display of the Melt-Cube in the booth.

Mold-Masters also will be highlighting a number of case studies showing successes of its Master-Series hot runners with sensitive bioresins in small to medium-size parts with single-nozzle and high-cavity systems.

Introduced at Fakuma 2015, the Mold-Masters Dura+ hot-runner system has been enhanced to include new Dura+ nozzles, full stainless-steel construction, and a highly polished runner finish. The line targets automotive lens applications. Mold-Masters will also display its TempMaster Series hot-runner controllers. Offering a compact cabinet and the ability to control 1 to more than 500 zones, the controllers apply Mold-Masters' APS auto-tuning control algorithm.

Milacron will also highlight a new way to take advantage of its Kortec co-injection technology for products needing a three-layer barrier sandwich structure. Up to now, Milacron had provided turnkey systems consisting of a two-component injection machine, Kortec hot runner, and engineering support—including integration assistance, startup, and training. Now, molders who wish to use an existing press can choose the new Kortec Connect package, which is comprised of the Kortec hot runner, Mold-Masters E-Multi secondary injection unit as an add-on, and the same engineering support.

Synventive Molding Solutions (***synventive.com***) will show the next generation of its eGate system of electronically controlled valve gates, which can control valve-pin position within 0.01 mm.

The company will also feature its synflow pin control, which can be added to any of Synventive's activeGate systems through an external hookup so that molders do not have to commit to a flow-control technology for the life of the tool.

Synflow's third generation has added the ability to stop the pin and hold it at any position mid-stroke. This allows for individual flow control of each nozzle to balance family molds or fill complex multi-gated geometries. Alternating opening profiles can be programmed, offering the ability to pre-fill cold runners or create differential packing within complex multi-gated parts.

NPE2018 will afford attendees four different opportunities to see HRSFlow's (***hrsflow.com***) FLEXflow electrically driven valve-gate system in action. In Wittmann Battenfeld's booth, an automotive spoiler will be molded using a five-drop FLEXflow system. At Yizumi-HPM, a tool case will be molded using a three-drop FLEXflow system, in a process that also applies MuCell foaming and back injection. At KraussMaffei, a lightweight center-console armrest will be molded in cooperation with ProperTooling. Special features include a multicomponent (2 + 3) drop FLEXflow system enabling overmolding of TPV. A grained interior-trim component with decorative foils will be molded at Engel, using a five-drop FLEXflow system paired with in-mold graining and back injection of PP via MuCell foaming.

Günther Hot Runner Technology (***guenther-hotrunner.com***) will feature a new two-phase hot-runner stepper motor that can individually control up to 16 valve pins. The DPE motors come in four versions differing by the number of channels: 4, 8, 12 and 16. All versions feature a central 7-in. LCD touchscreen display that shows all the all stepper channels' current position in color.

Thermoplay (***thermoplay.com***) is launching a newly expanded small-nozzle series featuring the F Ø11 mini valve-gate nozzle. Designed to meet the heightening requirements of special applications in cosmetic, medical and packaging markets, the new nozzle's larger inner diameter ranges from 3.5 to 4 mm, allowing increased melt flow. The minimum pitch for the F Ø11 valve-gate version is 17 mm; that can be reduced to 13 mm with an open gate.

Synventive's new-generation valve-gate control has added the ability to stop the pin and hold it at any position mid-stroke.

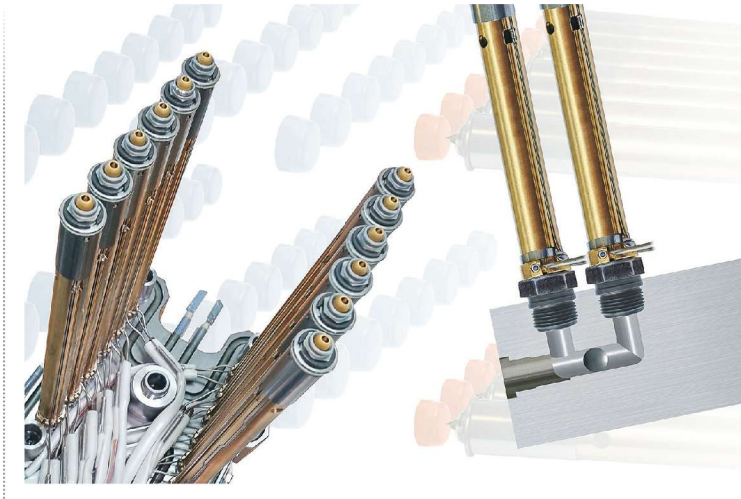
F Ø11 valve-gate actuation can be pneumatic or hydraulic, as well as individually or plate actuated. The pin, available in a cylindrical or conical option, is designed to minimize the witness mark on the part.

Also from Thermoplay, the DL-1B nozzle has an extended tip that is advantageous when the injection point is in critical locations that require a very small tip.

Incoe (***incoe.com***) will expand its DF (Direct Flow) nozzle line at NPE2018. Originally launched at K 2016 with a 12-mm flow diam., the series now includes a slim DF 5 nozzle with 5-mm diam. and SBH (Slim Base Heater). Incoe notes that the "slim" design reduces the DF 5's outer diameter by almost 25%, allowing nozzles with a large, 5-mm flow channel to be installed as close as 18 mm.

Incoe also has upgraded its GSCmini compact, low-cost, timer-based valve-gate sequencing controller. The new version can control either pneumatic or hydraulic valve actuation. Incoe recommends it for valve-gated applications that do not require sensors or linear transducer control, and for use in a tool room.

Männer (***maenner-group.com***) is extending its Slimline nozzle range, launching a new product for valve gating in polyolefin appli-



The slim design of Incoe's DF 5 hot-runner nozzle reduces the outer diameter by almost 25%.

cations with limited space. The small diameter—6.5 mm (0.256 in.)—of the Slimline caps and closure nozzle targets high-cavitation packaging applications.

Osco's Jumbo valve-gate nozzle is designed for large shots and shear-sensitive resins. With what are said to be the largest feed channels ever used, Osco (***oscosystems.com***) engineered this new, custom single-drop nozzle to deliver 28 lb of plastic for producing a container bin. The Jumbo eliminates the need for a multi-drop manifold system along with the temperature and valve-gate controllers. Significantly less time is needed in machining to accept the Jumbo nozzle compared with a four-drop manifold system. The Jumbo nozzle also requires less time to install, wire and plumb.

Hasco's Vario Shot nozzle series will be completed at NPE2018 with the addition of the Type 50 nozzle size. A new screw-in Vario Shot will also be introduced. Hasco (***hasco.com***) says this design allows for ready-to-mount systems.

GETTING IN CONTROL

Sise (***en.sise-plastics.com***) is presenting its latest generation of multizone controllers. Sise says this new generation will offer four different soft starts, zone grouping, PTI function for thermocouple anomalies, Moldscan for real-time hot-runner diagnostics, and material-leak detection. Available in five sizes, the MV3, which ►

will eventually be able to control up to 336 zones, has three available power cards for 2.5, 15 and 30 amps. MV3's control uses a 10- or 15-in. touchscreen display. The system supports up to 11 languages and offers unlimited mold file memory. Sise notes that that MV3 can communicate with molding machines, supporting Industry 4.0, while monitoring and saving production temperatures.

New in temperature controllers is Incoe's I-Series Pro. Based on the established I-Series controller, the new Pro model provides 12 to 144 zones (two zones per card) in a compact footprint.

Gammaflux Controls Inc. (***gammaflux.com***) will be exhibiting the G24 and LEC lines of controllers, with the LEC running in 2-, 6- and 12-zone configurations. The G24 will be shown as a stand-alone controller and with an integrated sequential valve-gate controller (SVGC).

Athena Controls (***athenacontrols.com***) is working to expand the number of zones beyond the current 64 in its Bedros control system to 144 zones.

MOLD COMPONENTS/SUPPLIES

Milacron's DME (***dme.net***) business unit is launching a new quality certification for its American standard mold base. In addition to these mold bases, The new DME Machined-4-Quality standard applies to the company's American standard mold base A-Series, B-Series, AX, X and T-Series lines.

Meusburger's new E 3064 guide for inclined pins reportedly provides optimal surface contact with the inclined pin, resulting in a high force absorption. Meusburger (***meusburger.com***) notes that the machining of the pocket in the slide is possible without inclining, and that the slide stroke can be customized by adjusting the guide's position.

Meusburger's new E 1307 fine-centering unit is flat and requires minimal installation space. The DLC-coated centering elements are available with or without fixing holes, which enable maximum flexibility in design and reduce wear. Meusburger designed this centering element to be as small as possible for exact centering of individual inserts. The product features a compact design and defined installation positions, which prevent incorrect mounting of centering parts. Ensuring minimal wear, the unit is suited for use in clean rooms. The centering parts' large chamfer on the contact surface enables corner radii for better hardening results on the insert, while also facilitating assembly.

In mold-base technologies, Hasco (***hasco.com***) will highlight locating guide bushings with a circlip groove and new, individually printable nameplates for custom identification of molds (see Oct. '17 Keeping Up).

SelfLube offers bushings, wear strips, parting-line locks, and gib assemblies, among other products from its 10,000 standard part numbers.

CUMSA (***cumsa.com***) will launch two vacuum devices to remove trapped air from the mold cavity. The Double Action Vacuumjet (VB) and the Smart Vacuumjet (SV) are based on the Venturi principle, so that only 6 bar (90 psi) of compressed air are needed to pull out gases at rates up to 60 liters/min. CUMSA adds porous inserts and/or laminar vents in critical areas of the mold, including at end of fill, to remove gases during injection and create less resistance to melt flow. The VB and VS can now also blow off the vents with compressed air after every cycle through the same vacuum channel.

The Smart Vacuumjet (SV) senses and displays the level of vacuum achieved in the cavity. If the desired vacuum cannot be achieved after 5 sec, but levels exceed -200 mbar, the SV will close the valve and start injection, indicating the maximum achieved vacuum with red numbers (instead of green) in the display. If, however, after that time vacuum does not reach the minimum threshold, the unit will not send the signal to start injection to avoid production of low-quality parts, with the display indicating the cause of the producton stop.

The patent-pending Linked-Valve system of linkages from Plastixs (***plastixs.com***) allows a single lever to simultaneously operate mold-cooling supply and return lines. The product is currently available for use on both 1- and 1.5-in. Smartflow aluminum manifolds and Plastixs 1- and 1.5-in. compact stainless-steel manifolds.

DMS's NPE2018 display includes the Almo worm-gear device that enables inserts to be tightened and released inside the mold cavity without dismantling the mold. DMS (***dmscomponents.com***) will also show Bolex P ball-guided ejector bushings. Here, the balls do not run aligned but at a slight angle, enlarging the contact area and enabling greater load capacity. Also, the company's BZ hydraulic locking cylinders with robust cam-finger design are said to withstand heavy loads in a compact package for molds with side actions, slides or core pulls.

ALBA Enterprises (***albaent.com***) will feature its line of ejector couplers that automatically connect and disconnect on every cycle through the standard motions of the machine. This eliminates the need for specialized rods for each mold, while guaranteeing full return of the ejector plate. During a mold change, processors need only to move the machine knockout to the full back position. At that point, they are free from the mold and clear for removal of the tool. Since there is no manual connection or disconnection required, ALBA couplers are especially suited for use in machines that have little access to the ejector plate. They also allow for center ejection to be tied in.

SelfLube (*selflube.com*) will showcase its trunnion lifter slides, which come in inch and metric sizes and are available with or without self-lubricating graphite.

MOLDMAKING & MAINTENANCE PRODUCTS

Uddeholm (*bucorp.com*) will showcase Uddeholm Mirrax ESR at NPE2018. The premium-grade stainless steel is especially suited for molding applications, according to the company. Mirrax ESR is described as a high-polish stainless tool steel with a combination of toughness, corrosion resistance, and uniform hardness across large cross sections.

