PT
PTonline.com

Plastics Technology®

NPE2018 Wrap-Up

More News in Primary Equipment From the Big Show

A property of Gardner Business Media AUGUST 2018 № 08 VOL 64

Missed NPE this Year?

It's Not Over Yet!

Experience the FUTURE at

www.virtualNPE.com

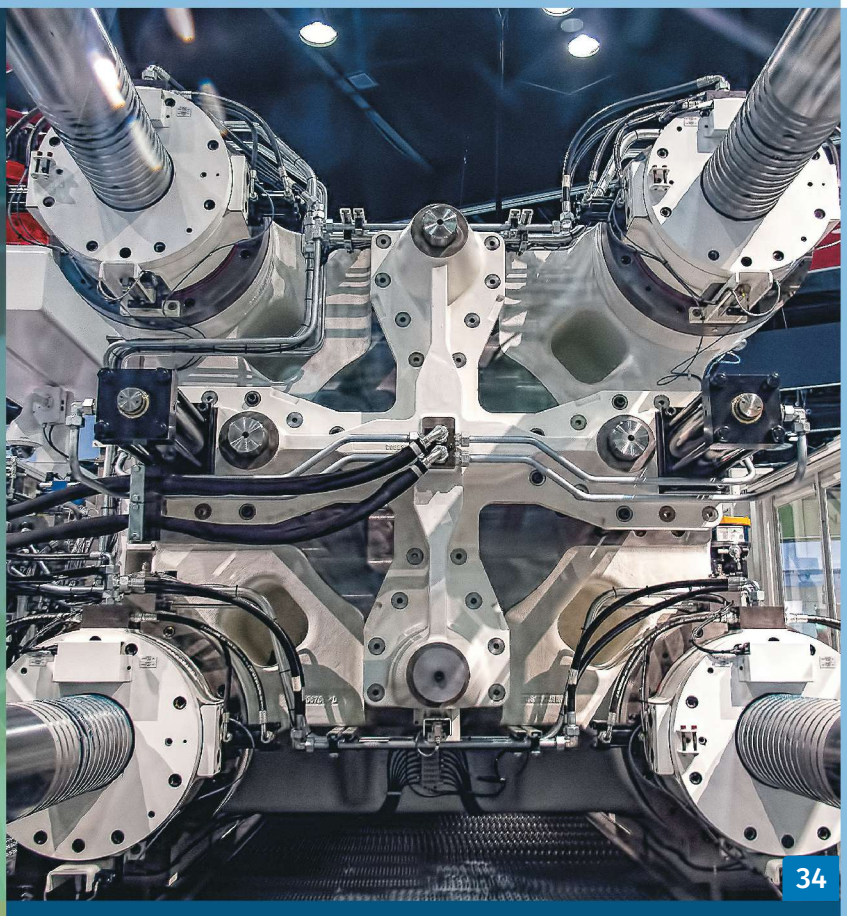
MachineSense®

NOVATEC

CONTENTS

VOLUME 64 • NUMBER 08

Plastics Technology



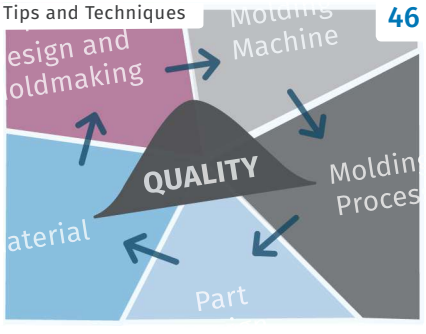
Cover Story

NPE Wrap-Up: News in Primary Machinery

Rounding up details from the Big Show not previously reported in all our other coverage, here's more news in injection and blow molding, extrusion and compounding. Next month, we'll conclude with recycling/scrap reclaim, tooling, robots, auxiliary equipment, materials & additives. (Cover photo by Matt Naitove of Milacron's new 2250-ton press at NPE.)

By Matt Naitove, Executive Editor &
Jim Callari, Editorial Director

Tips and Techniques



Improving Molding Process Capability: The Five Essential Pillars—Part 2

Each contributes to molded-part quality, and each must be optimized before production begins.

By Suhas Kulkarni, Fimmtech

PT Plastics Technology®

ptonline.com @plastechmag

PUBLISHER	Ryan Delahanty *rdelahanty@ptonline.com*
ASSOCIATE PUBLISHER EDITORIAL DIRECTOR	Jim Callari *jcallari@ptonline.com*
EXECUTIVE EDITOR	Matthew Naitove *mnaitove@ptonline.com*
SENIOR EDITORS	Lilli Manolis Sherman *lsherman@ptonline.com*
	Tony Deligio *tdeligio@ptonline.com*
	Heather Caliendo *hcaliendo@gardnerweb.com*
ADVERTISING SALES	Lou Guarracino *loug@ptonline.com*
	Jackie Dalzell *jdalzell@ptonline.com*
	Ryan Mahoney *rmahoney@gardnerweb.com*
ART DIRECTOR	Sheri Kuchta Briggs *sbriggs@gardnerweb.com*
MARKETING MANAGER	Kim Hoodin *khoodin@gardnerweb.com*
AD PRODUCTION MANAGER	Becky Taggert *btaggert@gardnerweb.com*

Subscription Inquiries: For questions or issues related to your subscription, please call 513-527-8800 or email subscribe@ptonline.com.

PLASTICS TECHNOLOGY IS A PROPERTY OF

GARDNER Business Media, Inc.

HEADQUARTERS
6915 Valley Avenue
Cincinnati OH 45244-3029
Phone 513-527-8800
Fax 513-527-8801
gardnerweb.com

NEW YORK OFFICES
1441 Broadway, Room 3037
New York, NY 10018
Phone 646-827-4848
Fax 513-527-8801
ptonline.com

Chairman and CEO	Rick Kline
President	Rick Kline, Jr.
Chief Data Officer	Steve Kline, Jr.
Chief Financial Officer	Ernie Brubaker
Chief Marketing Officer	Melissa Kline Skavlem
Chief Technology Officer	Phil Louis
Audience Development Manager	Julie Ball
Advertising and Production Director	Bill Caldwell
Custom Content Director	Tom Beard
Creative Director	Jeff Norgord
Creative Department Manager	Rhonda Weaver
Editorial Operations Director	Kate Hand
Strategic Engagement Director	Dave Necessary

GARDNER BUSINESS MEDIA ALSO PUBLISHES

Plastics Technology Handbook
Plastics Technology Mexico
Modern Machine Shop
Additive Manufacturing
CompositesWorld
Production Machining
NPE Official Show Directory
Moldmaking Technology
IMTS Directory
Products Finishing
Products Finishing Mexico
Automotive Design & Production

When you have the perfect balance of speed and precision, you're unbeatable.

At Canon Virginia, the same expertise that has been the foundation of our world-class products is available to support your business as well. For more than 20 years, we've been designing, making and using high-precision, high-volume injection molds. So no matter the challenge, we can provide personalized engineering to help develop the mold you need for your complex plastic part.

Canon

cvi.canon.com/mfg | 1.866.99.CANON

Get Free Guidance on Molding Resins

Mobile Specs app and website provide processing parameters on thousands of resins … at no cost.

Jim Callari
Editorial Director

About a year ago on this page I wrote about a new app designed to help injection molders set up their processing parameters (see September 2017 issue). Now, the app is available to download for free on Apple and Android devices. What's more, if smart devices are not your thing, you can go online at ***mobilespecs.com*** to get access to the same data. Also for free.

Mobile Specs was launched in June 2017 by Mike Kmetz. Mike was the president and founder of IDES and developed an online, searchable database, called the Prospector, that contains property information on tens of thousands of materials from suppliers all over the world, which he sold to Underwriters Laboratories in 2012. While at IDES, Mike also developed a book-length printed "pocket guide" to processing injection molding resins.

The free app and website bring that pocket guide into the 21st century. They include data on more than 20,000 commercially available materials from more than 100 resin producers and distributors. They offer up to up to 25 molding parameters for each material. With just a few taps on your mobile device or clicks on your mouse, you'll find the material you're looking for and be able to access data for mold shrink, melt flow, recommended processing temperatures, drying parameters, and a bunch more. Detailed text descriptions of each plastic, along with processing notes, provide molders with a great deal of background information about the material they are processing. What's more, the app and website offer full supplier processing guides, where available.

You can search for supplier name, generic polymer family, or specific products and grades. The information in the app is continuously updated by Mobile Specs' engineering team.

Mobile Specs has teamed with *Plastics Technology* on this innovative product, and together we will be developing ways to make this tool available to molders worldwide.

The free app and website include data on more than 20,000 commercially available materials from more than 100 suppliers.

You might be wondering why you'd need such a tool. These days, molders (and other processors, for that matter) need to be as nimble as possible concerning the variety materials they can run. Moreover, there has been a recent uptick in activity among material suppliers in developing new grades and formulations. Additive packages are adding new properties to materials. And now there is talk about a nylon 66 shortage. As Senior Editor Lilli Sherman has reported in articles in this magazine and in blogs on our website (***ptonline.com***), molders across a wide array of industries are considering how to meet their production obligations with rising costs and occasional supply disruptions of specific resins—like nylon 66. Suppliers are developing grades in response, and the end result might be a material that might be slightly different than what you're accustomed to.

I encourage you to check out the app and website. The only thing you stand to lose is the headache that usually follows when you mold an out-of-spec part. PT

MOBILE SPECS
FOR INJECTION MOLDING

FOLLOW US
@plastechmag
@jimcallari

MAGUIRE®
Intelligent Simplicity

YOU HAVE TO PAY YOUR ELECTRIC BILL, **SO WHY NOT PAY LESS?**

Did you know that newer desiccant dryers require 54w/lb. **Our Vacuum dryers require 14w/lb, saving up to 85% lb for lb.**

FOR EXAMPLE:
At 200lb/hr, annual energy bills* go from:

$8,000.00 | **DESICCANT DRYING**

TO...

$2,000.00 | **VACUUM DRYING**

On older dryers expect even greater savings. Vacuum dryers pay for themselves...year after year.

*Data based on a national average electrical rate of $0.12/kw.

5 YEAR WARRANTY

Want to save time, money and energy? Get in touch with us today to see how we can help you implement vacuum drying into your process.

@MaguireProducts | Maguire-Products | info@maguire.com | www.maguire.com

USA: +1 610 459 4300 | **CANADA:** +1 905 879 1100 | **EUROPE:** +44 1827 338 280 | **ASIA:** +65 68487117 | **IMEA:** +971 4 881 6700

Chen Hsong Makes New Push in U.S. Market for Injection Machines

With two new lines of energy-efficient presses and a new sales-representative firm, Chen Hsong Group of Hong Kong (***chenhsong.com.hk***) is putting new emphasis on the U.S. market for injection molding machines. Chen Hsong is the second-largest maker of injection machines in the world. It builds around 15,000 presses annually, selling one every 10 minutes, on average. Still, as company officials concede, it has been somewhat slow in penetrating the U.S. market. To remedy that situation, CH America, Torrington, Conn. (***ch-america.com***), was formed almost a year ago by industry veterans Erik Eggen and Ken Heyse. And to spearhead the new push, Chen Hsong has developed two new lines of machines, built in China, which were shown at NPE2018. Tailored specifically for the U.S. market, these are the Supermaster two-platen machines from 700 to 6500 metric tons and the Jetmaster MK6 toggles from 88 to 668 m.t. Additional sizes are available to 1600 m.t. (1763 U.S.). Both are servohydraulic driven for energy efficiency. "We're especially excited about the two-platen line," says Heyse. "They're modular, with 14 clamp sizes and 29 injection units that you can mix and match. They have clamp speeds up to 700 mm/sec, which is almost unheard-of for this style of machine. Dry-cycle speed is 7 sec."

C.K. Chiang, Chen Hsong president-manufacturing, between Erik Eggen (left) and Ken Heyse of CH-America. They stand in front of a new Supermaster servohydraulic two-platen press at NPE2018.

Chen Hsong also is developing a line of all-electric machines. They will be tested first in China and may make their Western debut at next year's K 2019 show in Dusseldorf.

Yizumi-HPM Expands—Again

Yizumi-HPM Corp. is already planning to expand its North American Technical Center in Iberia, Ohio, only seven months after opening it. Addition of 15,000 ft^2 of manufacturing space to the existing 22,000 ft^2 will help meet growing demand for the company's large injection and die-casting machines. The target is to start construction early next year. Meanwhile, in the fourth quarter of this year, the company plans to open a tech center in the Charlotte, N.C., area.
740-382-5600 • yizumi-hpm.com

Carolina Color Acquires Chroma Corp.

Continuing consolidation among producers of color and additive concentrates, Carolina Color Corp., Salisbury, N.C. (***carolinacolor.com***), has acquired Chroma Corp., McHenry, Ill. (***chromacolors.com***).

Chroma has been active for more than 50 years in masterbatches, dry colors, and precolored compounds. Carolina Color itself was acquired by N.Y.C. private-equity firm Arsenal Capital Partners in late 2017. As a result, Breen Color Concentrates, Lambertville, N.J., which Arsenal Capital acquired at about the same time, was merged into Carolina Color. In early 2016, Breen had acquired Hudson Color Concentrates, Leominster, Mass., and its subsidiary, Midwest Color, Niles, Ill.

New Plant to Reprocess PE/Al/Paper Food-Packaging Waste

This month, the world's first facility to recycle POAL (polyethylene and aluminum polycomposite) will open to produce a new, patented material called Ecoallene. POAL is used primarily for food packaging, and until now only the paper cellulose portion could be recovered. Italian machine builder Amut has developed this pioneering project together with the Italian start-up Ecoplasteam. Ecoplasteam can recycle 7000 tons/yr of POAL waste.

Amut has supplied Ecoplasteam with the machinery for POAL treatment and washing, as well as the extrusion and pelletizing line. The input material, in form of commingled bales, is processed through progressive phases to reduce the presence of paper fibers. Once clean, it is mixed by a gravimetric dosing system, filtered, pelletized, and packed in bags. The Ecoallene pellets can be extruded or injection molded like a standard polymer. They can be colored and incorporate additives for different applications.
+39 0321 6641 • amutgroup.com

MOLECULAR SIEVE DESICCANT

HIGHEST QUALITY – TWO TYPES – TWO SIZES

GUARANTEED TO BE PURE – CLEAN – FRESH MOLECULAR SIEVE DESICCANT

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

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

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

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

••• LOW DUST TYPE •••

FRESH DESICCANT HELPS ACHIEVE LOWER DEW POINTS!

4A 1/8" 4A 1/16" 13X 1/8" 13X 1/16"

ALWAYS KEEP YOUR AIR INLET FILTERS CLEAN!

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

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

Avoids excess moisture or contamination.

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

IF YOU BLEND SIZES

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

GUARANTEED LOWEST PRICES!

TYPE 4A DESICCANT

BEAD SIZE	MESH SIZE	PPE PART NUMBER	CONTAINER SIZE	PRICE PER CONTAINER			
				1 CONTAINER		2 OR MORE	
1/8" Size varies .098 to .177 dia.	4 x 8	MS4A4-030	30 lbs.	**$89.50**	($2.98 lb.)	**$85.00**	($2.83 lb.)
		MS4A4-110	110 lbs.	**$310.00**	($2.82 lb.)	**$295.00**	($2.68 lb.)
		MS4A4-300	300 lbs.	**$795.00**	($2.65 lb.)	**$760.00**	($2.53 lb.)
1/16" Size varies .059 to .098 dia.	8 x 12	MS4A8-030	30 lbs.	**$89.50**	($2.98 lb.)	**$85.00**	($2.83 lb.)
		MS4A8-110	110 lbs.	**$310.00**	($2.82 lb.)	**$295.00**	($2.68 lb.)
		MS4A8-300	300 lbs.	**$795.00**	($2.65 lb.)	**$760.00**	($2.53 lb.)

TYPE 13X DESICCANT

MIX OR MATCH FOR QUANTITY PRICE BREAKS

BEAD SIZE	MESH SIZE	PPE PART NUMBER	CONTAINER SIZE	PRICE PER CONTAINER			
				1 CONTAINER		2 OR MORE	
1/8" Size varies .098 to .177 dia.	4 x 8	MS13X4-025	25 lbs.	**$84.00**	($3.36 lb.)	**$79.50**	($3.18 lb.)
		MS13X4-110	110 lbs.	**$345.00**	($3.14 lb.)	**$330.00**	($3.00 lb.)
		MS13X4-275	275 lbs.	**$815.00**	($2.96 lb.)	**$775.00**	($2.82 lb.)
1/16" Size varies .059 to .098 dia.	8 x 12	MS13X8-025	25 lbs.	**$84.00**	($3.36 lb.)	**$79.50**	($3.18 lb.)
		MS13X8-110	110 lbs.	**$345.00**	($3.14 lb.)	**$330.00**	($3.00 lb.)
		MS13X8-275	275 lbs.	**$815.00**	($2.96 lb.)	**$775.00**	($2.82 lb.)