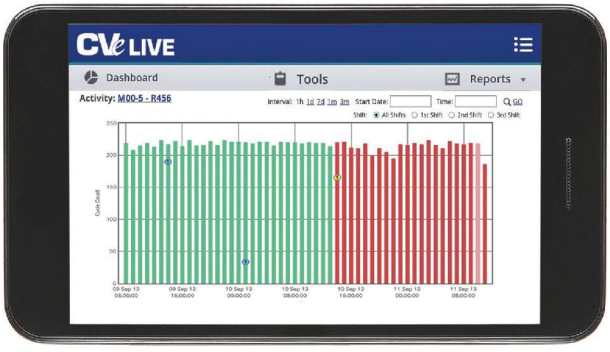
The company will also launch Corrax AM powder, a specially designed metal powder for additive manufacturing in plastics tooling applications.

Bales Metal Surface Solutions (*balesusa.com*) will highlight a number of coatings and finishes to protect metals from wear, abrasion and corrosion. Its Diamond E.N. product reportedly provides the uniform corrosion resistance of electroless nickel with the added toughness of diamond particles for a hardness of 57 Rockwell C.

MOLD MONITORING/TRACKING

Progressive Components (*procomps.com*) will introduce a monitoring and transmission platform that it says will advance the way the plastics industry monitors and maintains its tools. Progressive is pairing its tool-mounted CVe Monitor electronic mold-monitoring device to its CVe Live wireless device that relays data to the cloud-based CVe Live website.

New CVe Live features to be launched at NPE2018 include a Press Management Module that allows for scheduling, tracking, monitoring, and filing of all preventive-maintenance actions. An expanded electronic filing cabinet with the ability to add non-CVe assets to the database and store related documents has been added.



Progressive Components bills CVe live as a monitoring and transmission platform that will advance the way the plastics industry monitors and maintains its tools.

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TAIWAN SMART MACHINERY MAKE TOMORROW YOURS

Taiwan is small in geographic size, but it is considered a giant when it comes to smart machine revolution. Taiwan is home to major builders of plastic machines for decades and ranked the top 6 exporters in the world, as the output reached USD 1.16 billion in 2017.

To meet the growing global demand for smart automated manufacturing equipment in line with what has been dubbed "Industry 4.0," Taiwan's machinery companies are scrambling to turn out smart models by incorporating advanced information technology into their products such as product monitoring system via data collection.

Taiwan Kinki Machinery Co., Ltd. / Booth No.S17120
TKC machine controller with "ServiceNet" function can supply In Seconds at the Machine
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Everplast Machinery Co., Ltd. / Booth No.W9137
Integrated digital sensor data system contribute to precision control and provide basis for smart production machinery.

Fu Chun Shin Machinery Manufacture Co., Ltd. (FCS)
FCS divides Industry 4.0(Intelligent Manufacturing) into four steps.
- Process Stabilization: Injection machine can automatically adjust to adapt to the slight variation of injection conditions.
- Process Optimization: Application of process quality perception technology could not only improve production quality and yield, but also reduce production waste.
- Process Automation: The machine and the surrounding equipment mutually communicate and autonomously control the process.
- Intellectualization: Use smart monitoring and remote maintenance tools to reduce unplanned downtime and effective scheduled maintenance.

Maruka U.S.A., Inc/ Booth No. W911 And W1103

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BLOW MOLDING

Wide-Ranging PET Technologies for Higher Productivity & Specialty Products

In its largest NPE booth ever, Nissei ASB Machine Co. (U.S. office in Smyrna, Ga.) will bring five stretch-blow machines to Orlando, demonstrating a number of upgrades and special options that enhance productivity and allow production of a wide range of specialty PET containers from beer bottles, airline liquor miniatures, and sports drinks to premium cosmetics and wide-mouth jars. Integration with Industry 4.0 or the Internet of Things (IoT) is also on display.

• **ASB-12M v2:** NPE will see the launch of a revised version of this one-step machine that adds a new control system based on Industry 4.0 standards for factory integration. This servo-hydraulic machine will be molding a four-cavity, 40-ml, premium-quality, thick-walled cosmetic container in a family mold with two different designs. With a weight over 31 g, the resulting 2-mm wall thickness simulates the appeal of glass. Most notable, according to the company, is the short cycle time of 13.4 sec, vs. a typical 40+ sec for such a heavyweight container.

At NPE, Nissei ASB will mold (l. to r.) thick-wall PET cosmetic bottles (two different designs in a family mold); pasteurizable beer bottles; airline liquor miniatures in 48 cavities; sports bottles of Tritan copolyester; and heat-set, hot-fill jars that can accept a metal lug cap.

Normally, molding such a thick container on such a fast cycle would require specialized or expensive resins to avoid haziness from crystallization. Instead, Nissei ASB uses the preform conditioning station in these four-station machines to modify the preform's temperature profile, shape and thickness prior to its transfer to the blow station. Dry-cycle time of the machine has also been shortened by the next-generation computer control. The control features a larger PC-based touchscreen, which ASB plans to standardize across its model range. Major machine functions can be added or updated via software installation only.

This machine molds containers from 5 ml to 2.5 L in one to eight cavities. The model at the show has an optional long-stroke injection unit that provides a 50% increase in available shot size, suitable for thick cosmetic bottles.

• **ASB70DPH v4:** This medium-sized, four-station, one-stage machine will utilize a set of options that extend its versatility. These include an energy-saving servo-hydraulic system, 78% increased shot capacity with optional IU-50 injection unit; and extended daylight on the injection clamp for molding longer preforms. At NPE, this machine will mold a 700-ml sports bottle in Eastman's Tritan copolyester. The 90-g bottle will be molded in four cavities in 14.4 sec.

• **ASB-150DPX:** This servo-hydraulic machine is said to be the world's first triple-row, one-step injection stretch-blow machine. Making its debut in the Americas, this machine is designed for high outputs of small PET bottles in 24, 36 or 48 cavities. At NPE, it will mold 50-ml, 10.5-g airline liquor miniatures in what ASB says is an "unprecedented" 48 cavities with a cycle time of 8.6 sec, for output greater than 20,000 bph.

The container design requires a very small preform that ASB says would be impossible to handle and reheat in a two-step system. The company also notes that this triple-row machine has upgraded hydraulics and an optimized clamp stroke for faster injection clamping; and the blow-air circuit is optimized for small-bottle production, reducing air consumption by more than 50%.

ASB says this machine has generated strong interest in the dairy sector for flavored milk and yogurt drinks in 36 cavities. With 24 cavities, it can mold round or oval containers up to 300 ml with a 38-mm neck, suitable for single-serving juice or water.

• **HSB-2M/6:** This is a new model in a series of two-step, reheat machines with ASB's double-blow heat-setting process. This model can mold 1 L jars with thread diam. up to 86 mm in six cavities. It is aimed at hot-fillable and pasteurizable foods like pickles, jams, and sauces. The double-blow process is said to achieve the practical maximum heat resistance for PET of about 95 C (203 F). At NPE, it will mold six 500-ml jars with 80-mm neck in a 4.5-sec cycle (4800 bph). The neck is suitable for a metal, twist-off lug closure designed for filling at 88 C (190.4 F).

• **HSB-6N:** With fully electric clamp, this machine is for double-blow reheat stretch-blow molding of heat-resistant bottles with neck diam. up to 38 mm. Necks can be amorphous or crystallized. This machine will mold 650-ml beer bottles in six cavities and a 4.5-sec cycle (4800 bph). The bottles are designed to withstand tunnel pasteurization at 65 C (149 F) for 15 min.

404-699-7755 • nissei-asbus.com

BLOW MOLDING

Bottle & Preform Inspection Systems At NPE for First Time

Torus Measurement Systems of the UK (U.S. office in Golden, Colo.) will be exhibiting for the first time at NPE2018 next month, showing instruments for bottle and preform quality inspection. One example is the B302 Thread, Body & Thickness (TBT) Gauge for bottles and preforms (photo). It combines the inspection capability of the Torus B300 bottle wall-thickness gauge and the B305 automatic preform inspection system. The six-axis, noncontact TBT gauge combines automatic thread start and bottle alignment with confocal white-light technology to measure wall thickness and vision technology to measure neck finish, body dimensions, and perpendicularity.

At NPE, Torus will also demonstrate the B303 bottle burst gauge and will offer information on its other equipment, including the B301 semiautomatic preform gauge and B304 topload & volume gauge.

303-384-0279 • torus-group.com

BLOW MOLDING

New-Generation Automatic Baggers For Blow Molded Containers

The new BM Series from And&Or S.L.U. of Spain (U.S. office in Miami, Fla.) automatically arrays bottle layers and packs them in bags without operator intervention. Bags are formed from roll-fed heat-shrinkable film, so there is no need of preformed bags. It will be displayed at the upcoming NPE2018 show.

Features reportedly include compact footprint, easy integration in-line after the blow molder and leak detector, a heat sealer, easy adjustment and changeover with no need of change parts, and x-y bottle indexing or nesting feature for round bottles. Rolls of film are said to be replaceable in seconds. Micro-perforation of film for easy opening or tearing is optional (available in one, two, or three rows).

A wide range of models adapt to various bag sizes and line speeds. Single- or multi-lane bottle infeed is available. The BM Series is available as a stand-alone unit or together with a bag stacker or palletizer. A special "all-in-one" flexible solution, BCM/BCMS-RPZ, allows bagging, tray packing and slip-sheet palletizing in the same line.

And&Or offers a wide variety of downstream equipment and complete turnkey systems for plastic bottle blow molding. Products include takeouts, bottle handling, buffering and conveying, quality control (leak detectors, weight control, vision systems), spin trimming, neck milling and finishing, handle applicators, tray/box packing machines, bulk palletizers, tray formers, pallet handling, wrapping and strapping.

786-602-4187 • andyor.com

BLOW MOLDING

Large-Neck Spin Trimmer Packs Higher Speed

MTM Systems, div. of Lectro Engineering, St. Louis, will show at NPE2018 next month the MTM 2225 Horizontal N2N spin trimmer that can handle neck diameters greater than 6 in. at high speeds. It is designed for "log-style" (neck-to-neck) containers and can trim more than 100 logs/min. The new dual-belt trimmer fits in the same small footprint of the single-belt MTM 2025: 50 in. wide × 60 in. long. It comes with an infeed chute fully adjustable to fit most log designs.

MTM's upper and lower drive belts allow control of the rolling speed and direction the container will roll through the spin trimmer. Speeds and rotational direction can be controlled via the color touchscreen. Setup is said to be easy, accurate and repeatable with a new blade-holder design. This allows blade changes without any readjustments afterwards. The blades are pinned in location for exact fit and setup every time.

314-567-3100 • lectroengineering.com

BLOW MOLDING

Faster Takeaway for Shuttle Blow Molders

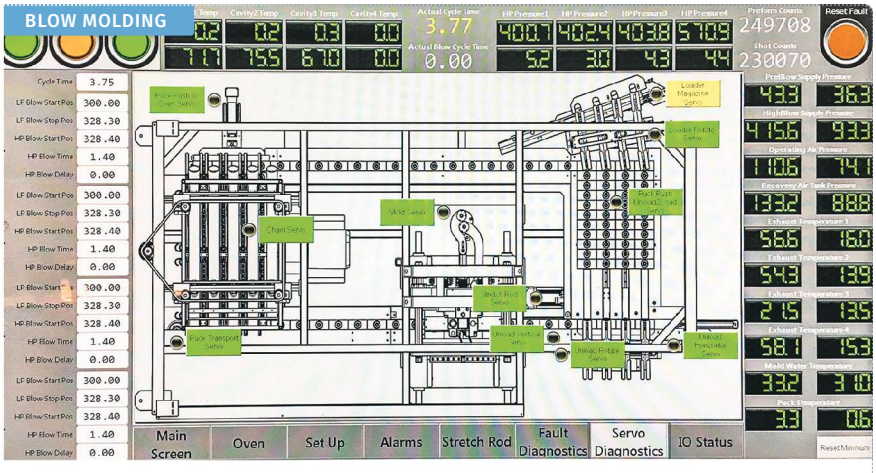
On display at next month's NPE2018 show in Orlando, Lectro Engineering's new, faster MTM 2001D takeaway system was designed with Bekum's "H" series in mind but is also suitable for other shuttle-type blow molders. Gearboxes have been upgraded to allow higher speed and handle greater torque. They also carry a three-year warranty, reportedly longer than for other gearboxes used on takeaways. Allen-Bradley PLC and servo motion-control system have also been upgraded to allow faster speed. And Lectro says its exclusive servo-driven dual-gripper design reduces linear motion by 50% compared with other systems, allowing for cycle times under 9 sec, claimed to be the fastest in the industry.

St. Louis-based Lectro's overhead wiring ducts allow for the main power and operator panel to be moved away from the takeaway so as to eliminate any trip hazards from cords or cables between the main panel and the takeaway. The two are mechanically connected, but the design still allows for a 20° swing in either direction. The main control cabinet is mounted on a mobile cart. The color touchscreen operator panel can store and recall up to 99 setup recipes. A self-diagnostic screen allows for faster troubleshooting.

Lectro also offers new shorter versions of the 2001D takeaway to meet customer needs. These can shorten overall length by as much as 14 in. Other features include a heavy-duty linear rail design, multi-directional scrap conveyor, and full guarding to ANSI specifications.

314-567-3100 • lectroengineering.com

BLOW MOLDING



Enhanced PET Stretch-Blow Machine And New Leak Tester

At NPE2018 next month, W. Amsler Equipment Inc., Richmond Hill, Ont., will introduce the next generation of its linear stretch-blow molder as well as a newly enhanced leak tester. The L42X all-electric reheat machine offers several new features for custom PET blow molders, including preferential heating, neck orientation, and hot-fill capability. It can make up to 2 L containers at up to 6500/hr in four cavities. It can also run two-cavity molds for containers up to 5 L. Neck finishes range from 18 to 70 mm.

The L42X has a 40-ton clamp and four parallel heating ovens, one for each cavity. It is equipped with 12 Bosch Rexroth servo motors, compared with three servos for the previous model. The extra motors are said to provide more repeatability and lower energy consumption, while requiring less wiring, which results in easier troubleshooting.

Other key features include agitated preform infeed to prevent bridging, preform temperature sensing prior to blow, pre-blow flow control for each cavity, water-cooled neck shields, and a large Windows-based touchscreen with access to assembly drawings, bills of materials, setup guides, troubleshooting, and training videos.

877-738-2569 • amslerequipment.net

BLOW MOLDING

On-Line Training For PET Processing

Plastic Technologies, Inc. (PTI), Holland, Ohio, a leading independent resource for PET package development, has expanded its training services with the PTI Online Academy. Providing the freedom to set your own schedule, this series of video tutorials (typically around 60 to 90 min each) includes courses on the following:

- Introduction to polymers and PET;
- Container design and development;
- Preform design;
- Barrier containers;
- PET recycling;
- Material handling and drying;
- Blow molding;
- Preform heating;
- Blow molding machine operation;
- Polymer to preform;
- Preform to bottle;
- PET industry overview, manufacture, and properties.

The content targets entry-level professionals, as well as seasoned veterans who can benefit from refresher courses.

419-867-5400 • plastictechnologies.com

INJECTION MOLDING

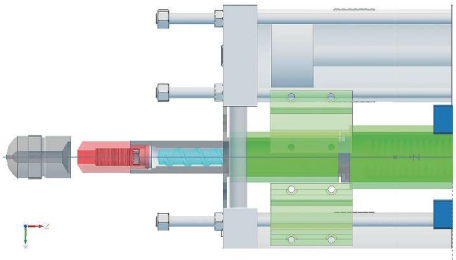
Novel Injection Unit With In-Line Screw/Plunger

Longstanding limitations of conventional reciprocating-screw injection molding machines are addressed by the new Inject-EX system from Md Plastics, Columbiana, Ohio. This injection unit, appearing for the first time at NPE2018 next month, can be supplied with hydraulic, hybrid, or all-electric drive. The all-electric version consists of a servo-driven screw connected in line with a plunger. The screw and plunger thereby move together as the entire injection unit reciprocates, driven by two servo motors and ballscrews mounted on either side of the unit.

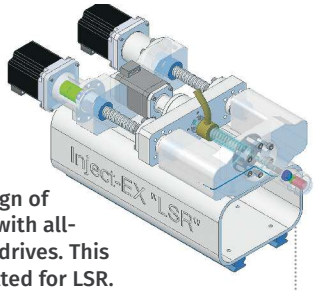
As explained by Michael Durina, president of Md Plastics, one well-known issue of conventional injection machines is inconsistent shot volume due to variability in closing of the check valve on the end of the screw at the start of injection. Another issue is that as the screw retracts during recovery, pellets experience a continuously changing L/D so their shear exposure is inconsistent, which leads to melt-viscosity variation. That effect is exacerbated by the fact that when the screw moves forward during injection, pellets fall down from the hopper into the empty flights that are provided to fill the shot. Those pellets are not compacted efficiently, which creates an issue during recovery of the next shot by adding shear due to screw slippage and a pause in recovery time.

The Inject-EX system solves the second problem because the screw (the company's Posi-Melt design) is stationary with respect to the feed hopper, which moves back and forth with the rest of the injection unit. Plastication of every pellet is therefore consistent, as in continuous extrusion, says Durina, even though this screw operates discontinuously.

As for the first problem, there is a check valve at the front of the screw, where it transitions to the plunger, but the valve is actually the same design used in Md Plastics' Mini-Shut shutoff nozzles rather than its nonreturn valves. This is a poppet valve that is spring loaded with Belleville washers. It therefore shuts immediately when the screw stops turning, not when it moves forward to inject.



Md Plastics' new Inject-EX injection unit with inline screw and plunger. The screw feeds melt through a spring-loaded check valve into a channel inside the center of the plunger. Version shown here has hydraulic cylinders to move the entire injector.



Advanced design of Inject-EX unit with all-servo-electric drives. This model is outfitted for LSR.

Melt passing through the valve is channeled through the center of the plunger until it reaches the front end, where it accumulates the shot in front of the plunger. To fill the mold, the entire injection unit moves forward, emptying the melt chamber in front of the plunger.

Durina is having a 20-ton machine built with the new injector by Chen Hsong of Hong Kong. That will be Durina's lab machine to further test and demonstrate the Inject-EX concept.

What's more, the Inject-EX machine will use Md Plastics' exclusive Temp-Tek melt-temperature and pressure sensor (see Oct. '15 Close Up). One sensor will be embedded in the melt chamber at the end of the plunger; another will be placed in the feed hopper. The first sensor will help ensure injection of a consistent mass of plastic, which is a function of consistent volume and density. The other will provide potentially valuable information about the temperature of pellets entering the screw, Durina says.

330-482-5100 • mdplastics.com

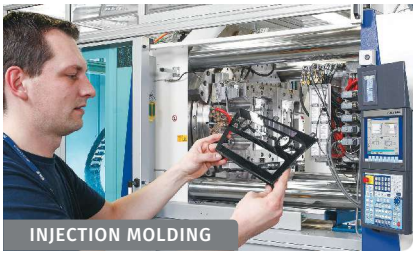
INJECTION MOLDING

Injection Machine Configured for In-Line Compounding

As reported in our feature previewing injection molding news at NPE2018 (p. 82), Wilmington Machinery, Wilmington, N.C., will show its recently developed Lumina MP800 medium-pressure injection press. This 800-ton unit with two-stage (screw/plunger) injection has an electric screw drive and energy-saving hydraulics with variable-frequency drive (VFD).

This press has a 6-in. extruder with throughput up to 2000 lb/hr. Additional information from the machine builder announces a new in-line compounding option whereby the fixed extruder would be equipped with a single screw of at least 30:1 L/D with dual mixing sections. It would be flood-fed with a mix of preblended materials to be homogenized in the extruder. The company claims uniform mixing of up to six components, thanks to the screw technology developed in the company's lab over the past year.

910-452-5090 • wilmingtonmachinery.com



INJECTION MOLDING

Advanced Training in Molding Skills

At NPE2018, Paulson Training, Chester, Conn., will present information on its newly enhanced ProMolder 2 injection molding training seminar, described as "the next generation in advanced molding skills training." This hands-on certification course now features more than six hours of additional machine time, plus the addition of a comprehensive "math for molders" module and time with Paulson's SimTech injection molding simulator.

ProMolder 2 is a five-day course that has been taught in Paulson's partner technical facilities around the country, including Arburg, Polymer Center of Excellence, Extellent, KraussMaffei (photo), and Toshiba. Graduates of Paulson's ProMolder 1 course, or those who complete the equivalent Paulson CD/DVD or web-based training meet the qualification to enroll in ProMolder 2. The more advanced course begins with a review of ProMolder 1 and covers key concepts:

- Analysis of part properties and machine solutions using the four plastics variables;
- Practical hands-on experience in machine settings;
- Detailed analysis of molded part defects, their causes and solutions;
- Comprehensive math module.

800-826-1901 • paulsontraining.com

INJECTION MOLDING

New Electric & Hybrid Injection Machines, and a 'Sneak Peek' at More to Come

Four new models of economically priced injection machines boast enhanced clamp and injection specs, while also offering energy savings. Absolute Haitian, the exclusive U.S. and Canadian representative for Ningbo Haitian Machinery Co. of China, is putting these new presses—two of them available now and two still at the preview stage of development—through their paces at NPE2018.

Making its debut in the Americas is the new Zhafir Jenius Series for large-part precision molding (506 to 3709 U.S. tons). Aimed particularly at automotive molders, the JE series (pictured) combines an all-electric injection unit with a servo-hydraulic, two-platen clamp. The end result is said to combine energy efficiency, short footprint, and greater repeatability—less than 0.1% variation in part weight from cycle to cycle. It also allows for screw recovery during clamp opening or closing. A 731-tonner will mold a 22.57-oz automotive grille from PP with 19% mineral filler in 60 sec.

Also new is a fast-cycling version of the Zhafir Zeres electric machine with integrated hydraulics for core pulls, ejectors and nozzle touch. This "2S" version for high-speed applications has a redesigned clamp and injection unit and more compact design with linear guides replacing tiebars. It's priced to make a precise electric machine affordable for cycle times as fast as 4 sec. The line extends from 44 to 1500 tons. At the show, a 505-ton model will mold a thin-wall PP container in six cavities (114 g shot) in a 5.5-sec cycle.

There's a sneak peek at the third generation of the Haitian Mars servo-hydraulic line, the MAIII. The first model, a 192-tonner, will become available in the Americas late in the year, with additional sizes available in 2019. But it will run in Orlando, producing a thick-wall tumbler in two cavities from Eastman's Tritan copolyester. The 6.35-oz shot runs in 70 sec. According to Absolute Haitian, this mold would normally require a 300-ton machine without the generous tiebar spacing of the MAIII.

Another preview from Absolute Haitian is the third generation of the all-electric Venus Series. It boasts upgrades to the clamp design, including "the industry's most generous tiebar spacing," according to the company. It also has increased injection-pressure capacity, as well as an open base to improve access to the part-drop area. Molders will get an advance look at the first model to become available later this year, a 101-tonner, running a medical needle body in eight cavities. The Venus III series will range from 45 to 899 tons.

508-459-5372 • absolutehaitian.com

INJECTION MOLDING

In-Mold PUR Coating Now Comes in Colors

Engel Austria (U.S. office in York, Pa.) and PUR machinery supplier Hennecke (U.S. office in Lawrence, Pa.; ***henneckeinc.com***) have upgraded the capabilities of Engel's Clearmelt system for integrating injection molding and in-mold coating with a clear, scratch-resistant PUR or polyurea coating. Thanks to Hennecke's new Colourline Multi-Connect system, Clearmelt can now coat thermoplastic substrates with colored coatings. The modular, plug-and-play Multi-Connect system reportedly allows fast and clean changes of colors. Color changes do not require cleaning and can be accomplished in less than 15 min, according to Hennecke.

Colourline is installed as a stationary isocyanate unit on the injection machine. The Multi-Connect color module with its own heater is a separate unit on a compact, mobile carriage. The Multi-Connect parking station holds up to seven color modules, including a clear, uncolored coating, if desired. Additional parking stations can be added, if necessary. The user can undock the desired color module from the parking station, move it to the isocyanate unit, and re-dock it there. The isocyanate unit then takes over control of the color module. Each color module has its own mixhead on which the isocyanate unit is attached. This ensures that each color circulates in its own system and prevents color mingling when changing colors. Because color pigments are highly abrasive, Hennecke developed the HT30evo piston pump for this purpose. Each color module has its own pump.