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

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

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

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

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

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

Major New Polyolefins JV Breaks Ground

The official groundbreaking for an over 2-billion-lb/yr ethane steam cracker held earlier this month in Port Arthur, Texas, is the first project for the newly formed Bayport Polymers LLC ("Bay-Pol"), a 50-50 joint venture between Total SA (U.S. office in Houston; ***total.com***) and Novealis Holdings LLC—a joint venture between Borealis (U.S. office in Port Murray, N.J.; ***borealisgroup.com***) and Nova Chemicals (U.S. office in Moon Township, Pa.; ***novachem.com***).

Bay-Pol combines Total's existing Bayport 900-million-lb/yr PE facility with the Borealis multi-modal Borstar technology that produces enhanced L/LDPE, HDPE and MDPE, and Nova's polyethylene customer and technical expertise to deliver a broad range of products. The project is expected to include a new 1.4-billion-lb/yr Borstar PE unit at the Bayport site, subject to a final investment decision.

W. Amsler Moving Its Operations

W. Amsler Equipment Inc., Richmond Hill, Ont., a maker of all-electric PET reheat stretch-blow machinery, will relocate its headquarters and manufacturing operations to Bolton, Ont., this summer. The 34,000-ft² space is more than double the size of the company's current facility.

905-951-9559 • amslerequipment.net

W. Amsler Equipment sales & marketing manager Heidi Amsler at NPE2018 with 1.5 L PET wine bottles produced on her company's L12 all-electric stretch-blow machine.

Firms Collaborate on 'Sustainable' Barrier-HDPE Pharma Bottle

A new HDPE pharmaceutical bottle that promotes sustainability through lightweighting resulted from a collaboration between Milliken Chemical, Spartanburg, S.C. (***millikenchemical.com***), a leader in nucleation and clarification technology; Jarden Plastic Solutions, Greer, S.C. (***jardenplastics.com***), an injection molder of medical, consumer and high-end industrial products; and Italian plastics equipment supplier SACMI (U.S. office in Des Moines, Iowa; ***sacmiusa.com***).

Milliken's proprietary UltraGuard advanced customizable additive masterbatch technology is key to this project. Incorporated into HDPE, it reportedly creates a passive barrier by altering the resin's crystal orientation to create a tortuous path that slows the passage of moisture and oxygen. According to Milliken, the technology can increase the barrier properties of HDPE by 20% to 60%, leading to significant lightweighting opportunities. Without the barrier additive, HDPE will typically form large, spherulitic crystals that do little to inhibit the passage of oxygen and moisture.

Also key to this project is SACMI's proprietary high-volume, rotary compression blow forming (CBF) technology. It extrudes "hockey-puck" blanks that are sliced off and placed into compression molds to produce preforms, which are then blown into finished bottles. CBF produces a precision-molded neck, as does injection-blow molding, but without any gate mark on the bottle. Also, the bottles have greatly reduced melt stresses and more uniform weights between cavities, and the system offers substantial energy savings. The combination of Milliken's barrier masterbatch and CBF equipment allows Jarden to produce the new thin-wall bottles.

Custom formulated for this application, UltraGuard has potential as a candidate for any PE application that requires barrier, including caps and closures, films for cereal and cracker bags, beverage bottles (e.g., nutritional drinks), nutraceuticals (probiotics, vitamins), and other types of pharmaceutical containers.

Una-Dyn Moves to New Plant

Universal Dynamics (Una-Dyn), a Piovan Co., has moved from its long-time home in Woodbridge, Va., to a 77,248 ft² manufacturing facility at the new Piovan North America headquarters in Fredericksburg, Va., 35 miles away. The move began in June and was completed last month. A Grand Opening event is planned for Oct. 4. The 91,000-ft² office and plant will produce Una-Dyn and Piovan materials-handling, storage, blending, drying and crystallizing equipment; Piovan's Aquatech process-water-cooling systems; and Piovan granulators and shredders for Una-Dyn's newly established Size Reduction Group (SRG). Development of Una-Dyn FACS supervisory software will also continue at the new location.

703-490-7000 • unadyn.com

Covestro Starts Up TPU Capacity Expansion

Pittsburgh-based Covestro LLC hosted a ribbon-cutting ceremony on June 12 to celebrate the startup of its TPU capacity expansion at New Martinsville, W.Va. This investment boosts Covestro's annual production capacity for Texin TPU in North America by 25% through debottlenecking. The company also recently announced a TPU capacity expansion in Taiwan.

412-413-2000 • covestro.com

LyondellBasell in Discussions To Acquire Braskem

Industry rumors that Houston-based LyondellBasell, Inc. (LBI, ***lyondellbasell.com***) is considering the acquisition of Braskem were confirmed via a mid-June joint announcement. Brazil's Braskem (***braskem.com***) informed its shareholders that its controlling shareholder Odebrecht S.A., had begun discussions with LBI (headquartered in Rotterdam, The Netherlands), for a potential sale to LBI of Odebrecht's shares in Braskem. The negotiations are still in a preliminary, confidential stage.

A HERO GETS THE LINE RUNNING AGAIN AFTER DOWNTIME.

A LEGEND MAKES SURE IT NEVER STOPS IN THE FIRST PLACE.

MORE CONTROL. MORE EFFICIENCY. AND MORE PEACE OF MIND.

CONAIR™

You're always the go-to guy, the person that everyone turns to. Now, SmartServices™ can make your reputation – and quality of life – even better. Thanks to our web-enabled interface, you'll have complete control over your plant floor anywhere, any time of the day or night. You'll be alerted to issues before – not during or after they occur – via text or email.

Ready to take it to the next level?

UPTIME GUARANTEED

Conair equipment is designed, built and supported to ensure it will rarely, if ever, be the cause of unintentional production stoppages.

If it ever is, we'll help make things right.

CONNECT YOUR ENTIRE PLANT WITH SMARTSERVICES™

724.584.5500 | info@conairgroup.com | **www.conairgroup.com**

All-PE Printed Collation Film Replaces Cardboard for Craft Beer Packs

Berry, Dow collaboration helps boost sales for beer maker while cutting costs and offering more in the way of sustainability, branding and shelf appeal.

By Lilli Manolis Sherman,
Senior Editor

Processing giant Berry Global has collaborated with Dow Packaging and Specialty Plastics to produce what's billed as the first all-PE printed collation shrink-film packaging for a craft-beer brewer in the U.S. The beer maker, Oskar Blues, is using the novel package instead of corrugated cardboard on its 24-can variety cases. It says the switch has resulted in a 300% increase in business, slashed costs, and improved its sustainability, branding and shelf appeal.

The craft-beer market is steadily shifting from glass bottles to cans to cut shipping and manufacturing costs, notes Ed McDonough, technical lead for the project for Berry Global (***berryglobal.com***), Evansville, Ind. He notes that the all-PE package is fully recyclable and reusable and has a lower carbon footprint than printed corrugated paperboard. Says McDonough, "I believe that the advantageous economics is married to sustainability, and this market—dominated by millennials—is very much into that."

Oskar Blues, Longmont, Col. (***oskarblues.com***), part of the CANarchy Craft Brewery Collective—the ninth largest craft brewer in the U.S.—launched the new packaging in 2017. Says Jeremy Rudolf, operations manager for CANarchy Craft Brewery Collective, "Moving to collated shrink packaging for our 24-can variety packs results in business growth, sustainability benefits and strong shelf appeal. Our primary focus is the quality of the beer we brew, but we also continuously evaluate options to evolve in other areas and enhance our sustainability profiles with innovations like this new packaging solution,"

PE collation film has saved Oskar Blues money, reduced use of secondary packaging, and has resulted in fewer trucks delivering packaging materials.

The three-layer blown film furnished by Berry serves as secondary package for the craft brewer. It wraps corrugated trays, replacing previous shrink-wrapping that held two 12-pack cartons together. Like the previous corrugated cardboard package, the film features Oskar Blue's branding and design, maintaining shelf appeal. The brewer says the switch has yielded 40% cost savings, reduced usage of secondary packaging by 64%, and has resulted in 73% fewer trucks delivering packaging materials to Oskar Blues. The company expects to see 46% in energy savings and 51% reduction in greenhouse gas emissions based on an environmental-impact assessment by packaging consultancy Allied Development Corp., Burnsville, Minn. (***allied-dev.com***).

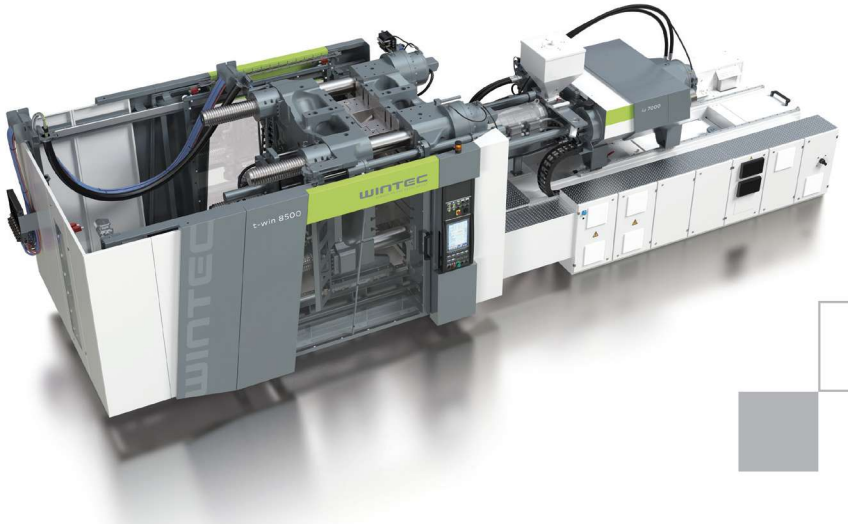
For this application, Berry uses reverse printing on a 10-station flexo printer with technology that allows use of multiple colors from a base of three.

While certain collation films are shifting to five layers, Berry's McDonough maintains the three-layer structure is sufficient since the application does not require barrier or tie layers. Adds Ritika Kalia, end-use marketing manager at Dow Packaging & Specialty Plastics, Midland, Mich. (***dow.com***), "Three-layer film is still the predominant technology; however, we are seeing some film converters starting to explore five-layer structures, especially in other geographies such as Europe." ►

WINTEC
MEMBER OF THE ENGEL GROUP

Welcome to the Americas

We have the economic answer to your standard machine requirements and we deliver it fast: WINTEC builds quality injection molding machines, focusing on a compact design, productivity, and extended machine life.
Our commitment to a lean portfolio and streamlined process results in an attractive price – your profit. You can rely on in-house spare parts and our own local team of experienced service.



t-win:
servo-hydraulic
driven two-platen
machine
(from 505 to 1965 US tons)

- fast response controller
- precision clamping
- built to strict quality standards
- engineered in Europe
- proven design

e-win:
all-electric
drive technology
(from 55 to 310 US tons)

WINTEC NORTH AMERICA
ENGEL Machinery Inc.
3740 Board Rd., York, PA 17406
Email: info.us@wintec-machines.com
www.wintec-machines.com

Berry runs three-layer coextruded blown collation shrink film made of various PE blends to achieve low haze, cuttability, shrinkability, and sealability.

Reverse printing on the multilayer film packaging is accomplished with a state-of-the-art 10-station flexographic printer with ECG (Extended Color Gamut) technology, which enables multiple colors from a base of only three colors, for sophisticated artwork that matches the quality of a photograph, according to Markay Doane, Berry Global's product-line director. He says, "The ability to print on collation shrink film is essential for applications where branding is so important. More and more companies see its potential, given the opportunity to achieve cost and sustainability goals while still capturing consumer attention with strong branding and shelf appeal."

Printed collation shrink film offers a cost-effective, sustainable secondary packaging option to the rapidly growing craft-beer industry.

According to Dow's Kalia, Oskar Blues' printed shrink-wrapped mixed case is indeed a first for the U.S. craft-beer industry. "Other arrangements, including four-packs in similar packaging, are becoming common in North America, and printed shrink-wrapped cases are already common in other regions, including Europe and Latin America." Kalia notes that now that printed shrink packaging is possible, the Dow team believes that more brand owners will move their products to this type of packaging to take advantage of the cost, manufacturing and sustainability benefits.

While McDonough will not reveal the exact PE grades used for this application, he notes that printed shrink film requires low haze, cutability, shrinkability, and sealability. As a result, the layers are all composed of various PE blends, including HDPE and LDPE, L/LLDPE and mLDPE, which is standard industrywide for printed shrink film used for water-bottle packaging.

WITH DRI-AIR YOU GET MORE THAN JUST THE BEST DRYER.

"We have been working with Dri-Air for over 20 years. The main reason we started with them was that they did everything on site at their plant - nothing was sourced outside - they were (and still are) in control of every component of Dri-Air products. A great advantage of Dri-Air products is their flexibility - as we grew, we were able to add on to the existing equipment without having to start all over again with dryers. The Dri-Air service is impeccable. We now have two facilities - Ellington and Somers, Connecticut, and ***as we continue to grow we can continue to adapt our Dri-Air dryers to our growth."***

— Norm Forest, CEO, Dymotek

PROUDLY MADE IN THE USA

DRI-AIR Industries, Inc.

T: 860.627.5110 | E: sales@dri-air.com www.dri-air.com **The Drying and Blending Experts**

In Food Packaging, Peelable IML Serves as Tamper-Evident Seal

Eliminate threaded closures and induction-sealed liners with 'functional' IML.

UfLIPseal concept involves molding a peelable IML label onto a hinged lid of a food or pharmaceutical container. The lid has a flange for ultrasonic welding to the body of the container.

A novel concept proposed by two Canadian package designers is intended to save costs and container weight by replacing threaded flip-top closures and induction heat-sealed liners with a peelable in-mold label (IML) that acts as a tamper-evident seal.

By Matt Naitove
Executive Editor

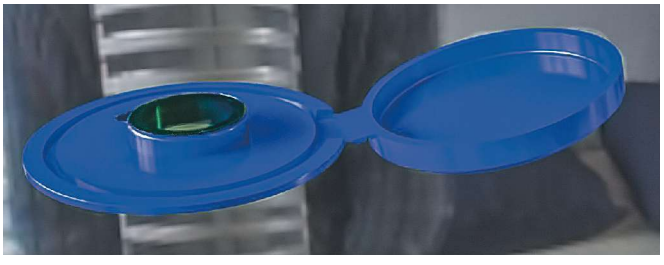
Stephen Robert and Bill Traynor, partners in KBS Impact Inc., Mississauga, Ont. (***kbsimpact.com***), have patented one version of this concept and have a patent pending on another. They call this approach "functional IML" or "FIML." They believe it has wide potential in applications such as non-dairy creamers, nutritional-supplement drinks, ketchup, mustard, salad dressing, vitamins, OTC drugs, drink powders, bath crystals, bath soap, wide-mouth overcaps for yogurt and other spoonable foods, gable-top containers with threaded closures for liquid foods, and even personal-care products in squeeze tubes. KBS Impact is looking for development partners to help commercialize applications or license the technology.

SAVING COST AND WEIGHT

The patent-pending variant of this technology is dubbed UfLIPseal. To envision how it would work, imagine a squeeze-bottle condiment dispenser or a rigid bottle for vitamin tablets. To utilize either product, the consumer must, in some cases, remove a bottle neck wrap, then unscrew the threaded overcap, puncture or peel off the tamper-evident seal on the container neck—often a multi-layer foil composite applied by induction heat-sealing—and then replace the hinged flip-top closure.

With UfLIPseal, the alternative is to injection mold the hinged closure with a peelable IML film, which can be decoratively printed or not, covering the cap's opening. Both cap and IML film would typically be polypropylene. The low-profile, non-threaded closure has a horizontal flange that allows it to be ultrasonically welded to a mating flange on the container neck immediately after the container has been filled with product. After retail purchase, the consumer need only peel off the IML film, using a free-standing tab provided for that purpose. No need to take off the whole cap and replace it—in fact, the cap is permanently joined to the container.

Improved consumer experience and lower production costs are offered by 'functional IML.'



UfLIPseal concept also applies to narrower openings of squeeze bottles. It avoids the need for the consumer to remove the cap, puncture or peel off a tamper-evident seal on the container neck, and replace the cap before first use. Instead, the user only peels off the IML film from the opening in the cap.

According to Stephen Robert, UfLIPseal offers several benefits to the producer, as well as the consumer. Eliminating threads in the overcap simplifies injection tooling and saves some cost. More important, it removes weight from both the cap and container neck, saving several grams of plastic—as well as molding cycle time, according to Robert. Another half-gram or so, and attendant costs, are saved by eliminating the neck overwrap and the induction-sealed foil composite. The lower profile of the nonthreaded UfLIPseal container neck and closure also reduce the overall height of the package, as shown in the photos on p. 16. And eliminating threads adds design freedom,

The Right Tool For The Job Applies To Chiller Systems Too

Use Advantage's experience to build your portable and central chiller system – it is the right tool for that job!

Maximum® Portable Chillers

- Air & water cooled models
- Cooling capacity ranging from 1/4-40 ton and fluid temperature range from 20-70°F
- Many models available with energy saving digital scroll compressors
- Built using high efficiency evaporators and condensers
- Tailor made microprocessor controls
- Fully factory tested
- Customized configurations available to meet your specific needs

Titan® & OACS® Central Chillers

- Air & water cooled models
- Cooling capacity ranging from 5-210 ton and fluid temperature ranging from 20-70°F
- Complete chiller, pump & tank packages simplifies and reduces installation costs and time
- Multiple refrigeration circuits match capacity to load and minimize downtime risk
- Outdoor or indoor models
- Easily expanded systems with tailor made control systems
- Customized configurations available to meet your specific needs

ADVANTAGE®
MAK NG WATER WORK.

525 East Stop 18 Road • Greenwood, IN 46142
317.887.072
www.AdvantageEngineering.com

says Robert, since the cap and container neck need no longer be round.

Robert says ultrasonic welding of closures and containers is already proven in high-volume packaging of dairy products such as yogurt. What's more, he says ultrasonic welding takes only 20% as much energy as heat sealing, and the ultrasonic welding heads are available instantaneously, as they require no heat-up time.

This hypothetical example of a vitamin bottle shows how, by eliminating threads, UfLIPseal reduces closure and neck height and saves overall container weight.

Robert acknowledges a couple of limitations in this approach. One is that ultrasonic welding requires the cap and container body to be of the same or similar materials. So the intuitive choice of materials would be PP to PP. Or a PET bottle would need a PET cap with a living hinge, which Robert says is technically possible. A second point is that food and drug packagers have large investments in filling lines, which would require substantial modification to convert to UfLIPseal technology. For that reason, Robert envisions it being used primarily in new products so that filling lines can be designed specifically for the new approach.

Patented U10Seal concept for wide-mouth containers of spoonable products involves molding a flanged ring and a spoon onto the underside of peelable IML label and tamper-evident seal.

IML LID WITH A SPOON ATTACHED

KBS Impact's currently patented variant of FIML is called U10Seal. It is aimed at single-serve yogurt, pudding, dry cereal, dry noodles, or other spoonable foods for wide-mouth tub-style containers. In this case, a preprinted IML label is placed in an injection mold and a ring of plastic is molded against the outer perimeter. This ring is later ultrasonically welded to a flange on the container body. The added feature of U10Seal is suggested by the name (a pun on "utensil"): a plastic spoon is molded onto the center of the IML film. Because the film is peelable, the spoon can be pulled off the film after peeling open the container. PT

Ultrasonic welding of filled containers is already proven in high-volume yogurt packaging.

QUESTIONS ABOUT IN-MOLD LABELING?
Learn more at PTonline.com
Visit the In-Mold Labeling Zone.

GET MORE WITH RAPID

Better regrind = Better parts = MORE profitability!

Rapid's superior regrind

Regrind from other granulator

You can sell it for pennies a pound, or, you can recover the full value of your regrind and get MORE out of your production.

Even the best molding processes cannot produce high quality parts if the regrind is poor.

Rapid Granulator's superior cutting technology and engineering has helped improve customers' bottom lines for almost 70 years.

Get MORE – call Rapid to arrange for a free test of your most demanding material.

It isn't scrap unless you throw it away!

rapidgranulator.com

Rapid®
Reduce · Reuse · Recycle

Call +1 724.584.5220

MATERIALS

PART 7

A Processor's Most Important Job

There are several process-related issues that influence crystallinity besides cooling rate. Let's examine a few.

By Mike Sepe

We have spent a lot of time on the subject of crystallinity and there is a lot more that we could say. The emphasis of this discussion has been on cooling rate, since it is within the control of the processor. But there are other factors that can influence crystallinity. The process-related items on the list play a relatively minor role compared with cooling rate, but they should be understood to appreciate the big picture. The other factors are related to aspects of mold design and to the material itself.

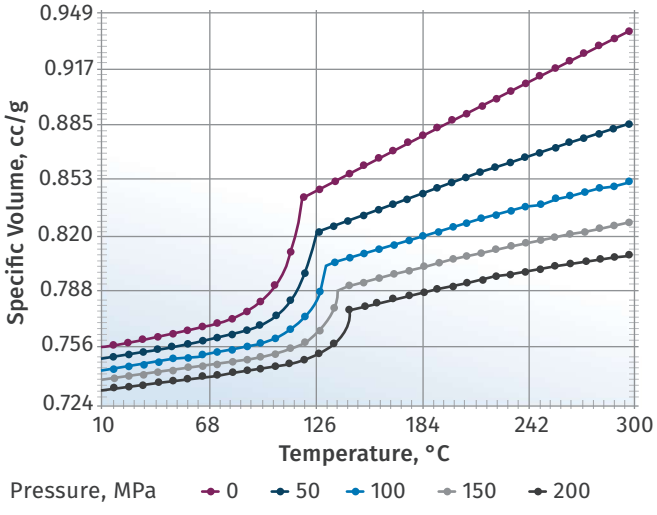
One process parameter that has a minor but measurable influence on crystallization is the melt temperature of the polymer as it enters the mold. The higher the temperature of the material, the longer it will take to cool to the point where crystallization stops. It is important to understand that we are referring to actual melt temperature, not the barrel settings. Anything that can alter the energy content in the polymer, such as screw rotation speed or backpressure, can also affect the rate of cooling and therefore the degree of crystallinity.

The higher the temperature of the material, the longer it will take to cool to the point where crystallization stops.

The other process condition that has an unexpected effect on crystallization is the pack and hold pressure profile. Higher pressures compress the material to a greater degree, forcing the polymer chains closer together and restricting their mobility. Since crystallization depends upon mobility, higher degrees of packing discourage crystallization.

This effect can be observed in a pressure-volume-temperature (PVT) diagram as shown in the accompanying graph. This shows the change in the specific volume of a PP as it cools while under different pressures. Larger changes in volume correspond in part to the achievement of a greater degree of crystallinity. It is apparent that this change in volume becomes smaller as the applied pressure increases. Both the melt temperature and the pack and hold pressure profile have a relatively small effect on crystallinity compared with cooling rate, but they are measurable, and they have been confirmed in laboratory tests.

PVT Diagram for a Filled PP



This pressure-volume-temperature (PVT) diagram shows the change in the specific volume of a PP as it cools while under different pressures. Larger changes in volume correspond in part to the achievement of a greater degree of crystallinity.

Another interesting influence is orientation. This is a phenomenon that occurs whenever a polymer flows. The act of moving the polymer produces an uncoiling of the entangled chains; and the straighter chains, aligned closely together, can produce zones of higher crystallinity. Thermoformers that produce parts in PET are quite familiar with this phenomenon and have learned that PET in a sidewall of a deep-draw container will exhibit a higher degree of crystallinity than the bottom of the container where the sheet did not stretch. This can affect the properties of the container. Too much crystallinity will reduce the toughness of the material and can result in brittle failures.

In injection molding, this type of crystallization is most often observed as a function of gate location and part geometry and is especially important in materials that can crystallize over an extended period of time, such as PE and PP. ►

KNOW HOW MATERIALS

Learn more at PTonline.com

Get more insights on Materials from our expert author:
short.ptonline.com/materialsKH

POLYMER PROCESSING SOLUTIONS.

Tailored to your exact needs.

What are you looking to accomplish? Increased throughput? Greater uptime? Quickly launch a new product? We can help. We supply polymer-processing equipment, but we are really in the making-your-product-ideas-real business. It starts with listening and culminates with a tailored product and lifetime service solution to meet your exact needs.

Visit davis-standard.com to learn more.

DAVIS-STANDARD®
Where your ideas take shape.

davis-standard.com
TEL +1 860-599-1010

Other factors are related to the nature of the material that has been selected. This is frequently beyond the control of the processor. However, a processor who knows the role of material selection in the achievement of crystallization can offer its customer a way out of a thorny problem. Nucleation is one modification of material composition that influences the way a material crystallizes. This is often achieved through additives and is commonly used in PPs, nylons, and polyesters.

Nucleation allows crystallization to begin at more sites simultaneously, producing a larger number of small crystals as opposed to a smaller number of large ones. This will alter the properties of the material, increasing stiffness while typically reducing impact resistance. It will also reduce the amount of shrinkage that the material exhibits as it cools, and it allows for a reduction in cycle time since the crystallization process begins and ends at higher temperatures. While nucleation is often accomplished intentionally with additives, it also can occur unintentionally with the addition of certain fillers and colorants.

Too much crystallinity will reduce the toughness of the material and can result in brittle failures.

Another material property that influences the rate of crystallization is molecular weight (MW). This is an often-forgotten relationship. Higher-MW grades of a given polymer will crystallize more slowly than their lower-MW counterparts. Again, if it is understood that crystallization is promoted by chain mobility, this makes perfect sense. In higher-MW systems, chain entanglement occurs to a greater degree and this limits mobility, suppressing the tendency for the material to form crystals.

We used this principle many years ago to solve a difficult problem with voids that formed in the thick section of a part molded from a glass-fiber-reinforced PBT polyester. The part had been designed with a nominal wall thickness of 3⁄16 in. but had an area approximately 3 in. from the gate where the wall thickness increased to almost 1 in. This area was prone to form voids as the part cooled, a defect that was completely unacceptable to the end user. Process development had minimized the problem, however quality checks still involved cutting open the thick section in almost 5% of our production to inspect for voids, since non-destructive imaging techniques were not readily available at that time. And even with all the appropriate process strategies in place, we struggled with certain lots of material.

When we analyzed our quality data as a function of lot-to-lot behavior, we noticed that the problem lots were the ones manufactured to the high end of the melt-flow-rate range. The nominal MFR specification was 11 g/10 min with a low end of 9 and a high end of 13. Lots that came in below 11.5 g/10 min afforded us the needed processing window without producing voids. Voids occur due to excessive, localized shrinkage; and when the crystallization rate was faster this shrinkage occurred to a greater degree. The higher-viscosity lots shrank less.

We may have been the first processor to ever contact a material supplier and ask for a material that did not flow as well. The technical-service representative for the resin company even tried to dissuade us from going in this direction, arguing that we needed an easier-flowing material so that we could pack more effectively. But the experimental data confirmed our approach and by cherry picking lots of higher viscosity we essentially eliminated the defect. We used this approach many times to solve internal void issues in thick walls.

We have probably exhausted the crystallinity conversation at this point. Next time we will delve into another defect that can be difficult to detect but is often driven by molding conditions: internal stress. 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*.

SHRED SCRAP

NOT YOUR TALONS

With easier-than-ever service and cleaning, you'll immediately notice that Republic's patented Split-A-Part modular shredders are safer to clean and service. And soon, you'll discover that your operating costs are much lower, thanks to the way they minimize heat, wear and tear.

Republic Machine™

republicmachine.com

Eagle Modular Shredder

READY FOR YOUR PRODUCTIVITY TO SOAR?

INJECTION MOLDING

Fill Based on Volume, Not Weight

Most parts should be 90-99% full after first-stage—by volume not weight. Here's why that's important and how to make a first-stage-only part.

By John Bozzelli

When processing via "Scientific Molding," injecting plastic into the mold or cavity is separated into two stages: filling (or "first stage") and pack-and-hold ("second stage"). During the last few weeks I've been getting lots of emails and have had several discussions focusing on just how full the part should be at the end of first stage. And since we call for a greater than 90% full part at the end of first stage, does this mean by weight or by volume? Good questions. Where do we find the answers?

To start let's define the terms, since there are host of different names, labels, or expressions for first and second stages. Terms such as fill, pack, hold, high-pressure, low-pressure, V-to-P, etc. have been used. Do they all mean the same thing or are there differences? Having numerous terms that are not clearly defined drives me to near insanity. It makes communications difficult, breeds misunderstanding, and confusion, and makes training especially difficult. So, to be clear on what I mean by first and second stage, see Fig. 1, which is an Injection Pressure (plastic pressure) vs. Time graph depicting first and second stage. This graph is typical for most but not all injection molding processes. (It would not apply, for example, to micro-molding, where the parts are too small to separate first stage from second stage.) In short, first stage fills the part to greater than 90% full, and second stage packs out the part with the remaining amount of plastic needed to finish filling the part, remove sinks, and provide the appropriate part dimensions.

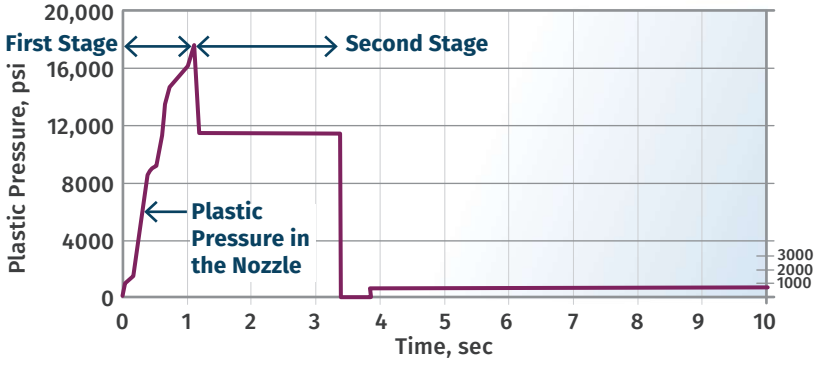
Having numerous terms that are not clearly defined drives me to near insanity.

Next let's cover the procedure to make a first-stage-only part. The goal is to make a short shot that is greater than 90% full. Seems simple enough; after all, the instructions to make a first-stage-only part is to take off second stage. Problem is, there are three different ways to take off second stage:

1. Take the second-stage timer to zero.
2. Take second-stage pressure to a very low value. I suggest 5 to 50 psi (0.5-3.5 bar) and leave at least 0.50 sec or longer on the second-stage timer.
3. Take second-stage timer to zero and reduce pressure to a low value.

Try each one … my bet is you will not produce the same first-stage-only part. So, which one is best? I suggest the second approach, and let me explain why. There is the issue of momentum or over-travel on most molding machines. That is, the screw does not stop at the set cutoff position. It is critical that the processor sees, understands and deals with this over-travel in developing first stage. Also, it is critical that the processor ensures that this first-stage-only part is done under conditions where injection or first stage is *not* pressure limited. Many go with 10% higher set or available ►

FIG 1 First and Second Stage



As shown here, first stage fills the part to greater than 90% full, and second stage packs out the part with the remaining amount of plastic needed to finish filling the part, remove sinks, and provide the appropriate part dimensions.

KNOW HOW INJECTION MOLDING

Learn more at PTonline.com

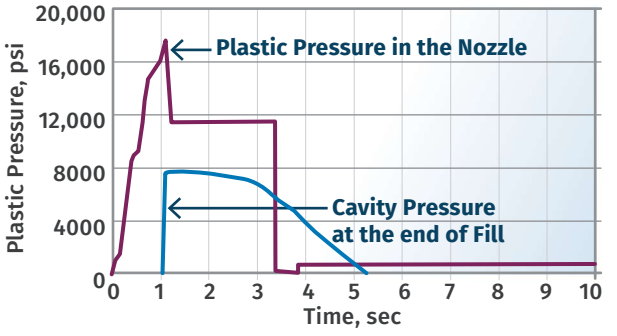
Get more insights on Injection Molding from our expert authors: **short.ptonline.com/moldingKH**

Large and efficient: It's possible with us! Our ALLROUNDER 1120 H combines electric speed and precision with hydraulic power and dynamics. And with our innovative GESTICA control system, operation is even more intuitive and smarter – this is high-end technology that's fun to work with!

www.arburg.us

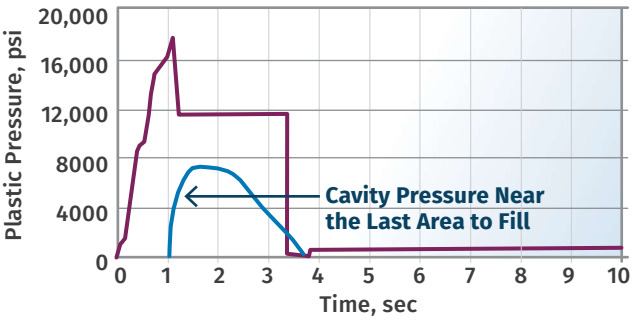
ARBURG

FIG 2 First Stage by Weight



In first stage, if you fill parts by weight you'll get a rapid, near- vertical instant rise on cavity pressure. This creates a significant force on the parting line of the mold and will likely prematurely wear it, leading to flash.

FIG 3 First Stage by Volume



Note the rounded end-of-fill cavity-pressure curve you get when filling parts by volume and not weight. It suggests less stress is being generated on the parting line, allowing it to withstand significantly more shots before wear and subsequent development of flash.

pressure vs. actual peak pressure during injection. I find this common rule of thumb to be inadequate.

So now that we know the procedure for making a first stage part, how full should it be? No easy answer here. Somewhere between 90 to 99.9% full—based on volume, not weight. Factors that influence this are the type of part, number of cavities, balance of filling, a weld line at the end of fill, a living hinge, etc. Bottom line for 99% of parts being molded: The first-stage part(s) should be visibly short, not full with sink. But why by volume and not weight?

Fill greater than 90% by volume, not weight.

The emails and blogs I've received and read covered a variety of rationales for volume or weight, dealing with melt density vs solid density, sinks, bounce-back, and other factors. For me ,the answer—volume—comes from studying cavity-pressure curves and witnessing the wear on parting lines along with the resulting development of flash on parts.

Figure 2 provides the injection-pressure curve in first and second stage, along with an end-of-cavity pressure curve for a first stage developed by weight. Note the rapid, near-vertical instant rise of cavity pressure. This is a significant force on the mold's parting line and will likely prematurely wear it, leading to flash at some point.