717-764-6818 • engelglobal.com

INJECTION MOLDING

New Robot EOAT Components

Robot end-of-arm tooling component supplier AGS Automation of Germany will exhibit new products at NPE2018. It is offering a new gripper-arm clamping piece in its modular system. This device permits easily changing the angle of the gripper arm in three dimensions. AGS also now has a PTFE coating available for gripper fingers to prevent sticking of elastomeric or other soft adhesive materials.

AGS products are available online through a newly revised customer portal, which includes CadGrip software for download. This lets users put together all gripper parts as a 3D model and view it from all perspectives. When finished, the user can export the corresponding components as an Excel document and use it to order the components through the portal.

+49 2204-968 10-0 • ags-automation.de

INJECTION MOLDING

Injection Process Monitoring/Control Adds Multi-Shot Molding, Quality Prediction

The Kistler Group (U.S. office in Amherst, N.Y.) is demonstrating a wide range of modular functionalities for the newest version (2.1.0) of ComoNeo, its process-monitoring and control system for injection molding that now includes integrated part-quality prediction.

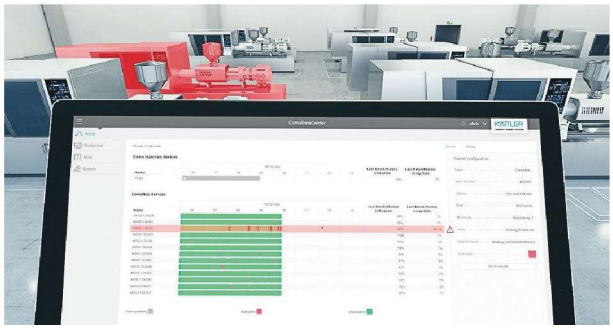
Since its initial launch three years ago, the ComoNeo system has continued to evolve. Based on measurement of cavity pressure, it controls the switchover point from speed to pressure control in mold filling within each cycle, analyzing the difference between current and reference pressure curves. The switchover point can be set manually or determined automatically by the system through analyzing a sequence of five test cycles.

More and more, injection molders are confronted with new tasks, such as multi-component systems with complex process technology—for example, in lightweight composites for the automotive and aerospace industries. To support such applications, ComoNeo now can also control multi-component and RTM processes. Two or more processes, depending on the component, would previously have had to be recorded and evaluated separately. With ComoNeo 2.1.0 it is possible to monitor up to four components in various tool technologies.

ComoNeo now also offers a model-based prediction of part quality based on specified tolerance limits. The integrated software calculates the optimal process parameters to ensure higher quality, especially in demanding applications.

In addition to predicting production quality, all collected data can be stored in the central ComoDataCenter database for further analysis. ComoNeo also controls the transfer of proven tool configurations to other machines, as well as balancing the hot runner in multi-cavity molds. To accomplish the latter, ComoNeo now incorporates the OPC-UA interface that is becoming the standard for Industry 4.0 machine-to-machine data connectivity.

888-547-8537 • kistler.com

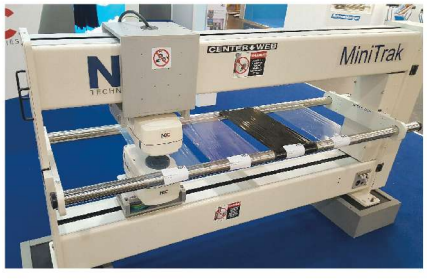


EXTRUSION

New 4.0 Measurement and Control Solutions for Web

NDC Technologies, Irwindale, Calif., is debuting several new measurement systems at NPE2018. The systems are said to be ready for Industry 4.0 with data integration and connectivity down to the gauge level.

NDC is showcasing its latest FilmPro infrared gauge for film, sheet and coating. This gauge uses advanced optical techniques to measure a wide range of film and sheet properties with high precision. NDC's modular FilmPro gauge can measure the thickness of clear, voided, pigmented, cavitated, porous, translucent colored, and even black-tinted films. The measurement capability of FilmPro also extends to single- or multi-layer products including thin biaxially-oriented films,



cast films, and CPE stretch films. It can simultaneously measure the individual thicknesses of up to six different layers in co-extruded films.

The FilmPro gauge is running at the show on NDC's Mini-Trak O-Frame scanner and Pro.Net TDi web-gauging system platform, which includes NDC's latest iView Pro operator work station (OWS).

NDC's new Low Energy X-ray sensor is suited for thickness and basis-weight measurements of lightweight extruded film and sheet and reportedly offers excellent narrow-streak resolution.

NDC's new web surface inspection systems (engineered by R.A.M.) provide 100% product coverage, enabling manufacturers to achieve zero defects. Systems include powerful capabilities to instantly detect, classify, document and record all optical defects across a broad scope of web materials.

626-960-3300 • ndc.com

EXTRUSION

Pipe, Tube Measurement & Control Solutions for Industry 4.0

Beta LaserMike, Dayton, Ohio, part of NDC Technologies, will be showing several new measurement systems at NPE2018 that are said to be ready for Industry 4.0 with expanded capabilities in connectivity, communication, and control. The company's LaserSpeed Pro non-contact length and speed gauge reportedly offers the highest accuracy in the industry (better than ±0.03%) and the widest measurement depth of field for the full velocity range. LaserSpeed Pro offers a new, quicker processing engine for faster communications and supports Ethernet connectivity. It's positioned as a replacement for contact encoders.

The UltraScan Pro provides high-speed precision measurement of wall thickness and concentricity and offers faster processing and measurement capabilities, high-speed tolerance checking, multi-layer measurements (up to four layers), enhanced Ethernet connectivity via built-in web server, and other advances. UltraScan is known for its patented "SNAP" technology with full automatic setup and calibration for quick, simple operation.

The BenchMike Pro is now outfitted with a larger, higher-resolution display and provides faster communications processing. BenchMike is said to be the industry's leading off-line diameter and ovality measurement system. It now offers Ethernet and USB connectivity.

The company will also be exhibiting a live demonstration of its latest InControl process controller and end-to-end measurement system for pipe and tubing.

800-886-9935 • betalasermike.com

EXTRUSION

Conical Twin for Shear-Sensitive PET, PLA

At NPE2018 next month, eFACTOR3, Pineville, N.C., is showing an MAS-brand conical twin-screw corotating extruder that it says is well suited to processing shear-sensitive PET of all kinds well as PLA—at low screw rpm and high outputs. The machine's short length reduces overall energy consumption and results in short residence times, which is said to improve melt quality. The machine can be equipped with various degassing systems, ranging from closed vent ports to one-stage water-ring pumps or a three-stage, high-performance vacuum system.

For "no dry" applications, the machine can be furnished with an optional PET Feeding Gate, which is used to remove surface moisture from the input flakes in the feed zone of the extruder. Downstream gear pump, filtration, and pelletizing systems can be supplied on a turnkey basis.

877-801-3232 • efactor3.com

EXTRUSION

High Speed Pre-Stretched Film Rewinder

Italy's Unitech SRL will be presenting its T012 Pre-Stretched Film Rewinder at NPE 2018. The T012 is a fully automatic, high-speed rewinder for stretch film. Its servo-drive technology allows it to run at high speed while keeping an accurate control of pre-stretch. Pre-stretch ratio is variable and can be adjusted from the operator panel. Running at an average speed of 3500-4000 ft/min, it has a productivity of 400-500 lb/hr. The T012 rewinder can work with cast or blown film.

+39 0381-630300 • unitechpackaging.com

EXTRUSION

New Pilot Line Verifies Web Gauging Performance

Mahlo America, Spartanburg, S.C., will be talking at NPE2018 next month about its new pilot line for processors to fully evaluate, before purchase, the complete capabilities of Mahlo's on-line sensor technologies to measure critical elements of specific web-produced materials. Mahlo offers this pilot line for product testing, sample evaluation, and technical training. The line is capable of processing up to 75-in.-wide webs and is equipped with a full suite of traversing scanners and measurement sensors for detailed analysis of any roll-goods product. The new pilot line gives manufacturers the opportunity to test first-hand the effectiveness of Mahlo's web-gauging technologies with their own web products and take away comprehensive measurement data to compare with their in-house lab testing.

Using non-nuclear sensors such as infrared, laser triangulation, white light, and microwave, as well as beta gauge and X-ray technologies, Mahlo sensors test for a wide range of properties including basis weight, thickness, coating add-on, density, moisture and air permeability.

864-576-6288 • mahloamerica.com

EXTRUSION

Static Eliminator for High-Speed Webs

Designed for static elimination in web applications, NEOS Series Bars from TAKK Industries, Cincinnati, use reactive intelligence to frequently sample the electrostatic field of a static-charged surface, and then increase the supply of static-neutralizing ions of the opposite polarity until the charge is neutralized. To be shown at NPE2018 next month, NEOA eliminates static at distances of up to 5 ft and speeds of 4500 ft/min.

NEOS technology provides process security for static critical applications by monitoring the bar's operational status and indicating whether it needs cleaning or other maintenance. The NEOS Series bars are powered by 24-v DC. All ionizing and sensing electronics are enclosed within the bar. The bars have reinforced housings for durability.

800-792-8255 • takk.com

COMPOUNDING

'Augmented Reality' Highlights Project-Engineering Capabilities

Farrel Pomini, Ansonia, Conn., will showcase its project-engineering and service solutions with a display that will include its augmented reality capabilities. Within project engineering, Farrel Pomini oversees and executes initial feasibility studies before moving on to complete engineering design, installation and commissioning services.

The company's service solutions portfolio includes spare parts, technical services, remanufacturing services and process laboratories. Remanufacturing services provide repairs ranging from the simple to a complete remanufacture bringing the equipment back to original productivity specifications. Process laboratories are available for conducting development trials and consultations with a variety of process tools and configurations utilizing production-size equipment.

800-800-7290 • farrel-pomini.com

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Catch the Headlines!

The must-see moments from both on and off the show floor at NPE2018 - The Plastics Show will be broadcast on the NPE Network!

The NPE Network will feature daily video highlighting the events at the show. It will also include one-on-one interviews and soundbites from attendees, exhibitors and speakers.

Stay informed and watch the latest on the NPE Network at the show, online, on the NPE2018 app and on TV in your hotel room!

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AUTOMATION

Bigger, Stronger Gripper For Collaborative Robots

On Robot, a Danish manufacturer of electric grippers for collaborative robots (cobots), has introduced the model RG6, a larger and stronger version of the company's RG2. It reportedly handles higher payloads than other two-finger cobot grippers on the market. The higher adjustable force (25-120 N, or 5.6-27 lbf) enables three times higher payload (6-8 kg or 13.2-17.6 lb) than the RG2 and wider stroke (160 mm or 6.2 in.) On Robot has a U.S. office in Charlotte, N.C.

Like the RG2, the RG6 is an electric gripper, said to be more compact, more energy-efficient, and simpler to use than pneumatic actuation. Features include customizable fingertips and support for dual grippers on one arm without extra wiring. The RG6 reportedly mounts quickly and easily on all cobot arms from Universal Robots, another Danish firm, with U.S. office in Ann Arbor, Mich. (*universal-robots.com*).

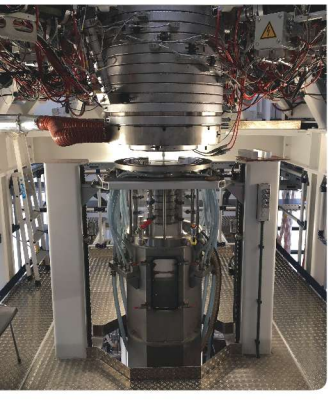
914-506-7047 • onrobot.com

EXTRUSION

Novel 'Stack Die' at NPE2018

Germany's Kuhne Anlagenbau GmbH will be showing at NPE2018 the Mo-Con, a new type of modular, expandable blown-film die.

So-called stackable "pancake" dies have become common since Brampton Engineering introduced the Streamlined Coextrusion Die in the early 1990s. Numerous other die makers soon followed suit with variations of that design. Kuhne says the Mo-Con die is similar to other types of stack dies because its modular design allows processors to add layers as the need arises. In the case of Mo-Con, the die can be designed from five layers on up. The highest number of layers produced so far is 13 layers for a Kuhne Triple Bubble line, says Adolfo Edgar, v.p. of blown-film sales for the U.S. and Canada. An undisclosed U.S. customer recently installed a nine-layer Cool Bubble water-quenched line with the plan of expanding it to 11 layers in the future, Edgar adds.