Figure 3 provides the injection-pressure curve for first and second stage, along with an end-of-cavity pressure curve for a first stage developed by volume. Note the rounded end-of-fill cavity-pressure curve. It suggests less stress is being generated on the parting line allowing it to withstand significantly more shots before wear and subsequent development of flash. Please understand there are a number of factors that influence parting line wear; this is only one of several. Also, the shape of an end-of-fill cavity-pressure curve is part-dependent.

In short, develop first stage with time on the second-stage timer and based on volume. It should provide less wear on the parting line. 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*.

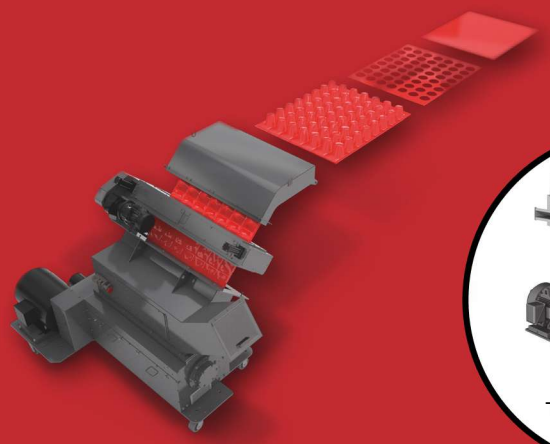
cumberland

NEW PRODUCTS

IMPROVE PRODUCTIVITY *with Metered Material Flow* AND EXCEPTIONAL REGRIND QUALITY

The three Thermoforming Feedrolls process a wide range of materials and sizes — from crushing large cups and containers to running thin sheet and web. The T50 Central Granulator is designed for applications ranging from large injection or blow molded scrap to furniture components and appliance parts. Combined, the machines continuously feed and meter thermoforming and extruded scrap flow.

THERMOFORMING SOLUTIONS
FEEDROLLS



- Flexibility
- Easy set up & maintenance
- Durable design
- Three models: Crusher, Versatile, Edge trim

T50 granulator with Versatile Feedroll

CENTRAL GRANULATORS
T50 SERIES

- Exceptional regrind quality
- Open design = Easy maintenance
- Application flexibility

www.cumberland-plastics.com

262-641-8600

TOOLING

PART 1

Why Ejector Pins Break ... and How to Prevent It

In part one of this four-part series, we focus on the molding machine and the ejection system as culprits.

There are dozens of reasons why ejector pins break. Very few of them have anything to do with the pins themselves. This month I will discuss how the molding machine and the ejection system can be the culprit.

By Jim Fattori

If the molding machine has a bent ejector cross (also known as the machine's ejector platen, ejector plate, or if you're old school like me, the dog bone), or if the cross's thin guide bushings are worn, it will travel at a slight angle and apply an uneven load to the mold's ejector plate. This condition is usually obvious because the machine's knock-out bars may not align with, or will rub against, some of the through holes in the moving platen. Steel crosses that are bent can be straightened out in a hydraulic press, but cast-iron crosses will probably crack.

If the molding machine's ejector cross is bent, it will apply an uneven load on the mold's ejector system.

A more common condition that will apply an uneven load to the ejector plate is if the molding machine's knock-out bars are slightly different lengths. Bars that are too long or of different lengths are the primary reason for bent ejector crosses. If the mold has knock-out extensions attached to the ejector plate, and they are not the same length, or one of their retaining bolts comes loose, this too can cause an uneven load on the ejector plate. Several mold-components suppliers sell standardized knock-out extensions. If you have your own design, make sure the extensions do not butt up against the back of the ejector retainer plate. Those designs are notorious for bending or breaking the retainer plate.

If you have an ejector-plate deflection issue, the root cause of the problem is probably not the thickness of the plate.

If the mold is equipped with a coil-spring ejector-return system, but one or more of the springs are broken, the ejector plates are going to try to twist or bend. This will also happen if the springs are of different lengths, or if the amount of preload varies due to varying counter-bore depths. I try to avoid using ejector-return springs. I once had a spring-loaded ejection system bind in the forward position. The foreman gave the ejector plate a hard tap with a brass rod. It broke free and slammed back against the support buttons—thankfully not against his fingers. Someone once told me he loves springs. "It speeds up the setup time because we don't have to connect the machine's ejector bars." I'm guessing he doesn't connect his seat belt either.

Another thing that can cause an uneven load on the ejector plate is the location of the ejector pins and of the forces required to eject the part. This is always the case when there is a single offset cavity.

When there is an uneven load applied to the ejector plate, it will try to bend, cock, or twist. This causes a chain reaction. If ►

KNOW HOW TOOLING

Learn more at PTonline.com

Get more insights on tooling from our expert authors:
short.ptonline.com/toolingKH

Business Friendly.

The world's finest High Speed Dispersers are also the most business-friendly dispersers you can buy. They're made right here in the USA. And with a large inventory of dispersers in stock, Ross can guarantee fast delivery. Thanks to the efficiency of our vast manufacturing resources, they're also easy on your budget.

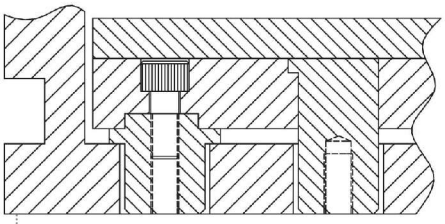
Learn more. Visit Dispersers.com. Call 1-800-243-ROSS. Or try our free online Knowledge Base & Product Selector web app at Mixers.com/web-app.

ROSS

Imagine the Possibilities

Scan to learn more.

the ejector plates have a guided system, the guide bushings will wear out prematurely. It can cause ejector pins to bend and break. It can cause the through holes in the core insert to wear out with elliptical or egg-shaped holes. It can cause the ejector pins to push against the molded part unevenly, which can distort the part or cause it to stick in the mold tighter. And it can cause the ejector pins to vary in height relative to the parting line.



Ejector extension designs should apply the machine's ejection force to the thicker ejector plate (left) and not the weaker retainer plate (right).

Did you ever wonder why molds have those round stop pins or rest buttons between the ejector plate and the clamp plate? They are there because if any dirt or debris gets in between these two plates, some or all the ejector pins are going to protrude beyond the parting line of the mold by an amount equal to the thickness of the debris. Protruding pins can cause sticking issues when trying to eject the part. If any ejector pins are under a cam, the pin or the cam can get damaged when the mold closes. The purpose of these rest buttons is to minimize the contact area between the two plates, to allow some debris to accumulate without affecting the proper position of the ejector system.

On occasion, rest buttons are moved or eliminated to make room for a core pin or some other component. This is when you can get a support problem. It is a good idea to have a rest button near or under any component that could apply pressure to the ejector plate, such as a lifter or an ejector pin that butts up against steel. Having rest buttons near the tapped holes for the machine's ejector bars is also beneficial. If the machine's retract position is not set properly, ejector bars can pull and distort a poorly supported ejector plate.

Thermal expansion is a major cause of misalignment.

Ejector housings are typically open on two opposing ends of a mold, and one of the open ends is often at the top when mounted in the machine. It is not that uncommon for small molded parts with undercuts on their cores to ricochet off the cavity upon ejection and end up inside the ejector housing. That can cause the ejector plates to try to bend the next time the mold cycles. This is easily correctable by installing an ejector housing cover or shield. Housing covers have additional benefits, as well. They are a good safety precaution for accidents caused by spring-loaded ejector plates—much more effective than painting the edges of the plates OSHA orange.

A cover also helps prevent potential mold damage by personnel trying to advance the ejector plates with a pry bar when there is an ejector pin under a cam. In lieu of a shield, rest buttons, which are typically mounted between the clamp plate and the ejector plate, can be added between the retainer plate and support plate. This creates a 3⁄16-in. gap, so any dirt, debris or the occasional small stray part won't cause the ejector plates to try to cock or bend. I only suggest this because most processors set the ejection forward position to be flush with the back of the support plate, even when they have plenty of ejector stroke, as opposed to staying a short distance away.

Always install all the Plastics Industry Association's (PLASTICS) knock-out patterns that will fit in a mold. If you don't know what they are, get a copy of *AN-109 Recommended Guidelines–Interchangeable Mold Mounting Dimensions* from PLASTICS. It is up to the setup man to decide which ejector pattern(s) to use. Hopefully, he chooses a pattern that will not damage the mold. Hydraulic ejector cylinders on small molding machines can have a forward ejection force of 1 to 5 tons. Larger machines can go as high as 80 tons. Now that's a force to be reckoned with! On large molds, if the knock-out bars are not spaced far enough apart, this can cause the plates to want to bend in the middle—toward the support plate. Conversely, if the knock-out bars are at the extreme outer edges, but there are a number of ejector pins pushing the runner and parts in the middle of the mold, the ejector plates will also want to bend in the middle—but this time away from the support plate. Therefore, make sure the knock-out bars are evenly spaced; or on large molds, consider using additional knock-out bars to help distribute the force evenly over the entire ejector plate.

A single offset cavity puts an uneven load on the ejection system.

Installing additional bolts connecting the ejector retainer plate to the ejector plate will provide some added strength to prevent the two plates from trying to bend or twist. But they do a much better job of preventing just the ejector retainer plate from bending, which is important. Extra bolts placed near the return pins, lifters and any groupings of ejector pins help prevent the

weak retainer plate from separating from the ejector plate as the assembly retracts.

The formula for calculating the amount of deflection a rectangular plate will have under a specific set of conditions states that the plate's resistance to deflection is proportional to the third power of its thickness. In that same formula, the unsupported length is also proportional to the third power. This is why it is so important for the machine's ejector bars to be evenly spaced.

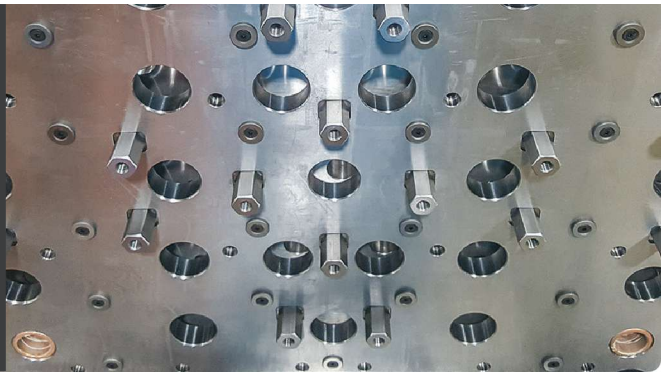
This deflection formula is important when molding a part with a large amount of projected area or calculating how thick to make a support plate or a cavity plate in a hot-runner mold. But when it comes to an ejector plate, the standard 1-in. or 1⅛-in. thickness is almost always sufficient. If you have a plate-deflection issue, the root cause of your problem is probably not the thickness of the plate; more likely it's an uneven loading issue. However, I do recall a large mold or two where we used a 1⅜-in.-thick ejector plate, but only because it was riddled with holes from support pillars and numerous other mold components.

Once I went so far as to heat treat an ejector plate made of S-7 steel and guided it with linear ball bearings for an electrical connector molded in liquid-crystal polymer. The reason wasn't possible plate deflection. The concern was that the ejector-pin height tolerance on the drawing was +0.0000 to -0.0005 in. If the head of the pin made even a slight depression into the face of a softer ejector plate, or if the ejector plate was even slightly out of alignment, the parts would be rejected.

While it is a little beyond the scope of this article, I should point out that it is good practice for ejector pins to be 0.0005 in. to 0.0015 in. below the surface of the part they are ejecting. This helps ensure the part will not hang up on the pin, which would require additional ejector pulses. It also helps reduce stress marks and "skid" marks on the part itself. Conversely, if the ejector pins are slightly into the part, you can get aesthetic issues caused by turbulent material flow, particularly on thin-walled parts. You may have seen this happen on a molded part with depressed engraving, formed by raised engraving in the steel.

Ejector plates should travel parallel to the centerline of the mold, and receive and apply an evenly distributed load.

Thermal expansion is a major cause of ejector-pin misalignment, especially on large molds that run at elevated temperatures. Just because the ejector plates move freely back and forth on the bench doesn't mean they won't bind up under production



Always equip a mold with all of the possible machine knock-out patterns, and be generous with the rest buttons.

conditions. The core and the support plate are rarely at ambient temperature. Ejector plates are almost always at ambient temperature. If the core plate expands (or contracts) and the ejector plates don't, some of the ejector pins will be out of alignment—typically the outboard ones. It all comes down to what the temperature delta is, and what is the distance between the outboard ejector pins. This thermal-expansion problem can easily be solved by doing two things: First, add cooling lines (water or oil), in the ejector plate. Second, if the ejector plates are guided, mount the guide pins in the support plate—not the ejection clamp plate. My personal preference is to mount the guide pins in the support plate in every mold.

If you ever wonder whether you should add a guided ejector system, ask yourself if the plates are heavy, or is the annual number of cycles 100,000 or more. If you answer yes to either question, the ejector system should definitely be guided. Otherwise, you can expect to eventually get premature ejector-pin wear and its associated down-flash sometime during the mold's lifespan. Even if the answer is no, it's still a good idea to help avoid wear and pin breakage problems. PLASTICS has a publication entitled *Classification of Injection Molds for Thermoplastic Materials*. It specifies that Type 101 and 401 molds must have guided ejection, and this is recommended for Type 102 and 402 molds as well. As a point of interest, Mike Noggle and Chuck Brewer Jr., along with Jack Kelly and Jim Atchison, hammered out the details of these mold classifications and assigned their work to the trade association in 1978.

Very large molds should have six or eight ejector-return pins—not the typical four. Additional return pins help ensure the ejector plates are pushed back evenly. And if the ejector plates are not tied into the machine's ejector cross, the added return pins will reduce the amount of coining on the face of the cavity plate. This also happens on small molds made of pre-hard or softer steels. Some quick-change mold inserts are supplied with only two return pins and they are considerably smaller than what is required for a long-running mold.

Bottom line: To help avoid ejector-pin failure, the ejector plates should travel parallel to the centerline of the mold, and the plates should receive and apply an evenly distributed load. 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*.

SMART ATTEND
ADVANCED MONITORING TECHNOLOGY

Solve your problems

FASTER
THAN EVER

At the most affordable price

"After integrating the Smart Attend, we immediately saved thousands in preventing unscheduled downtime. I cannot speak highly enough about the system and their service."

Winner of the 2017 CPIA Innovator AWARD

Smart Attends award winning production monitoring capabilities ensure you know exactly what decisions need to be made in those crucial moments. Instant visibility, real-time machine communication, and accurate information opens up new opportunities to grow as a business and implement more effective strategies.

www.smartattend.com

Extrusion2018

PT A Plastics Technology Event

September 18-20, 2018

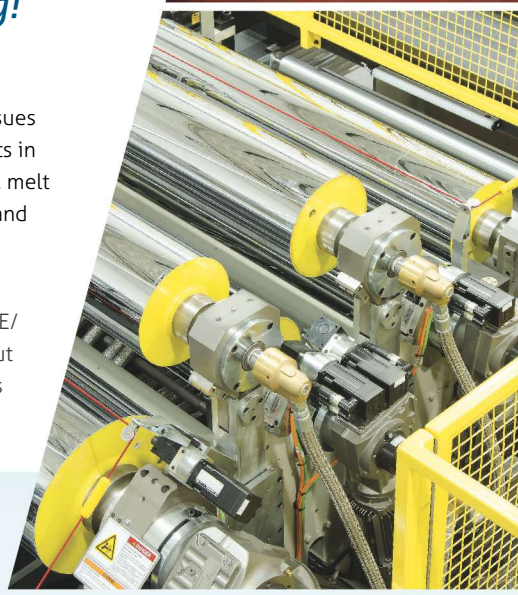
Huntington Convention Center of Cleveland
Cleveland, Ohio

Register TODAY!

The first and only conference devoted 100% to all aspects of extrusion processing!

Your day at Extrusion 2018 starts with GENERAL SESSIONS focusing on issues important to you and to everyone involved in the extrusion process. Experts in everything from resin conveying, drying, blending, purging, direct extrusion, melt filtration, foaming, screw design, and more will share the latest innovations and best practices in the field.

The general sessions are followed by BREAKOUT SESSIONS in each of the four major segments of the extrusion process: FILM, SHEET, COMPOUNDING, and PIPE/PROFILE/TUBING. Feel free to move from track to track, as you select the breakout sessions that will help you troubleshoot solutions to your problems and concerns about any aspects of extrusion.



Film Breakout Sessions
Learn more about developments in die design, winding, materials, gauging, new coextrusion technologies, new tools to boost output, maintenance and troubleshooting.

Sheet Breakout Sessions
Get updated on high-speed lines for PET, new developments in heavy-gauge sheet, foaming, and upstream materials conveying and drying best practices.

Compounding Breakout Sessions
Hear from experts and troubleshoot issues in venting, feeding, pelletizing technology, and more.

Pipe/Profile/Tubing Breakout Sessions
Learn about the newest developments in tooling, downstream, quick-change extruders, new cooling techniques, and more.

See the full conference agenda at
ExtrusionConference.com

Inset photos courtesy of (from top to bottom): Windmoeller & Hoelscher Corp.; Processing Technologies International LLC.; Gardner Business Media, Inc.

A product of Gardner Business Media, Inc.

Register by **August 17** ***& SAVE $100***

ExtrusionConference.com

THANKS TO OUR SPONSORS:

Platinum Sponsors:

CLOEREN INCORPORATED

GRAHAM ENGINEERING

MachineSense™

MAGUIRE® Intelligent Simplicity

NOVATEC™

ODEN TECHNOLOGIES

PLASTICS MACHINERY GROUP

RiverdaleGlobal® Changing the way you think about color

Gold Sponsors:

The ADVANCED Team

ECM Blenlyn Inc.

Brabender® CWB

CPS

CONAIR®

D.R. Joseph INCORPORATED

DAVIS-STANDARD® Where your ideas take shape.

esi Extrusion Services, Inc.

innovative RECYCLING SOLUTIONS

Nordson

NOVATEC™

PTI®

Reifenhäuser

PSI POLYMER SYSTEMS INC.

WINDMOELLER & HOELSCHER

Silver Sponsors:

Guill

Trendelkamp

VERSA

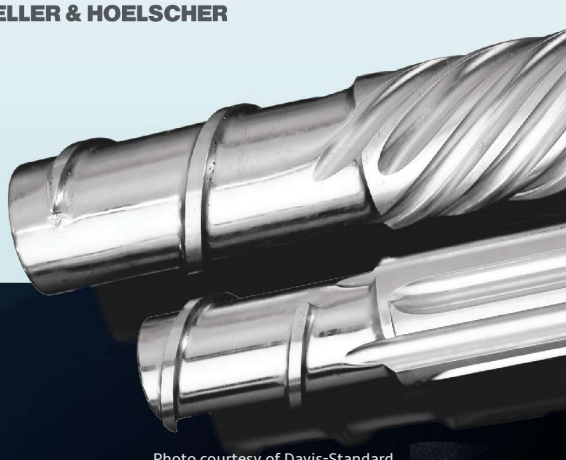


Photo courtesy of Davis-Standard

Limited sponsorships and exhibit space are still available!

Contact Ryan Delahanty | +1 630-345-3465 | ryand@gardnerweb.com

REGISTER ***TODAY & SAVE!***

ExtrusionConference.com

PART 1

News in Primary Machinery

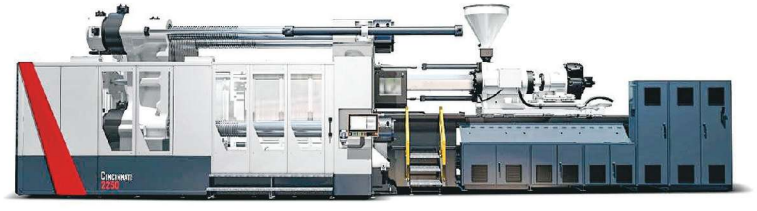
Rounding up details from the Big Show not previously reported in all our other coverage, here's more news in injection and blow molding, extrusion and compounding. Next month, we'll conclude with recycling/scrap reclaim, robots, tooling, auxiliary equipment, materials and additives.

By Matt Naitove, *Executive Editor*
& Jim Callari, Editorial Director

NPE2018 was rich in new molding, extrusion, and thermoforming hardware and technology. Much of this was reported in our April and May issues (including the five Show Dailies). Nonetheless, our editors vacuumed up enough additional news to require two more issues to present it all. But for the full picture of all that was on display in Orlando, go to the NPE2018 Zone at ***PTonline.com*** to explore the wealth of earlier reports on new technology.

INJECTION MOLDING NEWS

Our previous coverage included new and enhanced injection presses from Arburg, Bole North America, Boy Machines, Chen Hsong, Engel, Fortune International, KraussMaffei, Führung/Leadway, FCS/Maruka, Md Plastics, Milacron, Negri Bossi, Netstal, Nissei, Plustech/Sodick, Sumitomo Demag, Wilmington Machinery, Wittmann Battenfeld, and Yizumi-HPM. Presented here are additional new entries and more on some machines on which few details were previously available.



This 2250-ton press, part of Milacron's new Cincinnati series, is an example of the dominance of servo-hydraulic two-platen presses among new machines at NPE.

New machines were overwhelmingly of two categories, all-electric and servo-hydraulic. Within the latter group, a case could be made that the stars of the show were two-platen presses, whose compact format fits neatly with burgeoning applications for large machines for automotive, recreational vehicles, housewares, large bins, and other medium-to-large parts. Quite a few of these machines at the show hailed from China or South Korea.

For example, CH-America, the new representative for Chen Hsong of Hong Kong (*ch-america.com*), is particularly excited about the new Supermaster servo-hydraulic two-platen series from 700 to 6500 metric tons (7150 U.S. tons). CH-America sources point enthusiastically to platen speeds up to 700 mm/sec—"almost unheard-of" for this type of machine—together with modularity that allows buyers to mix and match 14 clamp sizes and 29 injection units.

Servo-hydraulic two-platen machines were among the most numerous new machines on display.

Clamp speeds up to 1100 mm/sec are claimed for new two-platen lines from LS Mtron, the new name for what used to be Lucky Goldstar and then LG of South Korea (U.S. office in Norcross, Ga.; *lsinjection.com*). Under an agreement announced at NPE, LS Mtron named Daiichi Jitsugyo America (DJA) as a distributor in the U.S. DJA also distributes Niigata injection machines from Japan (*niigata-us.com*). Niigata builds only all-electric toggles, however.

LS Mtron, the largest injection machine builder in South Korea (2800 machines in the last year), is looking to revitalize its U.S. presence. It offers three series of two-platen presses: the servo-hydraulic WIZ series from 450 to 1100 m.t.; WIZ-X series from 1300 to 4000 m.t.; and the One series of premium two-platen hybrid presses from 500 to 3300 m.t. The last series comes with a one-touch automatic tiebar-pulling system, quick-barrel-change system, and 250% greater mold-weight capacity.

QUESTIONS ABOUT NPE2018?

Learn more at PTonline.com

Visit the NPE2018 Zone.

Lucky Goldstar (LG) is back, under the name LS Mtron. The One is its new premium line of servo-hydraulic two-platen presses.

LS Mtron also builds the WIZ-T series of servo-hydraulic toggles from 90 to 400 tons and WIZ-E series of all-electric toggles from 18 to 850 tons. (Niigata's electric toggles range from 55 to 950 tons.) All machines have KEBA controllers. Scan a barcode on the mold, and load setup recipes for the press, robot, chiller, hot runner, etc. Controls for the auxiliaries can be integrated into the machine controller, and settings can be monitored and changed from a tablet.

As reported in our May Keeping Up, Engel (***engelglobal.com***) is bringing its Wintec line of Chinese-built machines—all-electric toggles (55 to 310 tons) and servo-hydraulic two-platens (500 to 1900 tons)—to the U.S. These machines (all with KEBA controls) are designed for general-purpose applications and offer limited options. They are available at substantially lower prices than the Engel line of machines, while maintaining high quality, the company says. Though supplied from Engel's U.S. headquarters in York, Pa., Wintec machines have their own president for the Americas, Peter Auinger, and their own North American sales manager, Don Ivey. In order to maintain the goal of quick delivery in the face of growing demand, Wintec is more than doubling the size of its Chinese plant and increasing the number of production employees 60% by the end of 2019.

LK Systems, Inc. of Hong Kong (U.S. office in Holland, Mich.; ***lk.world***) showed off its third-generation servo-hydraulic, two-platen machines—the Forza III series from 450 to 7800 tons. They have 10% greater daylight than the previous generation, as well as KEBA controls and linear guide rails for the clamp and injection unit.

Welltec Machinery of Hong Kong (***welltec.com.hk***) highlighted its JSeII series of servo-hydraulic two-platen presses from 450 to 4000 tons. They have B&R controls.

Building injection machines since 2014, Woojin Plaimm of South Korea (U.S. office in Mount Prospect, Ill.; ***woojinplaimm.com***) offers the DL-A5 series of premium servo-hydraulic two-platen presses from 500 to 3630 tons. Engineered in Austria, they come with B&R controls. The company also builds servo-hydraulic toggles from 50 to 880 tons, all-electrics from 30 to 850 tons, and vertical presses from 50 to 150 tons.

Other new or upgraded two-platen machines at the show previously reported included the following:

- Zhafir Jenius (JE) Series from Absolute Haitian, with servo-hydraulic clamp and electric screw drive and injection (***absolutehaitian.com***).
- GenII FA series servo-hydraulic presses from FCS of Taiwan, sold here by Maruka USA (***marukausa.com***).
- Medium-sized GX servo-hydraulic two-platen presses from KraussMaffei (***kraussmaffeigroup.com***) with a new "speed" option that includes electric screw drive for faster cycles.
- New Cincinnati series of large servo-hydraulic, two-platen presses from Milacron (***milacron.com***). A 2250-tonner ran at the show; a 6750-tonner is being built for a U.S. molder. This redesigned series features improved operator access to the mold and ejector areas, long stroke, full-stroke rod guidance, improved platen parallelism, simplified strain-rod pulling with a split nut, quick barrel change, active level sensors that adjust while the machine is running, and Mosaic+ control with fully integrated MoldMasters iM2 hot-runner controls and optional integration of a six-axis robot. The machines also boast faster clamp speeds (up to 1035 mm/sec for the 2250-tonner) and ability to carry heavier molds (to 121,250 lb on that model).
- Wilmington Machinery (***wilmingtonmachinery.com***) discussed its new Lumina MP800 two-stage, medium-pressure machine, which has electric screw drive and servo-hydraulic plunger and two-platen clamp.
- Wittmann Battenfeld (***wittmann-group.com***) reported that it is building larger MacroPower servo-hydraulic, two-platen machines, including its first 1100-, 1600-, and 2000-ton models.
- Yizumi-HPM (***yizumi-hpm.com***) showed a 1200-ton model in its new DP-N series of servo-hydraulic, two-platen machines with KEBA controls, tailored specifically for the U.S. market. By the end of this year, the company plans to offer wide-platen versions of all sizes (550 to 3500 tons), which will be 15-20% wider than standard models. In the future, the line will be extended to 5000 tons. ►

Several new controls allow for remote service and troubleshooting, as well as integration of auxiliary equipment for automated setup of repeated runs.

MORE NEW MACHINES

Here's a handful of other types of new machines at the show not previously reported:

Alba Enterprises (***albaent.com***) displayed the new 10-ton servo-hydraulic Babyplast micromolding machine; the maximum size was 6 tons previously. Also new is upgraded software with remote monitoring capability, faster CPU, and more detailed cycle-time analysis and QC package.

New M3 micromolding system from MHS Hotrunner Solutions is said to provide extreme shot-size precision and maximum protection of sensitive resins from thermal degradation through a novel three-step injection process involving two plungers and a valve-gate nozzle.

Another new micromolder is the M3 system from MHS-Mold Hotrunner Solutions (***mhs-hotrunners.com***). Suited to parts from 0.001 to 0.400 g, this system generates 4 m.t. of clamping force solely with electromagnets. An electric linear motor opens and closes the tiebarless clamp at speeds up to 6000 mm/sec. The molds are simplified "insert carriers" that use the company's Rheo-Pro hot-runner valve gates for direct gating of parts with no waste. The system handles up to eight (4 + 4) cavities, which can be multiplied to 32 by gating onto small sub-runners. Enclosed in its own cabinet, the system can integrate material feeding and drying, "touchless" robotic vacuum takeout, vision inspection, conveyor, and TCU.

As compared with previous MHS systems, the M3 boasts larger shot capacity (628 or 1430 mm^3), faster cycles (4 to 6 sec), faster tooling changes (a few minutes for one person), and more Industry 4.0 features—more communications and monitoring options, remote control, and more sensors throughout the machine for process monitoring.

Most important is a new injection concept, called Isokor. This proprietary three-step injection process uses two plungers. One key feature is pre-pressurizing the melt in the barrel and hot runners, and maintaining that pressure so that the system does not encounter variability in shot size due to melt compressibility. Another advantage is preservation of material properties by using relatively low-temperature plastication and gradually bringing the melt up to processing temperature only at the gate, where material is injected with extreme speed and pressure (up to 60,000 psi).

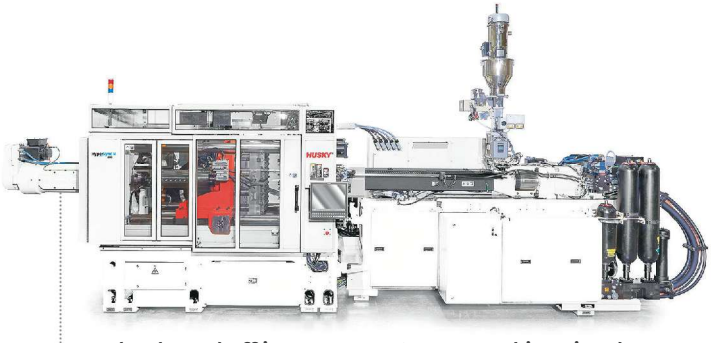
Husky Injection Molding Systems (***husky.co***) announced a new medical machine called HyperSync M, adapted from a cap-molding system introduced at K 2016. It boasts improved ejector parallelism and a smaller injection unit for more precise control. It also monitors mold cooling-water flow for quality control. Husky says it had sold 30 of these units.

Industry 4.0 is a coming trend in blow molding, too.

JSW Plastics Machinery (***jswpmi.com***) showed off its new "Flip" auxiliary injection unit, a servo-electric device with 1- to 1.5-oz shot capacity for use with JSW machines up to 450 m.t. It can be integrated with the controls of AD or ADS series machines or as a mobile stand-alone unit.

LK Systems brought out its first all-electric machines late last year. The e2Xcel line ranges from 45 to 500 tons. They have beltless direct drive of the clamp and injection unit, Gefran controls, and a servo-hydraulic power pack in the base for core pulls. The company also offers the eXcel line of servo-hydraulic toggles from 90 to 915 tons.

Milacron released details on its new Quantum servo-hydraulic toggle line from 125 to 610 tons. Replacing the MTS line, the new presses are said to be 30% faster with longer stroke and large tiebar spacing. The company described it as "a packaging machine for the price of a general-purpose press." In addition, the new base design is said to reduce deflection by 20%, and the new toggle design reportedly allows reducing minimum tonnage by an additional 30% vs. conventional toggles. They come with Endura Touch control, including a 15-in. color touchscreen, adjustable height and swing arm, real-time energy monitor, data storage for up to 80 molds, new core-pull configurator for custom sequences, SPC process monitoring with graphics, and ability to fully utilize the new M-Powered suite of connectivity (Industry 4.0) features.



Husky showed off its new HyperSync M machine aimed specifically at medical molding. This is a 400-ton version.

Niigata of Japan, supplied here by DJA (***niigata-us.com***), brought out its eighth-generation all-electric toggle line, the MD-S8000 series from 55 to 500 tons. They offer a larger control screen and linear guides in all sizes (previously only up to 200 tons). Also new ►

AM2018

Additive Manufacturing Conference

SEPTEMBER 11-12, 2018

Chicago, IL USA

CO-LOCATED WITH

IMTS2018

REGISTER TODAY!

The Additive Manufacturing Conference examines additive technologies for making functional components and end-use production parts. This two-day event covers the equipment, the applications and the materials impacting current and future additive manufacturing.

Visit **additiveconference.com** for program updates, show info and to get registered.

Use Code **AM20** to save 20% on registration!

PRESENTED BY

ADDITIVE MANUFACTURING

Modern Machine Shop

GARDNER Business Media, Inc.

AdditiveConference.com

are eighth-generation vertical electric presses with a rotary table. The MDVR S-8000 series runs from 55 to 165 tons. Both use the new S8000 control with a larger screen and remote monitoring capability—including the Factory View dashboard providing a quick look at production counts and other data. This controller also permits remote service and troubleshooting, and it can send email alerts of alarms or notices when it's time for scheduled maintenance. Controls for hot runners and TCUs can be integrated with the machine controls, so all three can be set up automatically as part of the mold recipe.

Yizumi-HPM introduced its latest series (FE-N) of all-electrics from 65 to 290 tons. The company is working on a 360-tonner, which it expects to introduce by the end of the year.

New powdered-colorant feeder from CAM Co. in Japan was running the Sumitomo Demag booth. Teamed up with a color-sensing camera, it is said to speed color changes and to maintain color during production, with up to 17% colorant savings.

Sumitomo (SHI) Demag Plastics Machinery North America (***sumitomo-shi-demag.us***) demonstrated some novelties on its latest SEEV-A all-electric presses. One was a new automated color-change system from CAM Co., Ltd. of Japan. The Pigmic color feeder uses a metering disc—a variable-speed rotating plate with holes to let the powdered colorant fall through—to dispense colorant into a feeding tube that extends deep into the feed throat so that only the resin in the barrel is exposed to colorant. The programmable unit changes colors prior to the last shot of the previous color and begins feeding the next color. A color-definition camera works together with the Pigmic unit in a closed-loop feedback manner to determine when the color change is complete and reject all intermediate parts. This system reportedly saves labor by automating the color-change process and saves time and material by shortening color-change times. What's more, the camera system works between color changes to ensure color consistency and adjust color feeding as needed. About 17% lower color usage is said to result from such optimization.