What's different about the Mo-Con die is that while the binary splitting and distribution is flat, the spirals towards the center of the modules are on a cone. This makes the die body more compact and directs the melt flow in a shallower angle to merge with the other layers. The binary distribution is done on the flat portion of the modules, as with the pancake dies. But whereas in pancake dies the melt is fed between the modules or plates, with the Mo-Con it is fed into the center of each module. As a result, assembly of the melt adapter to the die is straightforward and achieves a leakproof metal-to-metal seal, says Edgar. "There is less risk of having a leak at the interface where the melt adapter meets the module, since only two surfaces contact each other instead of three," he adds. (For more NPE2018 extrusion news, see feature on p. 94.)

416-700-7444 • kuhne-group.com

TESTING

Enhanced Color Formulation Software

Match Pigment 4.0, the latest iteration of color formulation software for plastics and coatings from Datacolor, Lawrenceville, N.J., is said to improve match acceptance on the first try, optimize the cost and quality of recipes, and reduce the need for physical matches. With a streamlined workflow and user-friendly interface, manufacturers can expect up to 50% increase in overall speed and productivity, according to the company. Other benefits cited are increased productivity with automatic transfer of multiple formulas to the dispenser queue and greater customization with flexible matching criteria options.

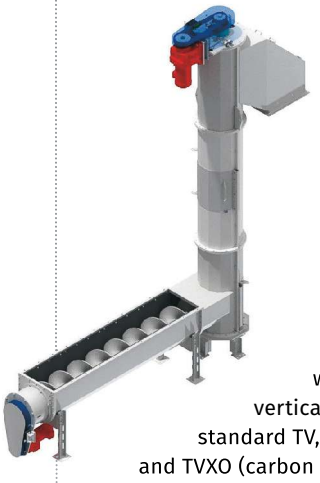
800-982-6497 • datacolor.com

RECYCLING

New Auger Feeders, Outdoor Mixing Silos

Zimmer America Recycling Solutions, Spartanburg, N.C., North American agent for Germany's STF Group and Italy's Beccaria SrL, is showcasing new recycling technology at NPE 2018. STF Group will present the next generation of its polygonal vertical and horizontal auger combination. New features for the horizontal auger reportedly include an easy-to-exchange liner of hard plastic for wear protection; larger auger diameter of 515 mm; external solid rubber coupling for better access and maintenance; and a stronger motor output of 3 kW.

The vertical auger's new features include wider side guide rails, adjustable from outside the housing; large doors for maintenance and inspection openings; complete lining of the lower inside section of the housing with hardened metal for wear protection; larger auger diameter of 600 mm; auger pitch of 400 mm; and a stronger motor output of 7.5 kW.



The updates allow a bigger throughput—6-7 tons/hr. In addition, the combination of horizontal and vertical augers (left) saves space since a long diagonal conveyor-belt system is no longer needed. STF screw conveyors are suited to transporting bottles as well as dry and wet plastic flakes.

Meanwhile, Beccaria SrL will launch a new series of vertical mixers in addition to its standard TV, TVX and TX mixing silos. TVO and TVXO (carbon steel and stainless steel) are outdoor mixing silos (right) built in its factory in Italy. They reportedly need no cover frame. These mixing silos are available from 1000 to 3500 ft³. They can mix a complete load of contents (usually 24 metric tons), producing a single batch of product, without use of additional vertical mixers, according to the company.

800-458-3194 • zars-usa.com

RECYCLING

Improved Continuous Melt Filter

Austrian machine builder MAS, represented here by eFactor3, Charlotte, N.C., brings a new design of its CDF (continuous disc filter) to NPE. The CDF continuously removes wood, paper, non-melting foreign plastics, rubber, aluminum, and similar contaminants from the melt stream. The melt passes through a filtration disc with self-cleaning, conical bore holes. Next, the melt continues to the downstream equipment via the melt tube. All contaminants remain on the rotating filtration disc until they are lifted off by the static scraper system into a discharge screw. The discharge is a combination of impurities and a small amount of melt.

Due to a large active filtration area, specific throughputs (kg/hr/cm²) are generally very low, which means low melt pressures, which results in a gentle extrusion and filtration process, the company states. The large filter surface is essential for high throughput and long service life of the filter discs and scrapers. The filter discs are made from hardened steel and are available in filtration fineness of 90 to 1000 µm. MAS's technology also reportedly ensures minimum melt loss while maximizing throughput.

877-801-3232 • efactor3.com

RECYCLING

Electrostatic Separation Systems For Mixed Waste Plastics

At NPE2018, Hamos GmbH Recycling-und Separationstechnik of Germany will show off its machines and systems for electronic and electrostatic separation and color sorting of metals, plastics and other bulk materials. Hamos also offers specific solutions for reclaiming e-scrap, cables, and PVC window profiles.

For instance, the Hamos EKS electrostatic separator sorts mixed materials into clean, single-polymer fractions. It uses tribo-electric technology to selectively charge homogeneously mixed plastics, giving one polymer (e.g., ABS) a positive charge and the other (e.g., PS) a negative charge. The separation is performed with high-voltage electrodes. Through this dry-process system, polymers reportedly can be separated to more than 98% purity.

In addition, Hamos supplies a Hamos KRS plastic recycling system (pictured) for the automatic separation of pre-processed plastic mixtures from recycling of electronics waste and refrigerators.

+49 8856 9261-0 • hamos.com

TOOLING

Custom & Standard Components With Conformal Cooling

HTS International Corp., Knoxville, Tenn., is featuring its iTherm conformal-cooling product lines for injection molding and blow molding in the 3D Printing Zone. Specifically, HTS will display custom and standard designs for cores and cavities, gate inserts, neck inserts, water-supply plates, sprue bushings, and hot-runner manifolds. These components are produced by a proprietary additive manufacturing process from 100% solid metal that does not involve sintering or brazing. Conformal cooling reportedly can save 10-50% or more in cycle time, in addition to quality benefits and improved tooling durability. HTS offers unique warranties on its technology, including pay-for-performance options.

865-410-8880 • this-ic.com

MATERIAL HANDLING

Flex-Screw Conveyor for Bulk Bag or Manual Discharge

A new Mobile Flexible Screw Conveyor from Flexicon, Bethlehem, Pa., is equipped with a multi-purpose hood that transfers material discharged from bulk bags and/or manually dumped from hand-held sacks into elevated process equipment or storage vessels dust-free. Mounted on a frame with locking casters for in-plant mobility, the system reduces cost by eliminating heavy frame components typically employed to support bulk bags, relying on the user's forklift or plant hoist to suspend the bag above the unit during operation.

An iris valve positioned atop the dust hood allows variable control of flow through the bulk-bag spout. A bag-support tray and hinged door allow manual addition of minor ingredients from hand-held sacks.

888-353-9426 • flexicon.com

WELDING

Rotary Infrared Welding System With Multiple Heating Stations

A rotary infrared (IR) welding system that features multiple heating stations to reduce cycle time is newly available from Dukane, St. Charles, Ill. To be shown at NPE2018, the reportedly unique Rotary Infrared Welding System is designed for assemblies that fall within a footprint of 7.87 × 9.84 in. and require a fast cycle time. It provides non-contact IR welding that is capable of producing welded assemblies as fast as every 8 sec, compared with conventional IR welding machines that run at a rate of 30-40 sec/cycle. According to Dukane, these rates are accomplished by enabling the normally sequential welding steps (load, heater extend, melt, retract, join, hold, open, and unload) to happen simultaneously on a rotary indexing machine. Each step of the weld process occurs at the same time on each of the indexer stations.

Using this method, a welded assembly is discharged at the same time a new one is being loaded. In essence, this rotary welder indexes and produces a part just about as fast as the melting rate of the plastic. If 16 sec of IR bulb exposure is required to sufficiently melt the plastic part for welding, then the rotary table is indexed every 16 sec plus an additional fraction of time for indexing. The welder with two dedicated index stations to heat the plastic can index the table every 8 sec, rather than 16. The part still receives the required 16 sec of exposure over two stations, but the index time is divided in half, making the machine run twice as fast. The rotary motion introduces the parts to the heaters rather than shuttling the heaters in and out on each cycle. This is said to drastically reduce vibration of the heaters and increase their life span. A servo-driven clamping station has programmable process limits for precise control.

630-797-4900 • dukane.com

TOOLING

Tool Mover Securely Moves Heavy Molds

RUD Chain Inc. Hiawatha, Iowa says that its RUD Tool-Mover moves heavy and sensitive dies, molds and tools safely and securely and therefore limits costs from damaged tools and improves safety for the operator. The Tool Mover does not need to be bolted to the floor. It is available in a variety of models with load capacities of 10, 16, 32 and 64 tons. RUD says that the mover is low-maintenance, low-noise and user-friendly.

319-294-0001 • rudchain.com

TOOLING

Micro-Welding Solutions Offer Affordability and Variety

Sisma laser welders and the PUK U5 Micro TIG welder on display at NPE2018 from Gesswein, Bridgeport, Conn., are designed specifically for repairs on small to large molds. They are said to be easy to operate. The new PUK U5 Micro TIG welder (photo) is billed as an affordable solution for mold repair and is easy to transport through the shop.

800-544-2043 • gesswein.com

WELDING

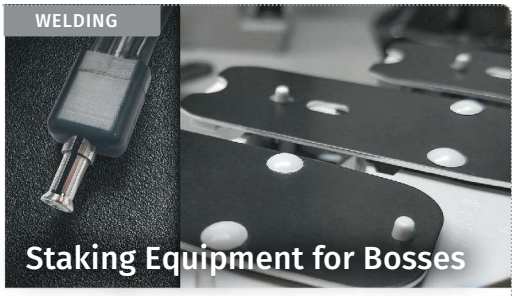
Powerful Integrated Ultrasonic Welder

An all-in-one, super-rigid ultrasonic welding press with a built-in generator and microprocessor will make its debut at NPE2018. New X-Press 15 kHz from Sonics & Materials, Inc., Newtown, Conn., is said to offer more power and amplitude than the company's X-Press 20 kHz. According to Sonics, this model accommodates part sizes too large for 20 kHz, but too small for larger conventional welders.

Elimination of a separate power supply is said to enable the 15-kHz unit to handle larger part sizes. This 2500W press features a one-piece cast-aluminum base and column hub, front-panel pneumatic control and keypad. It has a smaller footprint, along with a smaller price tag, than a non-integrated welding system. It welds in digital time and/or constant-energy modes. It also offers digital amplitude controls, ultrasonic horn/stack frequency display, and timers for weld, hold, delay, and and after-burst. Engineered for maximum rigidity, the unit combines a heavy-duty, 3.75-in.-diam. steel column, direct in-line air cylinder, and a single-rail linear slide.

203-270-4600 • sonics.com

WELDING



Staking Equipment for Bosses

ToolTex, Grove City, Ohio, is offering the new SimpleStake "impulse-staking" system for staking plastic bosses of various sizes through its newly created Simplestake Division. The impulse-staking process creates heat on demand and is said to be well suited to sensitive and delicate parts in electronics, medical, lighting, and automotive where excessive heat and pressure may cause damage to visible areas.

The process is said to apply much less pressure on the part, unlike traditional heat staking and ultrasonic welding, reportedly providing a clean and string-free method of staking. With little or no maintenance required, the SimpleStake welding system is said to yield an extremely high-quality weld, quickly and simply.

614-549-3222 • simplestake.com

MATERIALS

Medical-Grade PC For IV Connectors

A new medical-grade PC for use in luers and other IV connectors from Covestro, Pittsburgh, is formulated to withstand cleaning agents and aggressive solvents found in oncology drugs and other treatments. Makrolon Rx3440 PC is said to offer superior ductility and chemical resistance to help prevent cracking. Comprehensive lab testing reportedly has shown that Rx3440 PC provides best-in-class chemical and

oncology drug resistance, compared with other transparent resins used for IV access components. Better retention of stress to provide more reliable IV connections is also claimed. The material is biocompatible according to ISO 10993-1 and USP Class IV standards and boasts greater structural integrity to allow for thin-wall designs.