On a 130-m.t. SEEV-A machine, Sumitomo Demag demonstrated its relatively new S-Move software for speeding clamp closing in complex molds with deep draws and many slides or motions. The system molded 1-ml PP medical pipettes (0.87 g each) in a 32-cavity hot-runner mold in 7 sec. S-Move replaces multi-step mold open/close speed profiling with an optimized profile that is both smoother (less vibration) and 15% faster by eliminating unnecessary steps, the company says. This is possible because the control "learns" where high contact force occurs relative to mold position. Then it can close the mold much faster, while "thinking ahead" to anticipate those critical points and decelerate appropriately. S-Move reportedly auto-tunes clamp speed and ramp speeds within two or three cycles.

Another new software feature—variable accumulator loading—was demonstrated by Sumitomo Demag on its super-high-speed El-Exis SP 300 hybrid press. It molded 72 HDPE still-water caps (26/22 mm) with tamper-evident band in 1.8-1.9 sec, though the system is said to be capable of 1.6-1.7 sec cycles. To save time, the system starts injection before the mold is fully locked up, almost like injection-compression molding. The new feature adjusts accumulator charging to provide only what the process requires, for a reported 10-15% energy savings.

NEWS IN CONTROLS & MES

Arburg (***arburg.com***) provided more details on its new controls. Two machine sizes, the Allrounder 920 H and 820 H (550 and 440 m.t., respectively) have been converted to the new design introduced with the 1120 H (650 m.t.). The 920 H is currently available, the 820 H is coming in October. An option on these two machines is the new Gestica controller that's standard on the 1120 H; standard configuration is with a new design of the Selogica control, dubbed Selogica ND. The main difference is that the Gestica control embodies the look and feel of smart mobile devices.

The company also has introduced six optional "digital assistance packages" for users of Selogica and Gestica controls. The first of these is not actually a new capability; called "4.set-up," it provides guided step-by-step setup assistance for inexperienced operators. Another is the new "4.start-stop," which is said to simplify and shorten times for production startup in complex applications, such as with multi-component and hot-runner molds. It provides a guided filling study for a new mold. Simulation of filling will be added to the machine control in the future. "4.optimization" is designed to enhance part quality with features for customized process and efficiency optimization, such as injection during mold closing, dosing across cycles, and extended mold-locking functions. Future enhancements will include screw-position-controlled injection for hydraulic presses—already available for all-electrics.

"4.production" offers experienced operators greater flexibility and freedom in programming functions for special processes and

complex molds. An example is the ability to program greater numbers of hot-runner cavities. Future plans include adding a nonlinear curve of pressure drop at the transition point from injection to holding phases, replacing the current programming of linear steps. This new feature reportedly will help balance multicavity molds.

"4.monitoring" provides detailed process and quality monitoring and seamless process documentation. It helps detect process deviations at an early stage.

"4.service" incorporates Arburg's new remote service capability, with online support and ability to give Arburg technicians direct access to the machine control. The company is also exploring use of Augmented Reality for service, whereby special goggles can overlay a view of the actual machine with additional virtual information or objects. The company is also working on predictive-maintenance features.

A new family of ISBM machines has twice the output of preceding models.

Toshiba Machine (*toshiba-machine.com*) showed off its new ECSXIII all-electric machines with their enhanced V70 controller. It has a screen twice as large as previous models and offers varying access levels via ID card, fingerprint, or facial recognition. Incorporation of the OPC UA communication protocol reportedly permits integration of robots, hot runners, chillers, and other auxiliaries. Setup recipes for these auxiliaries can be saved together with the mold data and recalled for automated setup of the cell in later runs. Toshiba also demonstrated integration of a Mold-Masters E-Multi auxiliary injector for a multi-component demonstration. Toshiba six-axis robots will also be fully integrated into the V70 in the future.

Toshiba also demonstrated automated quick mold change using magnetic platens and an automated mold cart from Pascal of Japan. On a 250-ton ECSXIII press, the system accomplished changeovers in 2.25 min, part to part, on a fully automated basis. The magnetic platens are not bolted on, but are replacements for conventional platens, so there is no sacrifice of die height. A robot assisted the mold change by replacing the knockout rods, which were also magnetically coupled.

In manufacturing execution systems (MES), T.I.G. of Austria (*tig-mes.com*, now owned by Engel) is offering a new entry-level option, called TIG 2go, which reportedly attracted the greatest interest at NPE. It enables simple, worldwide access to all connected machines through its cloud-based infrastructure. As a simple point of entry to Industry 4.0, TIG 2go offers an overview of the most important operating data like OEE (overall ►

Brown Machine's new Quad Series thermoformer is available with a dual servo-drive system that maintains coining force at higher speeds.

equipment efficiency), which includes measures of performance, quality, and uptime. For machines connected via Euromap 63/77 or OPC, TIG 2go offers simple analyses of process stability. Also new from T.I.G. is a licensing model for all its products via software subscription, which has the advantage of low initial investment cost.

EXTRUSION & COMPOUNDING NEWS

Reifenhauser (***reifenhauserinc.com***) introduced several products in response to growing demand for blown-film technology that expedites changeovers. The new EVO Drain is a fully automated material-changing system for all secondary resin components (the main material component is not switched to reduce the risk of bubble breaks due to lack of resin in the extruder). In this new technology, residual resins in the feed hoppers are transported by a separate conveyor automatically into a waste bag so there is no manual emptying of waste pails. Emptying and cleaning take about 30 sec for each component. Then, a drain valve in the suction pipe near the suction lance opens and enables piping to be cleaned without suction of new material; the suction lance can remain in the resin reservoir. During cleaning of the feeders, the screw runs slowly, backwards and intermittently.

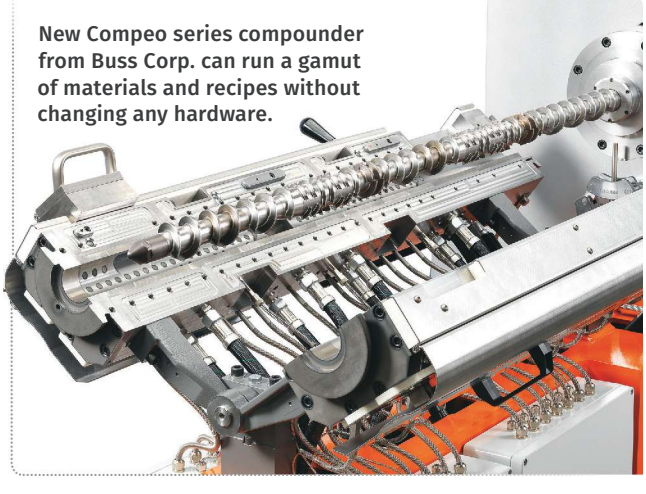
Reifenhauser's new EVO Ultra Die is billed as a fusion of axial, conical and stack die technology. A compact design and short melt-flow paths result in the lowest melt-volume possible to expedite startups and changeovers. Reifenhauser also introduced a Universal Screw, a barrier design that reportedly can run a wide variety of polyolefins along with EVOH, PP, and nylon.

SINGLE- & TWIN-SCREW COMPOUNDING

CPM Extrusion Group (***cpmextrusiongroup.com***) displayed a new 45-mm twin-screw compounding extruder designed for custom-compounding and masterbatch markets. The CXE 45 sHO can be furnished with screw elements designed to gently incorporate glass fibers and/or heat-sensitive flame retardants and additives, and with Century's T-Profile Technology elements, which boost mixing and degassing efficiency. A tie-rod design is said to enable what Century calls "an extraordinarily efficient water-cooling system," which, combined with high-performance cartridge heaters, allows processing of high-temperature nylons for automotive applications with "unmatched process control."

The extruder is also furnished with smart monitoring technology. For the motor, safety clutch and gearbox, optional temperature and vibration sensors can be applied to provide comprehensive condition monitoring that enables the operator to plan a preventive-maintenance program. A gearbox oil sensor constantly evaluates impurities, water content, soot formation, air content, oil aging, acidification, oil temperature, electrical conductivity and the relative permittivity of the oil. Other sensors measure ambient temperature and humidity. For each screw shaft, a sensor assesses the torque and provides valuable information on shaft performance corresponding to specific energy input to the product and can give an indication of wear on shafts and the barrel. The machine is also equipped with condition monitoring technology for the drive, heaters and cooling water.

Two years in the making, the Compeo series compounder from Buss Corp. (***busscorp.com***) can run a gamut of materials and recipes without changing any hardware. Conventional three- or four-flight kneading elements can be combined with new elements comprising two or six flights, which can be used at any desired point in the process section. As a result, previously conflicting objectives, such as a high specific throughput at a controlled energy input, can be achieved simultaneously. All the flights are generated as free-form surfaces, which means that they provide uniformly intense product shear to prevent localized overheating.



New Compeo series compounder from Buss Corp. can run a gamut of materials and recipes without changing any hardware.

The modular concept also means that process length, type and number of feeding units, temperature control, and degassing can all be tailored to the specific processing task. A vertical inlet screw or side

feeders can also be used instead of an inlet hopper. Further side feeders can be provided along the processing zone, while liquid additives can be injected at any desired position through kneading teeth with a bore.

The newly developed discharge unit is based on the principle of a slowly rotating conical twin screw. Regardless of compounder configuration, the discharge unit builds up pressure for downstream units such as screen changers and pelletizers and ensures constant throughput even at high backpressures. The housing of the discharge unit can be removed completely for ease of maintenance and cleaning. The machine is available in 55, 88, 110, 137 and 176 mm.

THERMOFORMING NEWS

The new-generation Quad Series thermoformer from Brown Machine Group (***brownmachinegroup.com***) is now available with a dual servo-drive system that maintains the 180 tons of coining force provided by the original design—at speeds above 40 cycles/min (up from 28/min before). Each platen is driven by two Yaskawa servo motors and has four mechanical toggle assemblies that are corner-guided by four linear bearings. The toggles are strategically positioned on a honeycomb platen designed to eliminate deflection and guarantee consistent material distribution across the complete mold area. Symmetrical drive loads throughout the toggle linkages and drive system are said to eliminate all over-hung loads. The dual servo-drive system can be retrofitted at a much lower cost than a new machine.

Brown also introduced the HTP-1T case-packing system, designed to erect cartons and pack products sequentially within the same machine to save floor space. The initial offering is targeted for the cup and lid industry, but the company has development plans for other markets.

BLOW MOLDING NEWS

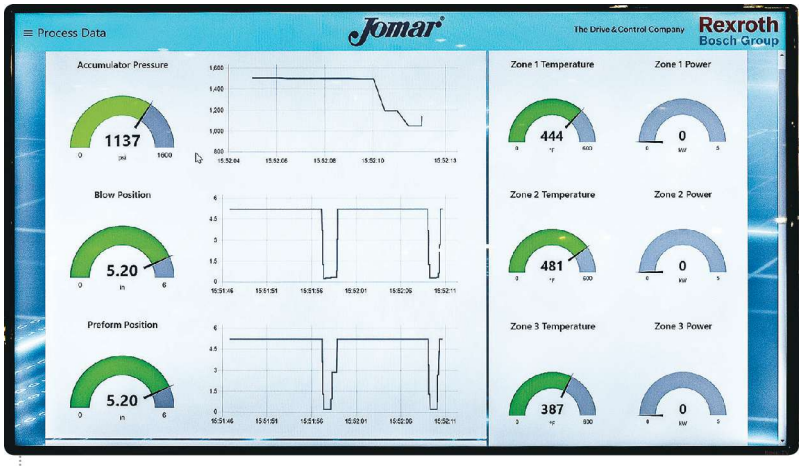
As noted in our April show preview, PET stretch-blow machines were the most numerous category of blow molders at NPE2018. We have already reported on new systems from W. Amsler, Flexblow/Terekas, KHS, Nissei ASB, 1Blow, PET All Manufacturing and SIDE. Here's what else was new:

Aoki Laboratory America (***aokitech.co.jp***) was operating four one-step injection stretch-blow molding (ISBM) models in its new AL series, which offers cycle times about half those of previous versions. The company focused on speeding up the preform injection molding stage, which required an injection screw about 5D longer and wider in diameter. Increased mold cooling allows for quicker release of the preforms for an overall faster cycle.

The new AL-1000-150 was molding a 32-oz smooth, round PET mayo jar in six cavities. Compared with the previous SB III-500-150 machine with the same cavitation molding a jar ►

of the same weight, the cycle time was 8.6 sec, vs. 17.45 sec before, for production capacity of 2508 bph, up from 1236 bph.

A new AL-500-50 was molding 30-ml PET medicine bottles in 10 cavities on a 3.4-sec cycle or 8370 bph. With the same cavitation and bottle weight, the previous SB III-250LL-50S achieved a 9-sec cycle, for 4000 bph.



Jomar's newest servo-hydraulic injection-blow machines have controls designed with Industry 4.0 in mind—for example, remote monitoring of process-data "dashboards" like this one.

The new AL-500LL-50S long-stroke machine molded 200-ml PET personal-care bottles in six cavities and 8.5 sec, for 2538 bph. For the older SB III-250LL-50S, the comparable figures were 18.1 sec and 1188 bph.

The fourth new machine is the AL-1000LL-40, which molded 90-ml HDPE packer bottles in 12 cavities and 9.5 sec. This machine has four times the shot capacity of the SB III-250LL-50S, which could mold the same bottle in only six cavities and 20 sec. The difference is 4536 bph vs. 1080 bph.

SIPA of Italy (U.S. office in Atlanta; ***sipa.it***) demonstrated a newly enhanced model ECS SP80 (80-ton) single-stage ISBM system for up to 16 cavities, containers up to 8 L, neck diam. to 110 mm, and outputs up to 7200 bph. This hybrid machine incorporates servo-hydraulic injection and clamping and electric screw drive. The rotary system has four stations, including one for preform conditioning. At the show, a four-cavity system produced four different bottles (around 200 ml) simultaneously on a 14-sec cycle. New features include a quick-mold-change system for short runs that can cut changeover times by about 25%.

As reported previously, W. Amsler Equipment Inc. (*amslerequipment.net*) introduced its L42X linear two-stage (reheat) machine at the show. It also showed 12-oz, long-neck craft-beer bottles produced for visitors to the NPE Bottle Zone. These monolayer, amber-colored PET bottles contained a barrier additive and were capped by a standard metal crown closure.

Another interesting bottle displayed by Amsler was a 1.5 L screw-top wine bottle for the Magnotta winery of Toronto (photo on p. 8). Like the beer bottles, they use a barrier additive, and also a colorant from Repi S.p.A. to eliminate the resin's blue tint.

Kiefel's Mould & Matic subsidiary (*mouldandmatic.com*) showed off one of its Blowliner one-stage ISBM machines based on an Engel injection unit and a linear stretch-blowing system with integrated take-out robot. The Blowliner M (medium-size) machine at the show has been sent to Kiefel's U.S. office in Portsmouth, N.H., for customer trials and demonstrations.

Quicker mold and material changes accommodate shorter runs.

OTHER BLOW MOLDING NEWS

Our pre-show reporting include new machinery from Uniloy Milacron (*milacron.com*), Rocheleau, Hesta, Graham Engineering, PET Technologies of Austria, and S.T. Blowmoulding of Italy. In addition, we reported in last month's NPE Close-Up that Jomar Corp. (*jomarcorp.com*) may have changed some perceptions of what the injection-blow process can achieve with production of polycarbonate LED light bulbs with very low-visibility gate marks and parting lines. This demonstration of the company's new-generation servo-hydraulic IntelliDrive 85S machine also showed off its Industry 4.0 capabilities in the form of remote process monitoring on an easy-to-read "dashboard" of variables such as accumulator pressure, preform and blowing clamp positions, servomotor rpm, screw rpm, zone temperatures, and power consumption. Future enhancements reportedly will include remote preventive-maintenance monitoring of factors such as screw hydraulic pressure to detect hydraulic leaks.

In keeping with the Industry 4.0 theme, Kautex (*kautex-group.com*) presented Kautex Remote Service, allowing remote diagnostics and troubleshooting by Kautex technicians, saving the time and expense of an on-site visit.

Two other exhibitors of shuttle blow molding equipment, Bekum America (*bekumamerica.com*) and Hesta of Germany (*hesta.de*), represented here by Jackson Machinery (*jacksonmachinery.com*), both talked about a market shift from PETG copolyester (recycling ►

Examples shown by Bekum of growing applications in extrusion blown EPET, in some cases replacing PETG copolyester for enhanced recyclability.

code 7) to extrudable PET, or EPET (recycling code 1), in order to make clear bottles that can be mixed with the standard PET recycle stream. Machines for EPET reportedly need higher clamp force and a longer extruder that can run at lower rpm to generate less shear. The looming issue, sources said, is availability of sufficient quantities of high-melt-strength EPET resin to support this increased demand.

Meanwhile, Bekum discussed two new features of its EBlow and HyBlow machines. One is the adaptation of Bekum's spiral-flow head to smaller sizes (e.g., 40 mm). Another is a quick-mold-change option that reportedly allows changeovers in less than 15 min per side without tools. Mold change is from the front instead of the side, an unusual arrangement that allows closer spacing of machines in a plant. One element of this QMC technology is magnetic clamping of the molds and blow pins; the mold comes out with the pins in place.