844-646-0545 • covestro.com

MATERIALS HANDLING

Plug Single-Tunnel Diverter Valve

New PST30 plug single-tunnel diverter valve from Schenck Process, Whitewater, Wis., introduces a number of new features, such as internal shim-able positive stops, inflatable pneumatic seals at each port, position indication from the tunnel itself, and external tunnel position indication. A version without inflatable seals is also offered.

PST30 also features 145° port-to-port rotation, two-way switching capability for either dilute-phase or dense-phase conveying, pneumatic actuator with 4-sec actuation time between ports, and two SPST proximity sensors. The housing, end plates, plugs, and inlet/outlet ports can be aluminum or 316 stainless steel. Aluminum versions are hard anodized for wear resistance.

800-558-0184 • schenckprocess.com/us

Wide Range of Downstream Products For Extrusion, Compounding

Maag Americas, Charlotte, N.C., is showcasing a variety of products for extrusion processors and compounders at NPE2018:

- **Extrex x6 class gear pump:** This new and reportedly unique melt pump delivers the needed volumetric efficiency at the highest counterpressures and with the lowest amount of shear stress. This results in a reliable and gentle transfer, pressure boosting, and metering for a wide range of thermoplastics.

- **FSC plate screen changer:** The hydraulically operated FSC is equipped with a pressure-adaptive sealing system that allows the required sealing forces to be adjusted to the actual melt pressure automatically. Solid and robust construction, available in all sizes and designs, ensures a reliable and leak-free filtration of molten polymers.

- **Extrusion modular cart:** A compact, movable tripod design reduces inline footprint compared with four-wheel designs. The modular system allows for one cart size to handle the four most common extrusion pump models for 3.5-, 4.5- and 6-in. extrusion lines. With a simple adapter-plate change, the original cart can handle a larger pump or gearbox.

- **Gala/Automatik Model 420 Cyclo centrifugal dryer:** This newly developed, energy-efficient dryer is suitable for use with both Pearlo underwater pelletizing, and M-USG and P-USG underwater strand-pelletizing systems. In addition to its minimal space requirement, Cyclo also features highly accessible components, such as the pellet-conveying rotor.

- **Gala/Automatik EAC-7 Pearlo underwater pelletizer:** Newly designed pelletizer is for processing pellets for virgin materials, compounds, masterbatches, engineered plastics, wood and naturally filled polymer composites, TPEs, and hot-melt adhesives at up to 36,000 kg/hr (about 79,400 lb/hr)

- **Maag Primo E pelletizer:** This dry-cut pelletizer produces cylindrical pellets.

- **RES Bullet 64 Pelletizer:** Designed for 24/7 operation, the Bullet Series is suited for laboratory and production use. The tool-less, removable infeed and discharge chutes suit this pelletizer to compounders that have multiple material changeovers several times a shift. It is easier and faster to clean and service than previous models and provides higher rates, less waste, high product quality, and ease of operation.

- **RES Chameleon color mixer:** New mixer is suited to color changeover times under 30 min at throughput rates up to 2000 lb/hr. It is reportedly easier to use and has a smaller footprint, and can be supplied with a jacketed vessel.

- **RES pulverizing system Rex Duo:** The Rex Duo Series pulverizer is used to produce large quantities of high-quality powders at higher production rates.

888-622-4872 • maag.com

MATERIALS

PC Copolymers with Superior Clarity And High Heat Resistance

A new line of high-clarity, high-heat, injection moldable PC copolymers reportedly offers a unique balance of heat resistance, high flow, and excellent color stability under extreme molding conditions, together with a high refractive index (RI of over 1.6) and high transparency (greater than 89% in the visible and infrared spectra at thickness of 1 mm). They will be exhibited at NPE2018.

Lexan CXT resins from SABIC, Houston, are designed for optical applications in the electronics, consumer, industrial and healthcare industries. Typical products include lenses and small sensors that detect visible light. In healthcare, the material answers the call for excellent optical quality and ability to resist high temperatures involved in overmolding clear face shields with silicone rubber, for example. With Vicat B120 softening temperatures as high as 190 C/374 F and glass-transition temperature (Tg) of up to 195 C/383 F, the CXT resins can withstand demanding assembly processes, such as cold reflow or wave soldering onto printed circuit boards. Parts will also stand up to prolonged exposure to high service temperatures, it is claimed. Feedback from SABIC customers during development also indicates potential benefits from shorter cycle times, improved dimensional accuracy, fewer production stoppages, lower reject levels, and potential to create components with more complex geometries, thinner and longer walls, and improved textural definition.

713-532-4999 • sabic.com

MATERIALS

Laser-Weldable PBT and Acetal

A broader range of engineering thermoplastics that facilitate laser welding of housing components for the automotive and electrical/electronic industries is now available from Polyplastics (U.S. office in Farmington Hills, Mich.) Included is Duranex PBT 730LW, which is said to enable laser welding of workpieces as thick as 2mm (0.079 in.), which could not be achieved with a previous material.

Another key product is Duracon POM, which is said to exhibit excellent laser transmissibility compared with other semi-crystalline engineering plastics. This acetal also sports a low melting point, allowing the laser output for welding to be kept low. The newest addition is Duracon POM M90LP, which uses pigments that do not inhibit laser transmissibility.

248-479-8928 • polyplastics.com

MATERIALS

TPEs for Direct Molding onto EPDM Automotive Profiles

Among the new TPEs that will be showcased at NPE2018 by Kraiburg TPE, (U.S. office in Buford, Ga.) are Thermolast K TPEs that are specially developed for automotive exterior applications and direct overmolding onto EPDM profiles. These TPEs reportedly feature good adhesion to EPDM and excellent UV resistance. They are positioned as an alternative to SBC and TPVs based on more cost-effective processing characteristics. These TPEs are processed at relatively low temperatures of 392 F to 428 F, resulting in faster cooling.

The first of these EPDM-adhesion TPEs—TC7EAZ and TC7EFZ—have 70 Shore A hardness and are aimed at corner joints and end elements for EPDM window trim and sealing profiles. Weathering tests have shown superior surface quality of these compounds vs. competing materials. TC7EFZ is a low-fogging grade.

678-584-5020 • kraiburg-tpe.com

MATERIALS

PVDC with Short Carbon Fiber for Chemical Processing Applications

A partnership of Arkema, King of Prussia, Pa., with Xenia, an Italian compounder with expertise in specialty fiber-reinforced thermoplastic composites (***xeniamaterials.com***), has resulted in a range of short-carbon-fiber compounds based on Arkema's Kynar PVDC fluoropolymer. Designed for injection molding and extrusion, these compounds are targeted to wide range of specialty applications in the chemical-processing industry that require extreme durability.

These compounds reportedly exhibit exceptional mechanical properties, with elastic modulus up to 15,000 MPa (2.176 million psi), and outstanding resistance to a broad range of aggressive chemicals. Parts made from these compounds may be further processed by welding and fabrication methods commonly utilized with standard Kynar PVDF.

610-205-7000 • arkema.com

MATERIALS

Long-Fiber Thermoplastics for EMI/RFI Automotive Shielding

Through a partnership with Integral Technology's subsidiary ElectriPlast Corp., Canton, Mich., an innovator in conductive plastics (***electriplast.com***), PolyOne Corp., Avon Lake, Ohio, aims to commercialize the patented long-fiber conductive material, ElectriPlast. This filled thermoplastic can replace metal in EMI/RFI shielding applications at up to 60% lighter weight.

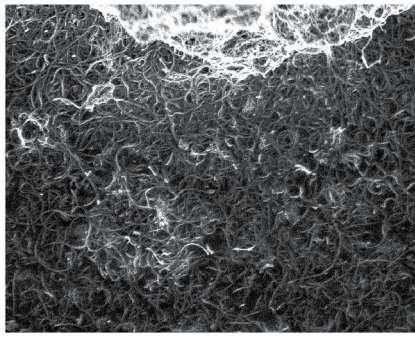
Through an exclusive, 10-yr license agreement, ElastiPlast technology will complement PolyOne's existing specialty materials portfolio, providing superior shielding for advanced automotive driver-assist systems (ADAS), including housings and connectors, as well as internal components for cameras, sensors, and electronic control units. With ElectriPlast's Flexible Content Technology (FCT), the percentage and kind of metal fibers can be tailored to meet each OEM's specifications. Using its formulation expertise, PolyOne plans to develop ElectriPlast materials tailored for shielding applications in tandem with customers and application development experts at Integral Technologies.

866-765-9663 • polyone.com

ADDITIVES

Conductive Masterbatches for PP, PE, PVC, PLA

An expanded line of conductive masterbatches for the electronics-handling markets such as large dunnage, totes and pallets will be launched at NP2018 by Modern Dispersions Inc., Leominster, Mass.



- **PP-235** conductive PP masterbatch is for injection molded totes and storage containers requiring ESD properties. It is used at a 50-60% loading with natural or mixed-color PP.
- **CF-238** universal conductive masterbatch for extrusion and injection molding imparts ESD properties at 40-50% loading with a natural or recycled feed streams. Its universal carrier is said to be compatible with a variety of polymers including polyolefins, PVC, and PLA for flexible film and tubing.
- **PP-20GO** developmental grade containing graphene oxide, is undergoing testing to assess its electrical and thermal conductivity, increased tensile strength, and improved barrier properties. It is targeted for films and fibers. The company is exploring masterbatches with other nanocarbons as well.

978-534-3370 • moderndispersions.com

Volume Resin Prices Mostly Up

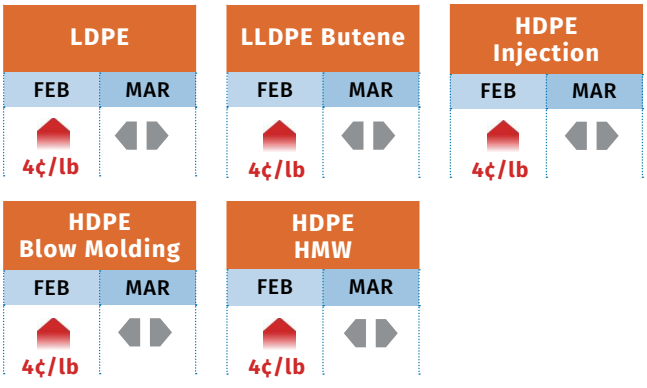
At the conclusion of the first quarter, the price trajectory was upward, except for PP and nylon 6

Tight monomer and/or resin supplies and, in some cases, higher feedstock costs, resulted in higher prices by the end of the first quarter for PE, PS, PVC, ABS, PET, PC, and nylon 66. The exceptions were PP and nylon 6; the former's prices moved up a whopping 11¢/lb between December and January, though they are anticipated to drop by the same amount or more by this month; while nylon 6 prices remained flat through the first quarter, following a December 5¢/lb increase.

By Lilli Manolis Sherman
Senior Editor

These are the views of purchasing consultants from Resin Technology, Inc. (RTi), Fort Worth, Texas (***rtiglobal.com***), CEO Michael Greenberg of the Plastics Exchange in Chicago (***theplasticsexchange.com***), and Houston-based *PetroChemWire* (*PCW*, ***petrochemwire.com***).

Polyethylene Price Trends



PE PRICES UP

Polyethylene prices moved up 4¢/lb in February, and film processors increased prices to cover the latest increase, noted Mike Burns, RTi's v.p. of client services for PE. Meanwhile, suppliers were still posting a March 3¢/lb increase. Since July 2017, prior to Hurricane Harvey, PE contract prices have increased by 11¢/lb, according to Burns. He anticipates that higher oil prices, which have firmed up global PE prices, will continue to be a significant factor behind the sustained PE price hikes.

With regard to the March increase, The Plastic Exchange's Greenberg reported that processors remained optimistic that as new PE production becomes more visible, it will help put a cap on pricing. Similarly, Burns ventured that PE prices may have peaked with a rollover in both March and April. *PCW* reported the PE spot market as tight for most grades, with firm prices, and projected that domestic prime material direct sales would slow in March as suppliers aimed to implement another 3¢/lb.

RTI's Burns characterized demand as good and noted that while the American Chemistry Council's data showed supplier inventories to be high, resin availability did not appear to match the data. He expected PE prices generally to remain firm through the second quarter due to higher global PE prices

Market Prices Effective Mid-March 2018

Resin Grade	¢/lb
POLYETHYLENE (railcar)	
LDPE, LINER	101-103
LLDPE BUTENE, FILM	87-89
NYMEX 'FINANCIAL' FUTURES	48
APRIL	48
HDPE, G-P INJECTION	103-105
HDPE, BLOW MOLDING	93-95
NYMEX 'FINANCIAL' FUTURES	50
APRIL	50
HDPE, HMW FILM	110-112
POLYPROPYLENE (railcar)	
G-P HOMOPOLYMER, INJECTION	83-85
NYMEX 'FINANCIAL' FUTURES	57
APRIL	57
IMPACT COPOLYMER	85-88
POLYSTYRENE (railcar)	
G-P CRYSTAL	111-113
HIPS	117-119
PVC RESIN (railcar)	
G-P HOMOPOLYMER	83-85
PIPE GRADE	82-84
PET (truckload)	
U.S. BOTTLE-GRADE	71-73

PP PRICES DROP

Polypropylene prices dropped in February by 6¢/lb in step with propylene monomer. Further decreases were expected for March, according to RTi's v.p. of PP markets, Scott Newell. He predicted a potential drop in the neighborhood of 5-7¢/lb, based on anticipated lower March monomer contract settlements, and noted that U.S. spot monomer prices are now the lowest in the world. ►

Polypropylene Price Trends

Homopolymer	
FEB	MAR
6¢/lb	5-7¢/lb

Copolymer	
MAY	MAR
6¢/lb	5-7¢/lb

The reversal in the pricing trajectory followed increases of 11¢/lb in December and January, which resulted in demand destruction. Newell expected a significant rebound in demand across the PP polymer chain as early as last month. He expected PP imports to drop back to limited volumes, noting that domestic supplier inventories were in good shape, and he anticipated that PP production rates would ramp up. At the same time, both Newell and *PCW* ventured that monomer prices could bottom out this month. Newell projected April PP prices to be flat, despite Braskem's announcement of a 5¢/lb increase for April 1. "This is a margin-expansion increase that will be tough to implement it. I don't see it as a slam dunk. In suppliers' best-case scenario, they might get a couple of cents."

PCW characterized PP spot activity as limited, with lower prices as the market looked for better clarity on March monomer values. The Plastic Exchange's Greenberg reported that as a result of the February collapse in monomer prices, buyers and sellers of PP had developed widely varying price expectations. "Processors have clearly backed away from the market, seeking minimal supply to fill in gaps, while they wait for prices to fall further."

PS PRICES HIGHER

Polystyrene's price moved up 2¢/lb in February, and suppliers issued increases of 4¢/lb for March 1. The key drivers behind the latter, according to both *PCW* and Mark Kallman, RTi's v.p. of client services for engineering resins, PS and PVC, were tight styrene monomer supplies and higher butadiene costs. Both observers also expected this upward pricing trend would last through March and into at least part of April. They expected most of the new increase to be implemented.

Polystyrene Price Trends

GPPS	
FEB	MAR
2¢/lb	

HIPS	
FEB	MAR
2¢/lb	

Kallman noted that while March benzene contracts settled down 5¢/gal and could drop farther, February styrene monomer contracts settled 5¢/lb higher and were expected to move up again in March due to planned and unplanned production outages. There were also reports that the tightness was leading to monomer imports from Europe. Depending on the recovery of the monomer market, Kallman said prices may peak this month, with some potential for further upward movement.

PVC Price Trends

Pipe	
FEB	MAR
3¢/lb	

Gen. Purpose	
FEB	MAR
3¢/lb	

PVC PRICES UP

The February 3¢/lb PVC increase was fully implemented, according to both RTI's Kallman and *PCW,* and suppliers were intent on pushing through a March 4¢/lb price hike. Moreover, there was talk from at least two suppliers that they would likely come out with an April increase.

PCW cited an industry source that projected that the March increase would get split in half between March and April. Kallman noted that it was unlikely that even half would be implemented in March. He cited a 2.75¢.lb reduction in February ethylene contract prices, which translated to a 1.4¢/lb cost reduction for PVC. He ventured that April PVC prices would be flat to higher, depending on domestic demand if the construction season has a strong start, as well as export demand and whether all planned PVC production shutdowns are completed. *PCW* noted that after years of using ethylene pricing to justify PVC price increases, suppliers are now aiming to shift buyers' attention to supply and demand, plant downtime, high export pricing, and rising freight costs.

PET PRICES MOVING UP

PCW reported that domestic bottle-grade PET resin on March 7 was at 71-73¢/lb for railcars, bulk trucks and truckloads delivered to the Midwest, flat or a couple of cents higher than in January and February at 71¢/lb. Imported PET with an IV of 78 or higher was at 67-69¢/lb delivered duty-paid (DDP) to the West Coast, and 69-70¢/lb DDP to the East Coast, up 2-4¢/lb from February. Some offers were as low as 61-63¢/lb FAS (Free Alongside Ship) to New York-area ports with transit time of 6-8 weeks from locations in Asia.

PET Price Trends

Bottle Grade	
FEB	MAR
2¢/lb	0-2¢/lb

For April, *PCW* expected domestic PET prices to rise 1-3¢/lb from March, due to a drop in imports from five countries that accounted for about 42% of all imports in 2017. This drop is the result of anti-dumping duties expected to be imposed on these countries at the end of March. The countries are South Korea, Indonesia, Brazil, Pakistan and Taiwan—which was the number-two source of PET imports after Mexico last year. Antidumping duties were imposed on PET imports from China, India, Oman and Canada in 2014.

Supply has been limited due to M&G Chemicals idling PET plants in Apple Grove, W. Va., and Altamira, Mexico, in October when M&G subsidiaries filed for bankruptcy protection. On March 6, it was announced that the bankruptcy court auction of M&G Polymers' unfinished Project Jumbo PET plant in Corpus Christi, Texas, and other assets was scheduled for March 19. The plant is about 80% finished and has a design capacity of about 2.4 billion

lb/yr. Expected to be the world's largest PET plant, the earliest it is expected the come online is the second quarter of 2019.

ABS PRICES CLIMBING

Prices of ABS moved up 5¢/lb in January, and suppliers issued price hikes of 6-7¢/lb for March 1. RTi's Kallman expected suppliers to be successful in pushing through the latest increases by this month.

Despite a drop in benzene contract prices, resin increases were driven by a 5¢/lb hike in styrene monomer in February, with more expected in March, along with a 13¢/lb increase in butadiene and higher global ABS prices. Demand is expected to be steady throughout the year.

PC PRICES UP, THEN FLAT

Suppliers of PC resin were forceful in implementing increases of up to 14¢/lb in January. Independent compounders, meanwhile, were passing through similar double-digit increases on their PC compounds in February and March, according to RTi's Kallman. The move was driven by a tightened market due to production issues for intermediaries.

Still, prices of PC resin and compounds were expected to be flat this month, given lower benzene and propylene prices. Kallman characterized the global PC supply/demand situation as tight due to both planned and unplanned outages, including major capacity expansions in Asia being slowed. He expected demand to continue to be good, driven by automotive, electronics and construction.

NYLON 6 FLAT; NYLON 66 UP

Following a 5¢lb increase in December, nylon 6 prices were flat in January and February and were expected to remain flat in March and April, according to RTi's Kallman. One supplier issued a 10¢/lb increase for April 1. Noting that there did not appear to be industry support for this initiative, Kallman also said, "We have improved domestic production following two *force majeure* actions. I don't much expect further upward price movement." He foresees generally flat prices with possible downward movement in the middle of the second quarter.

Nylon 66 prices moved up 5-10¢/lb in January and again in February. March was expected to be flat for base resin, with some carryover of the increases for compounds, according to Kallman. Driving the price spikes is a market that went from a "bit tight to quite tight" due to unplanned outages in production of intermediates, one domestic *force majeure* and three in Europe. Kallman said PC prices this month would be flat to higher. He anticipated upward pricing pressure if the market remains tight and cited strong demand expected from automotive as well as construction, electronics and appliances, along with generally strong global GDP growth expected this year. PT

Processing Index Rallies for Another Month

With a February reading of 58.6, the index expands at its fastest rate in five years.

By Michael Guckes
Chief Economist

Registering 58.6 for February, the Gardner Business Index (GBI): Plastics Processing index continued its rally with a record high reading, beating the peak last set in early 2014. New orders again exceeded production for the sixth consecutive month. The GBI is based on survey responses from subscribers of *Plastics Technology* magazine.

The latest index reading (see Fig. 1) was driven by production and new orders, while all other components pulled the Plastics Processing Index lower. In past months, Gardner Intelligence has reported on the muted response of backlog and supplier-deliveries readings despite new-orders growth exceeding production.

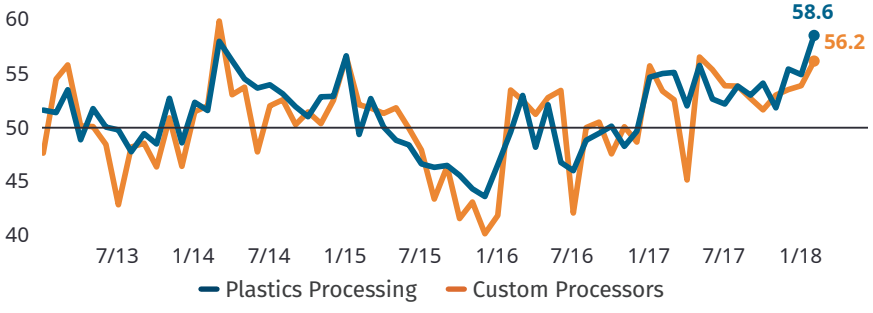
Until this month's spike in the backlog reading to a multi-year high, prior months of backlog data have indicated a mix of contraction and at best tepid growth. February's sharp increase in backlogs may act as the catalyst for processors to put more pressure on their suppliers and reduce backlogs in the coming months (see Fig. 2).

The GBI reading among just custom processors in February indicated increasing expansion in the industry. The latest reading was only marginally below the high of 2017 and is over 5% higher than the reading from a year ago. During the month, custom processors reported growing production and new orders. The reading for supplier deliveries was only slightly above the total index. Over the last 12 months the supplier deliveries reading is up 3%.

Michael Guckes is the chief economist for Gardner Intelligence, a division of Gardner Business Media, Cincinnati. He has performed economic analysis, modeling, and forecasting work for nearly 20 years among a wide range of industries. He received his BA in political science and economics from Kenyon College and his MBA from Ohio State University. Contact: *(513) 527-8800; mguckes@gardnerweb.com*. Learn more about the Plastics Processing Index at *gardnerintelligence.com*.

FIG 1

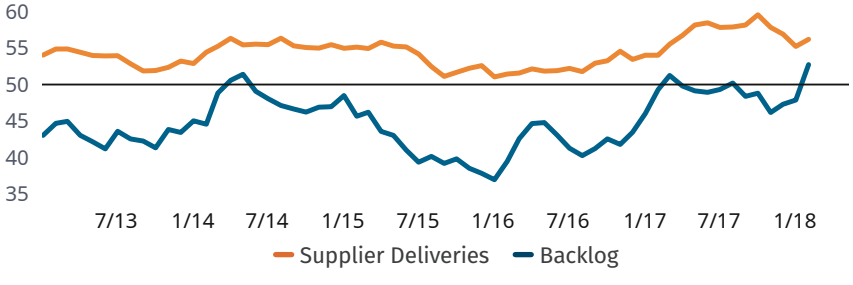
GBI: All Processors vs. Custom Processors



The Plastics Processing Index expanded at its fastest rate in over five years, driven by production and new orders. Based on readings of supplier deliveries and employment, the industry has been slow to respond to strengthening new-orders growth over the last six months. Custom processors are expanding as well.

FIG 2

GBI: Plastics Processing — Backlog and Supplier Deliveries (3-month averages)



While new orders have grown more than production since September of 2017, only in February has backlog shown significant growth. Furthermore, supplier deliveries and employment readings are only now beginning to show upward pressure and a general response by the plastics industry to strong demand.