As reported last month, W. Müller USA (***mullerheads.com***) showed how it can dramatically reduce color-change times by applying a plasma spray coating of amorphous metal onto the flow channels of its continuous-extrusion heads. The coating is said to be more lubricious, lowering the tendency of the plastic to stick to the metal.

SACMI of Italy (U.S. office in Des Moines, Iowa; ***sacmiusa.com***) demonstrated production of super-lightweight barrier HDPE pharmaceutical bottles with its unique Compression Blow Forming (CBF) system in a joint project with Milliken & Co. (***millikenchemical.com***) and blow molder Jarden Plastic Solutions, Greer, S.C. (***jardenplastics.com***). The 90-ml bottles were molded of Dow 6620 Health+ HDPE and Milliken's new, proprietary UltraGuard additive,

which alters crystal orientation to create a tortuous path that inhibits passage of moisture and oxygen. Milliken's technology is said to boost HDPE barrier properties by 20% to 60%. This, together with SACMI's CBF technology, which reportedly produces consistent bottle walls without thin spots, is said to allow for HDPE pharma-bottle weight reduction of up to 28%. CBF maintains bottle weight within ±0.1 g, according to SACMI. The system also incorporates eight cameras for inline QC checks of bottle dimensions, wall thickness and presence of contaminants.

As we reported in the NPE Show Daily, Wilmington Machinery (***wilmingtonmachinery.com***) was talking at NPE about several new machinery concepts. In rotary wheel machines for packaging, Wilmington has an idea that increases the machine's efficiency—the percentage of time that each mold is actually forming parts—from 65% to 80%. Russ LaBelle, company founder and president, calls it a "radical improvement" in dry-cycle time that will result in more bph per mold.

HDPE pharma bottles are made up to 28% lighter with a combination of SACMI's Compression Blow Forming (CBF) process and Milliken's barrier-enhancing UltraGuard additive technology.

At the show, he was also talking about foam blow molding for bottles and industrial parts. Potential applications include large (40-gal) industrial containers and automotive parts such as tanks for fluids other than fuel. LaBelle is considering foam-core and other multi-layer structures that could be produced on wheel or reciprocating-screw machines. He has a patent on a machine with three reciprocating screws that could make parts from 1 to 100 lb. Accumulator heads is another possible alternative.

As reported in our April preview, Trexel, Inc. (***trexel.com***) presented its new MuCell P-Series nitrogen dosing unit for microcellular foaming of thin-wall products such as packaging. At the show, company sources noted that this technology can also be used for injection-blow molding. What's more, Trexel has modified the design of its B-Series dosing unit for industrial extrusion blow molding. It now can be used for both conventional 2D blow molding and 3D suction-blow molding. Also new is the ability to use the MuCell process with a standard screw, eliminating the need for a restriction to keep the gas from blowing back upstream, because very little gas is required for blow molding. PT

PART 2

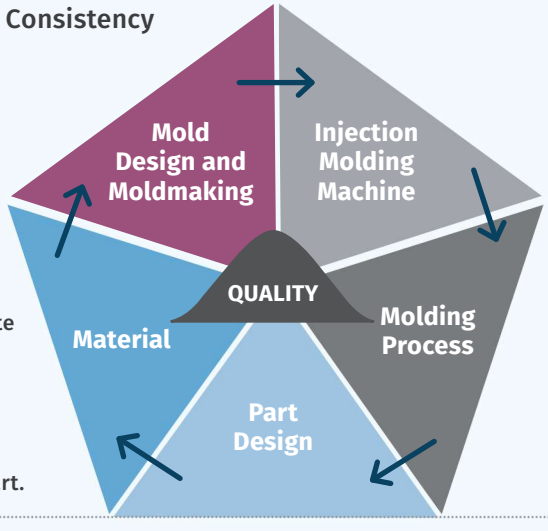
Improving Molding Process Capability: The Role of the Five Essential Pillars

Each contributes to molded-part quality, and each must be optimized before production begins.

By Suhas Kulkarni, *Fimmtech*

The first installment of this two-part series (see May issue) discussed the concepts of process capability and the pressure-volume-temperature (PVT) diagram. Optimum packing of the part will lead to lower variation and therefore higher process capability (Cp) and process capability index (Cpk). The goal at every stage should therefore be to try and achieve the optimum part weight. Achieving this optimum weight is related to the fill and pack-and-hold phases and therefore everything related must be considered. The temperature of the part must also be considered when ejected, since it is related to the dimensional stability.

FIG 1 The Five Pillars for Achieving Part Quality and Consistency



Five pillars contribute to the quality of an injection molded part, and each must be considered and optimized before production of the part.

There are five pillars that contribute to the quality of an injection molded part (Fig. 1). Each must be considered and optimized before production of the part. Cp and Cpk are measures of the capability of the molding process to produce good parts. The higher the numbers, the better the chances of molding acceptable parts—or the lower the chances of having rejects. Since process development and establishing a molding process constitute the last of the five pillars, it often becomes the burden of the process engineer to improve the Cpk. Achieving the required Cpk should be considered at every stage of each of the five pillars.

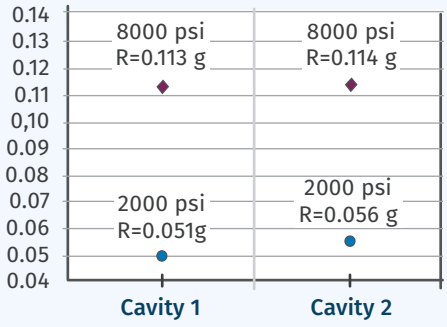
In the fill phase the cavity is filled with molten plastic. In the pack phase, additional plastic is packed in to compensate for shrinkage. The challenge is to add the plastic before the cooling melt reaches its no-flow temperature. If the part is underpacked and the plastic temperature inside the cavity is below the no-flow temperature, no amount of pressure will help in packing the additional plastic. Above the no-flow temperature, as the packing time and pressure increase, the part weight increases. The higher the pressures and times, the higher the part weight. (Parts can and will get overpacked, a topic that will be discussed in a later article.)

At the higher part weights, the number of molecules inside the cavity starts to stabilize and the variation between shot to shot therefore reduces. This reduction in the variation therefore helps to increase the process capability. The goal should therefore be to achieve maximum packing without overpacking the cavity.

The proof is in the data (Fig 2). A two-cavity mold was used for this experiment. Thirty parts were molded with 2000 psi and 8000 psi of plastic

packing pressure. The 30 parts were weighed, and the ranges was calculated. The results clearly show that higher packing pressures will reduce the variation in the part weights, which will be reflected in the part quality and dimensions.

FIG 2 **Effect of Packing Pressures on the Part-Weight Range**



(Data from 30 parts at 2000 & 8000 plastic psi)

Results of this experiment show that higher packing pressures will reduce the variation in part weights, which will be reflected in the part quality and dimensions.

THE FIVE PILLARS

Each of the five pillars plays an important role in achieving the goal of reducing variation. Note that the factors mentioned below are not the *only* factors. Once molders understand the goal of trying to achieve optimum packing, they must investigate means to achieve it. Let's look into some of these:

Part Design: One of the important rules in part design is to have flow lengths that will let the plastic be fluid enough not just to flow into the end of fill but also until all the packing of the part is achieved. This is defined for each material by the length-to-thickness (L/T) ratio of the part. Thin walls often increase the pressure required to fill the part, and the end of fill suffers. The available pack-and-hold pressure in the section with thin walls is not consistent, leading to the variation in the specific volume of fill, which in turn leads to shot-to-shot variation in the part dimensions and therefore lower process capability. One guideline to follow is not to have process-capability-required dimensions towards the end of fill if the flow lengths are long. Gating the part in a thin section and then trying to pack out a thick section can also pose issues of consistency in the thick section.

Once molders understand the goal of trying to achieve optimum packing, they must investigate means to achieve it.

Material: As the melt is filled into the cavity, it cools and reduces in volume. This shrinkage must be consistent from shot to achieve process capability. Naturally, materials with high shrink value will have a higher variation compared with those having lower shrink values. For example, a PP will have more shot-to-shot variation than an ABS since the shrinkage of PP can be 1.5 to 2% or more, whereas it is 0.7% to 1.2% in the case of ABS. A filler can also influence this, usually reducing the shrinkage value. Materials can therefore influence the process capability.

For higher process capability, choose a material that has lower shrinkage. It is also important to consider the size of the part. The larger the dimension, the larger is the absolute value of the shrinkage. If a given material shrinks 1%, then the total reduction on a 1-in. part will be 0.010 in., but on a 10-in. part the total shrinkage will be 0.100 in. The variation in the 10-in. part will be higher than the variation in the 1-in. part and therefore may be less process capable. (For that same reason, it is very easy to control dimensions in micromolding, leading to high Cp values .)

Mold Design and Moldmaking: Here, the gate location, amount of venting, and cooling are some of the factors that affect the process capability.

Remember, in part design the L/T ratio is critical to the fill the part. The gate location should be such that the L/T of the part should not be close to the L/T limit of the material, or that will lead to inconsistency from shot to shot. In some cases, the choice of gate location is dictated by part cosmetics and/or by simple economics of the cost of the mold that can lead to lower process capability. The final customer should be made aware of this.

Vents in the mold help push the air out of the cavity and replace it with plastic. If the number of vents and/or the vent depths and/or the vent lands are not adequate, the air does not flow out of the mold at the required rate, restricting the plastic flow. Air pockets, voids, short shots, and burning can all result because of this restriction. This again leads to an inconsistent fill from shot to shot, resulting in lower process capability.

The part must reach the material's ejection temperature before it is ejected. Below the ejection temperature, the material has sufficient mechanical properties to be ejected from the mold and not be deformed. But the resin molecules may still have enough energy to move and settle at their location of choice, leading to post-mold shrinkage. To have uniform cooling of the part (think warpage again) and efficient cycle times, there must be effective mold-temperature control. Design of the cooling lines is therefore critical.

The cooling-line diameters—the distance from the part and between each other— should be such that when the part is ejected there are no "hot spots" that will again lead to inconsistent shrink and warp, affecting the process consistency. The cooling time will depend on the rate of heat removal from the cavity. To achieve a short cycle time, molders may decrease the cooling time. The part dimension may be achieved but the variation from shot to shot may be high, leading to lower process capability.

Injection Molding Machine: The melt must be homogeneous and not degraded. The barrel and the screw play an important role in achieving this goal. The molding-machine barrel must be chosen ►

so that the plastic resides inside long enough for the plastic to melt, but not so long as to degrade. Therefore, the percentage use of the barrel should not be too low or too high. This percentage is usually considered to be 15 to 20 on the low side and to 70 to 80 on the high side. The lower the number, the higher the chances of degradation, especially for heat-sensitive resins and/or longer-cycle parts.

The shear from the screw rotation must also be minimized. The higher the shear, the more you will experience issues with melt homogeneity. All these issues will result in melt consistency and therefore lead to lower process capability. The choice of the barrel size is therefore important. The process must also not be pressure limited.

Materials with high shrink value will have a higher variation than those with lower shrinkage.

Molding Process: As has been the underlying theme, optimal packing of the part will give the best process capability. The above four factors help in achieving this goal. The process engineer must realize not to compromise part dimensions for process capability. In other words, an underpacked part may achieve the required dimensions but may not have a good Cp value.

LINKING THE PILLARS

Apart from the above reasons linked to the five pillars, there are several other factors that are common among them:

Molding Process Window: This is related mainly to part design, mold design, and the mold build. The larger the molding window, the more robust and more capable the process. The leading reason for smaller process windows is parts beginning to flash at pack pressures slightly higher than those used to just pack them out. This indicates the mold shutoffs may be inadequate. It could also be because a section in the part is too thick, requiring the molder to use excessive pressures. If the machine tonnage is insufficient, parts will flash before they are packed out to an optimal level. Processors will therefore use lower packing pressure, leading to inconsistency.

Pressure-Limited Process: This is related to material selection, part design, mold design, or machine selection. A pressure-limited process will not allow sufficient pressure to fill and pack the part, leading to inconsistencies. A material with a low L/T limit can make a process pressure limited. Molders usually suggest using lower viscosity materials to help them fill the part easier at lower pressures. Thin sections in the part design can also increase the required pressure, making the process pressure limited. The location of the gate must be in an area that will let plastic flow easier into the ends of fill, making it less prone to pressure limitation. Sometimes in thin-wall parts, the required pressures can exceed 30,000 psi plastic pressure and therefore a machine with a higher pressure capacity must be selected.

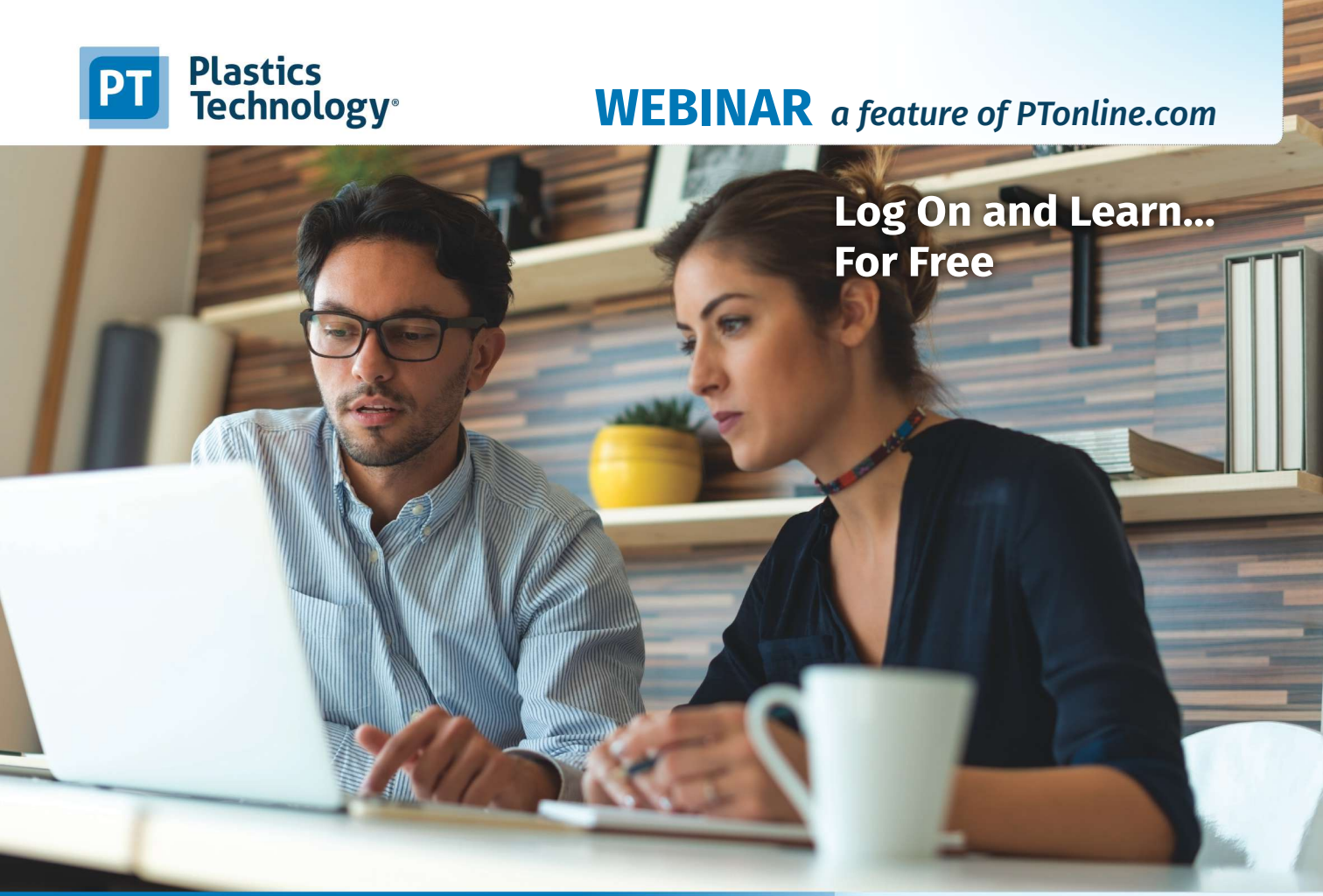
The above are some of the factors to be considered. There are several other factors not mentioned here. It is important that each project is looked at with a holistic approach, avoiding the over-the-wall engineering approach. This will ensure the success of the project.

During this study there was another interesting observation that was made between cavity-to-cavity process capabilities. This will be discussed in a later article. PT

ABOUT THE AUTHOR: Suhas Kulkarni is the founder and president of Fimmtech, San Diego, an injection molding service-oriented firm focusing on Scientific Molding. Fimmtech has developed several custom tools that help molders develop robust processes, and its seminars have trained hundreds of individuals. Kulkarni is an author of the book, *Robust Process Development and Scientific Molding*, published by Hanser Publications. Contact: *(760) 525–9053; suhas@fimmtech.com; fimmtech.com.*

Plastics Technology®

WEBINAR *a feature of PTonline.com*



Wednesday, August 22nd
2:00 PM ET

Register for this webinar at:
ptonline.com/webinars

Direct vs. Indirect Cooling For the Injection Molding Process

What are the benefits of better cooling? What does Industry 4.0 have to do with temperature control units? What are the latest features available today and what can they do for me?