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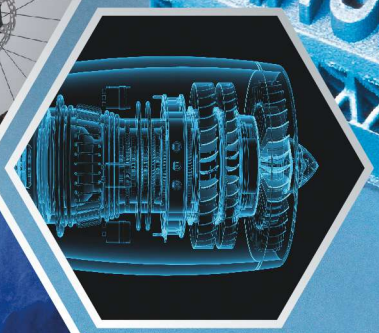

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Medical Market Is Trending Up

A medical manufacturing expansion in the works.

By Michael Guckes
Chief Economist

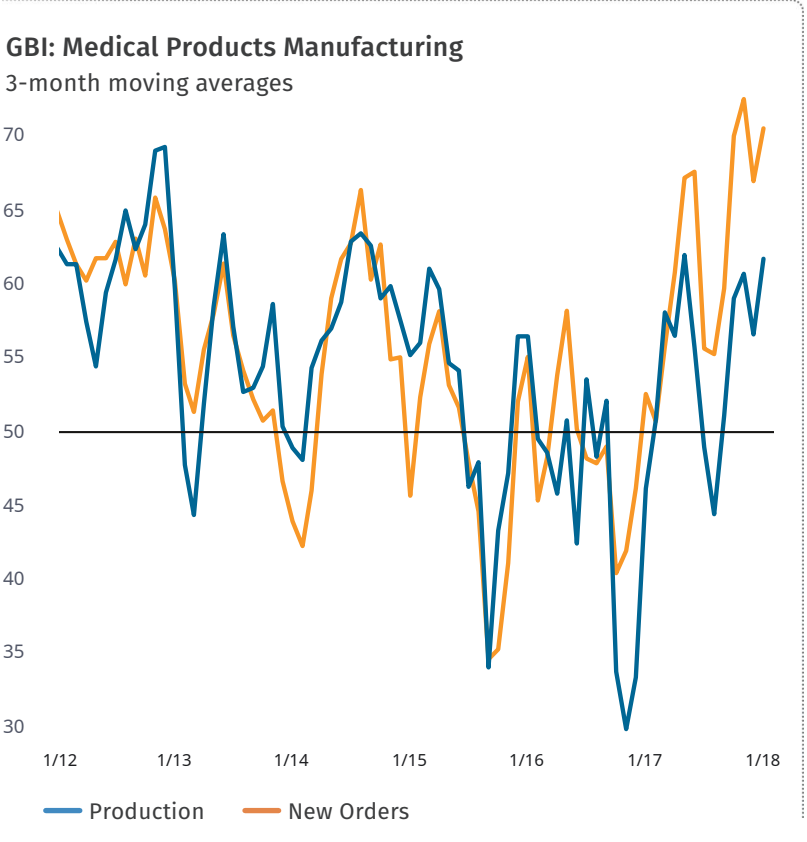
Gardner Intelligence predicts 2018 will be a strong year for medical manufacturing, based upon data supplied by medical-goods manufacturers of the Gardner Business Index. Since the second quarter of 2017, our data indicates that new orders growth continues to outpace production. These two index components were the primary drivers of the Business Index among medical devices and equipment manufacturers in 2017. And as 2018 unfolds, they appear set to repeat this accomplishment. Gardner Intelligence is a division of Gardner Business Media, publishers of *Plastics Technology* and other business-to-business magazines.

As the medical industry began experiencing multiple months of new-orders growth in excess of production during 2017, the index readings for supplier deliveries should have increased as manufacturers increased their consumption of inputs in order to meet the demands of the medical industry. However, our data indicate that this was not the case, as 2017 readings for supplier deliveries did not significantly change in response to growing new orders.

If our interpretation of the data is accurate, then unresponsive supplier deliveries figures from 2017 to the present have in part hindered production from being able to fully respond to increased new-orders growth, leaving open the production and new-orders gap. As would be expected—and as the data confirm—backlog readings taken during 2017 changed drastically, from registering contraction in the first quarter of the year to setting multi-year highs by the fourth quarter of 2017.

Gardner is projecting ongoing strength for the medical manufacturing industry in 2018 as it continues to find ways to meet growing demand. This may be accomplished as links in the supply chain are improved and/or as manufacturers increase their capacity through increased capital spending. According to Gardner's data measuring expected capital spending over the next 12 months, medical manufacturers during the three-month period ending January 2018 indicated an approximately 40% increase in planned capital-equipment purchases compared with the expected spending data from the same months a year ago. New capital-equipment investments may help the industry more aptly respond to changes in new orders; however, this is not likely to be a proper nor full substitute for the seeming bottleneck that has been created by unresponsive supplier deliveries.

This positive view of the industry is also supported by Wall Street analysts covering medical devices, instruments and supplies. Based upon 56 publicly traded, U.S.-listed firms with revenue forecasts for 2018, analysts expect revenue growth of 11.9% this year and earnings margins to increase from an actual median level of 13.5% in Q3 2017 to 16.1% in Q32018 and over 17% in 2019.



ABOUT THE AUTHOR: Michael Guckes is the chief economist for Gardner Business Intelligence, a division of Gardner Business Media (Cincinnati, OH US). He has performed economic analysis, modeling and forecasting work for nearly 20 years among a wide range of industries. Michael received his BA in political science and economics from Kenyon College and his MBA from The Ohio State University. *mguckes@gardnerweb.com*

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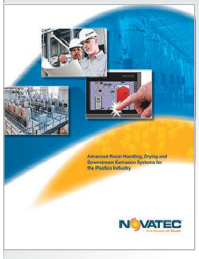

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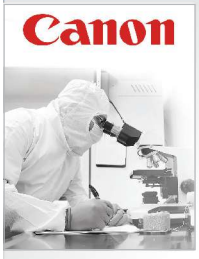

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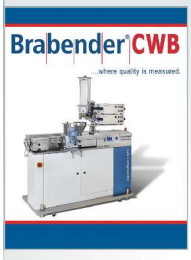

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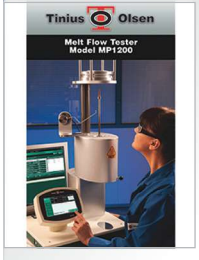

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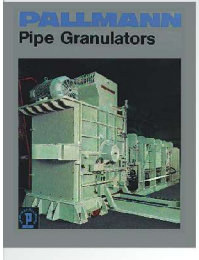

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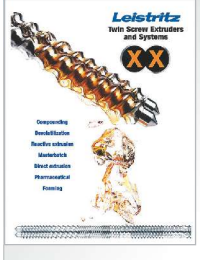

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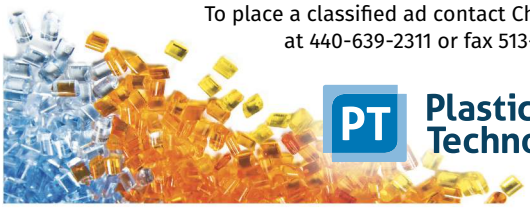

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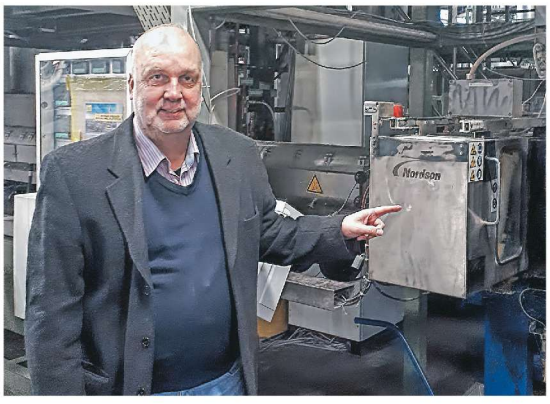
CYKLOP GMBH — COLOGNE, GERMANY

New Screen Changer Boosts Productivity, Cuts Scrap for Extruder of PET Strapping

Cyklop's move to a new-model, high-efficiency screen changer reduces number of screen changes and backflush waste while yielding uniform melt flow and high throughputs.



Bernd Causemann, plant manager at extruder Cyklop, says switching to a new-model Nordson melt-filtration system has reduced the number of screen changes and backflush waste on a line producing PET strapping from bottle flake.

By Jim Callari,
Editorial Director

An advanced melt-filtration system has enabled Cyklop, an international supplier of industrial packaging systems for load securement, to increase productivity, reduce downtime, and cut material waste in the production of strapping tape from PET bottle flake.

At its facility in Cologne, Germany, Cyklop GmbH replaced an older hydraulically powered backflush screen changer with the recently introduced BKG HiCon V-Type 3G system from Nordson (U.S. office: Nordson Xaloy, Hickory, N.C.; ***nordson.com***).

In the BKG HiCon V-Type 3G screen changer, melt flow from the extruder is split at the entry side and guided to four screen cavities on two screen-bearing pistons with screens in each cavity.

Cyklop reports that the new screen changer reduces operating costs because it needs 30% fewer backflushes and requires screen changes 40% less frequently. Employed in a production line at throughput rates of 992 to 1212 lb/hr, the HiCon V-Type 3G system maintains flow and melt pressure at constant levels, ensuring uniform product quality, according to Bernd Causemann, Cyklop plant manager.

"The BKG HiCon V-Type 3G screen changer requires less maintenance and operator supervision than either the older Nordson system or a backflush system from a competing supplier," states Causemann. "The higher efficiency of the V-Type 3G screen changer means fewer backflushes and less material waste. The system is particularly good in dealing with contamination surges, since the filtration area is regenerated very effectively in a short time."

In the new screen changer, melt flow from the extruder is split at the entry side and guided to four screen cavities on two screen-bearing pistons with screens in each cavity. Each pair of cavities is positioned so they can filter their respective melt streams, until the piston removes one of the cavities from the process to remove contaminant buildup by means of backflushing. In normal operation, polymer is flowing through all four cavities. While one of the screens in the cavities is changed or flushed, the other three—or 75% of screening capacity—remain in the process so that throughput remains uninterrupted.

The backflushing cycle is automated. In addition to the two screen-bearing pistons, there is a single hydraulically actuated displacement piston that operates during backflushing. When the differential pressure across the screen changer increases to a preset level because of contaminant buildup, the backflush sequence for all cavities will be started automatically. For each cavity, the displacement piston retracts, creating a reservoir of filtered molten polymer. This material is then hydraulically compressed and discharged in reverse direction, back through the screen, carrying away contaminant for removal from the system. The sequence is performed for each cavity, one after the other.

"In comparison with the earlier V-Type system, the height of the new version has been reduced by 30%, permitting a lower extrusion height," notes Christian Schroeder, global product manager for BKG melt-delivery products. "A single displacement piston is used for backflushing instead of having one for each screen cavity; and hydraulic piping has been optimized." PT

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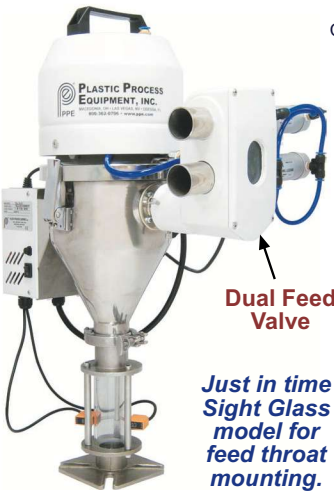

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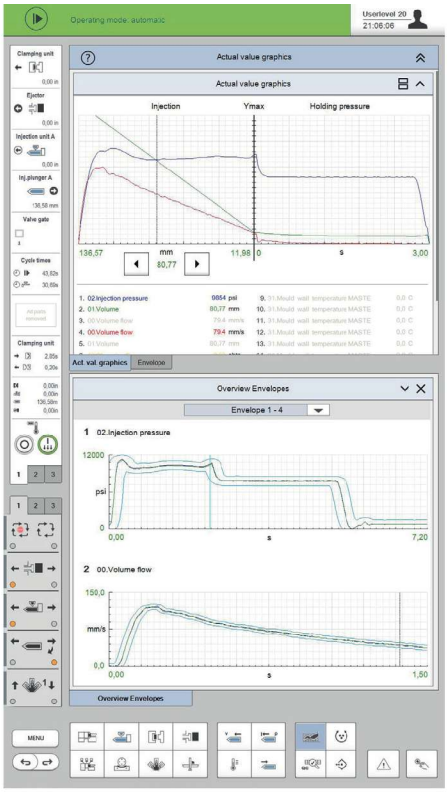

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