Part cooling takes up to 50-80% of cycle time so increasing cooling capacity on a mold can lead to increased production. Understanding the overall amount of heat in the molding process is important to be able to size a temperature control unit properly. Learn the pros and cons of using direct and indirect cooling, the latest features (including Industry 4.0) and how you can benefit!

PRIMARY TOPICS:

- Overview of Cooling in the Injection Molding Process
- How Much Cooling and What Size Temperature Control Unit you need for your process
- Latest features available and benefits

PRESENTER

Joe Golin
Product Specialist

Wittmann Battenfeld

Joe Golin started his career with Wittmann Battenfeld in 2015 in the Material Handling & Auxiliary Division. In three years, Joe has grown from a Technician — gaining valuable knowledge building and servicing Wittmann's auxiliary products — to Technical Inside Sales where he learned the ins and outs of the order process. His strong product knowledge brings him to his current position as Product Specialist, where he is responsible for all Technical and Commercial items such as inventory, pricing, and custom orders for all auxiliaries products, including Temperature Controllers. Joe is currently enrolled at North Western Community College studying Mechanical Engineering.

PT Keeping Up With Technology

PRODUCT FOCUS **Injection Molding**

NJECTION MOLDING

Small Electric Press Debuts In LSR Micromolding

At its recent Competence Forum open house in Germany, KraussMaffei (U.S. office in Florence, Ky.) showed off the newest and smallest member of the highly modular, all-electric PX series of injection presses. The new PX 25 has 25 metric-ton clamp force; the rest of the line ranges from 50 to 200 m.t. It was demonstrated in an LSR micromolding application—a radial seal (pictured) with an intricate undercut and weighing 0.15 g. For this project, the press was equipped with a new injection unit housing a 12-mm screw. Cycle time was 14 sec.

Addressing growing demand for both LSR and solid silicones in the U.S. and Asia, KM also introduced the new AZ 50 feeder for solid silicone rubber on a servo-hydraulic CX 200 two-platen press (pictured). The feeder has a rotating hopper and pulls the silicone downward using a continuously rotating stuffer screw. Rear ventilation allows air to escape upwards, unlike other systems that use a piston, which is more likely to result in entrapped air and bubbles in molded parts, KM says.

978-772-5100 • kraussmaffeigroup.us

INJECTION MOLDING

New Models of Economical Robots

Wittmann Battenfeld (U.S. office in Torrington, Conn.) has added larger and smaller models to its Primus series of simple, economical pick-and-place robots. These units, adapted from the W8 series, have three servo axes and a limited range of options. The first unit, Primus 16, has a payload capacity of 5 kg (11 lb) and was introduced at K 2016. The second model, Primus 14, debuted at Fakuma 2017 and was also shown at NPE2018; it can carry 2 kg (4.4 lb).

Now there are also the Primus 10 (1.5 kg/3.3 lb) and Primus 26 (10 kg/22 lb), as well as Primus 26T with telescopic vertical axis. The largest models are suitable for injection presses up to 400 metric tons, vs. a maximum of 250 m.t. previously. All Primus models come with up to four vacuum circuits and the R8 TeachBox control.

860-496-9603 • wittmann-group.com

EXTRUSION

Rupture Disc Can Be Alarmed

Dynisco, Franklin, Mass., expanded its rupture disc offerings at NPE2018 with the model BP520 burst plug, This custom assembly with pop-top burst indication is installed on barrel bodies with hex ends, where the hex OD (across flats) is larger than the burst-plug body. The metal retainer strap is held in place by the hex and the metal T-shaped cap is fastened to the other end of the strip. A 2-mm hole is drilled through the body and cap. A burst-indicator (BI) wire is passed through the hole and when the disk ruptures, the T-cap "pops open" shearing off the BI wire and indicating a burst to the control system.

508-541-9400 • dynisco.com

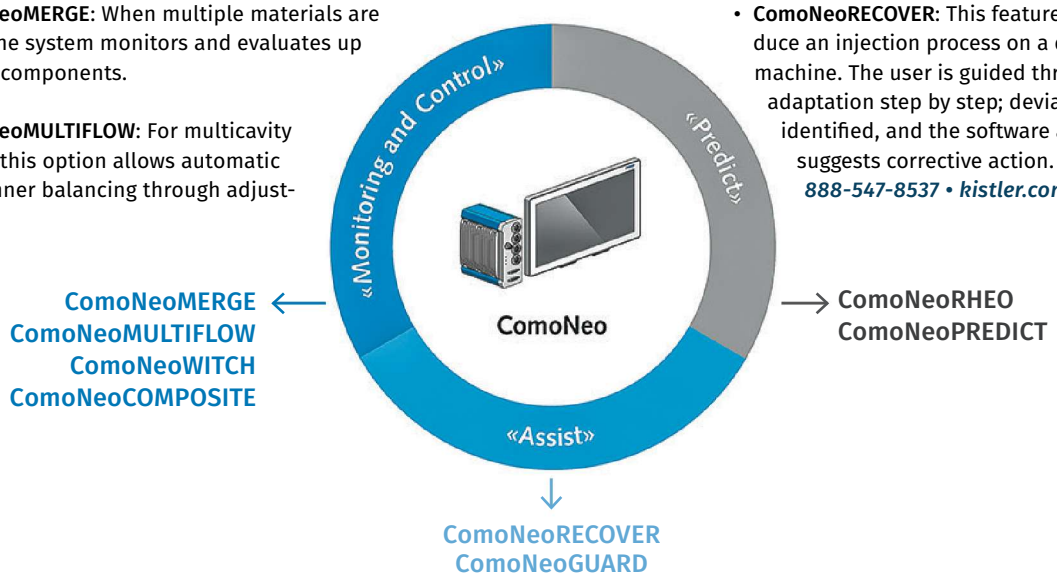
INJECTION MOLDING

Customizeable Process-Monitoring System

At NPE2018, Kistler Instrument Corp., Amherst, N.Y., showcased its latest process-monitoring system for injection molding, called ComoNeo 2.1.0. Based on cavity-pressure monitoring, it provides setup assistance, part-quality prediction, and a degree of process control. A particular feature of ComoNeo is its customizeability by the user. Molders can tailor their system with these optional functions:

- **ComoNeoPREDICT**: It allows model-based prediction of specified part quality based on cavity pressure and temperature profiles. Based on Stasa QC software, this function uses measured values and statistical analyses to calculate part quality in advance and to assess quality within tolerance bands.
- **ComoNeoMERGE**: When multiple materials are used, the system monitors and evaluates up to four components.
- **ComoNeoMULTIFLOW**: For multicavity molds, this option allows automatic hot-runner balancing through adjustment of individual nozzle temperatures to ensure identical flow conditions in all cavities.
- **ComoNeoSWITCH**: This function ensures automatic switchover from injection to holding phase at the appropriate time.
- **ComoNeoCOMPOSITE**: This new feature is aimed at optimizing the RTM process for long-fiber composites, using special RTM sensors from Kistler.
- **ComoNeoGUARD**: This function helps users define monitoring windows that enable accurate separation of good and bad parts. It is said to result in less segregation of "pseudo scrap."
- **ComoNeoRECOVER**: This feature can reproduce an injection process on a different machine. The user is guided through the adaptation step by step; deviations are identified, and the software assistant suggests corrective action.

888-547-8537 • kistler.com



MATERIALS

First TPE to Resist Blue-Jean Stains

A new TPE alloy is aimed at phone-case brand owners that have been searching for a blue-jean resistant material. Said to be the first TPE to resist this type of staining on white and light-colored phone cases, CE 3320-70 is the latest addition to the Versaflex line of proprietary TPE alloys from PolyOne Corp., Avon Lake, Ohio. According to the company, brands using silicone or TPU have sought an alternative for numerous reasons, including long sourcing lead times and manufacturing challenges for silicone and the inability of TPU to endure blue-jeans contact without staining.

PolyOne tested the new TPE's effectiveness using the same rigorous test methodology used to measure blue-jean staining on auto car seats. The material showed no signs of staining, equal to that of the industry benchmark—a white silicone case. Versaflex CE TPE also stands up to sunscreen, hand sanitizer, isopropyl alcohol and UV light. This recyclable thermoplastic also processes faster than silicones and adheres well to PC when overmolded. The new offering can be precolored to specifications or used with a PolyOne OnColor masterbatch.

866-737-2066 • polyone.com

BLOW MOLDING

New Testing & Handling Units at NPE

As reported in April's Keeping Up section, Proco Machinery Inc., Mississauga, Ont. (***procomachinery.com***), introduced at NPE2018 the Robo Packer case packer and Half-Cube Palletizer, both using collaborative robots ("cobots") for packing bottles. One feature of these systems not previously reported is availability of new "sleeve-style" robot end-of-arm tooling specifically for handling PET bottles. Because these bottles can stick to each other when hot, tooling that encases each bottle—up to four at a time—in a separate sleeve prevents bottles from accidentally touching each other. The sleeve tooling (patent applied for) is 3D printed in plastic for light weight because of the relatively low payload capacity of the cobots.

Another introduction at the show was an upgraded leak tester from Amsler Equipment Inc., Richmond Hill, Ont. (***amslerequipment.com***), with a new camera system that can detect neck ovality issues. The inspection system handles bottles from 10 ml to 20 L at rates up to 18,000 bph. It can detect holes as small as 0.006 in. and can check for obstructions in the bottle neck, variations in wall thickness, and color deviation. Operating on either a continuous-motion or indexing conveyor, it also can detect fallen bottles and perform batch counting. The unit comes with an operator touchscreen with graphical display, locking caster wheels, and a 6.5-ft-long conveyor with dual guide rails.

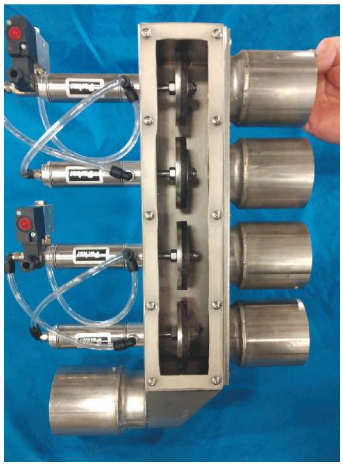
Air Logic Power Systems (ALPS), Oak Creek, Wis. (***alpsleak.com***), joined forces with IMD Ltd. of Switzerland (U.S. office in Nashville, Tenn.; ***imdvista.com***) to come up with a "Total Bottle Inspection Solution." The new ALPS Flex Pitch is a fast, tool-less leak tester with integrated IMD Bottle Vision inspection. The system can test a wide range of empty containers without use of a timing screw, thus greatly reducing changeover time and cost for tools. Test heads can be preset to the required pitch for fast changeover between containers of different diameters. The integrated vision inspection can check for contamination, cosmetic defects, correct dimensions, and ovality with a "self-learning" ability that is said to make it intuitive and easy to use.

MATERIALS HANDLING

Versatile Diverter Valve Meets Industry 4.0 Objectives

Vactec LLC, Kalamazoo Mich., has developed a material-diverter valve called the Director for vacuum-conveying systems. It is available in either manual or automatic configuration and can feed up to 12 materials to a single destination. Optional designs are available to feed multiple destinations. Standard sizes are 1.5 to 4 in.; the unit can be mounted horizontally or vertically. Director V, the vertical model, has a footprint of less than 1 ft² and can interface with new or existing vacuum systems. All connections in and out are hard piped, so there are no cumbersome flexible hose connections.

Contamination is avoided with a purge cycle that can be manually or automatically actuated for a material change. One inlet is dedicated as a purge port, and a single conveying/purge cycle cleans the valve to prepare it for the new material. If the material being conveyed is abrasive, the valve is supplied with Vactec's NiTec finish, which raises the hardness to 1100-1300.



"What processors will appreciate most about the Director is its versatility and the ability to have a traceable, verifiable material diverter. With a manual or an automatic remote-controlled option that meets Industry 4.0 objectives, this eliminates those bothersome flex-hose 'spaghetti bowls' once and for all," comments Chuck Thiele, Vactec president. The automatic model can be programmed to trace the material selected, time of the start of a run and time of completion. Coupling the valve with an in-line weighing system enhances data acquisition and process-management capabilities.

269-599-3975 • vactecusa.com

ADDITIVE MANUFACTURING

New Rigid & Elastic Materials For 3D Printing

Carbon, Silicon Valley, Calif., announced two new materials for 3D printing at NPE2018: Epoxy (EPX) 82 and Elastomeric Polyurethane (EPU) 41. EPX 82 is a high-resolution, high-strength engineering material with long-term durability, while EPU 41 offers higher resilience for making durable elastic lattices.

EPX 82 has a heat-deflection temperature of 239 F (115 C) and good impact strength, suiting it to applications requiring a balance of strength, toughness, and thermal-cycling durability such as connectors, brackets and housings in automotive and industrial sectors. Its mechanical properties are reportedly comparable to lightly glass-filled thermoplastics (e.g., 20% GF PBT, 15% GF nylon) and meet USCAR-2 fluid-compatibility standards.

New EPU 41 is especially well-suited for producing elastomeric lattice geometries that can outperform traditional foams. It has higher resilience at room and low temperatures than the existing EPU 40 grade; and its tear strength, energy return, and elongation suit it to cushioning, impact-absorption and comfort applications.

(650) 285-6307 • carbon3d.com

CAMX

THE COMPOSITES AND ADVANCED MATERIALS EXPO

October 15-18, 2018: Conference / October 16-18, 2018: Exhibits
Kay Bailey Hutchison Convention Center / Dallas, TX

Co-located with
IFAI Industrial Fabrics Association International

COMBINED STRENGTH. UNSURPASSED INNOVATION.

www.theCAMX.org

BIGGER AND BOLDER IN DALLAS, TEXAS

CAMX – the Composites and Advanced Materials Expo, is –

- the one source for products, solutions, networking and advanced industry thinking.
- the largest global marketplace in North America.
- a conference program with over 300 technical and business sessions.
- the gateway to expand your reach into untapped markets and applications.

Find Everything You Need in One Amazing Event.

Register Today!

PRODUCED BY
ACMA American Composites Manufacturers Association
sampe North America

OFFICIAL MEDIA PARTNER
CW CompositesWorld

Prices Up for PP & PET; Flat for PE, PS, PVC

The upward trend for PP and PET continued, but at least PP prices likely have peaked.

By Lilli Manolis Sherman
Senior Editor

Lower feedstock prices and generally more balanced supply and demand served to stabilize prices of PE, PS and PVC. In contrast, upward pressure from feedstock costs and stronger domestic and/or global demand resulted in further increases in PP and PET prices. However, the month of June brought some surprises in the price trajectory of nearly all of these five resins, and the potential "trade war" issue loomed over nearly all.

These were the views last month 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***).

PE PRICES FLAT

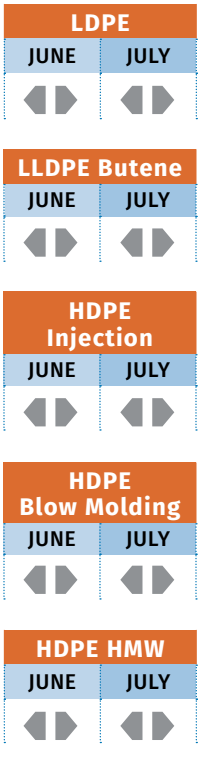
Polyethylene prices remained flat in June, despite what was expected to have been a "slam-dunk" 3¢/lb price hike. *PCW* reported in late June that ExxonMobil Chemical, which led the move, reiterated its intent to increase June PE tabs by 3¢ and announced an additional 5¢/lb for July 1 on certain ethylene-octene and EVA copolymers. But come July 1, Nova Chemical, CP Chem and Formosa pulled back, according to Mike Burns, RTi's v.p. of PE markets. *PCW* and The Plastics Exchange's Greenberg reported similar outcomes, noting that flat contract prices were in line with spot-market prices.

Greenberg noted, "Meanwhile, North American PE suppliers still enjoy a major feedstock cost advantage to facilitate exports, which is how they plan to move the bulk of all this new PE production that seems to be backing up. Also, the whole tariff situation has yet to resolve, maintaining a level of uncertainty, and not just with China."

RTi's Burns added that it's simply a better deal for suppliers to push exports right now—with 65% of exports currently going to Latin America. He also noted that domestic LDPE is still tight, HDPE is snug globally, and he predicted "firm PE prices through September."

PCW characterized domestic PE demand as healthy and noted that some processors were opting to carry additional inventory as a hedge against hurricane-related disruptions. *PCW* also noted there were reports that tight supply of catalysts and comonomers butene and hexene could restrict PE output, but no significant supply impacts were confirmed by anyone.

Polyethylene Price Trends



Market Prices Effective Mid-July 2018

Resin Grade	¢/lb
POLYETHYLENE (railcar)	
LDPE, LINER	101-103
LLDPE BUTENE, FILM	84-86
NYMEX 'FINANCIAL' FUTURES	48
AUGUST	48
HDPE, G-P INJECTION	103-105
HDPE, BLOW MOLDING	93-95
NYMEX 'FINANCIAL' FUTURES	50
AUGUST	50
HDPE, HMW FILM	110-112
POLYPROPYLENE (railcar)	
G-P HOMOPOLYMER, INJECTION	91-93
NYMEX 'FINANCIAL' FUTURES	57
AUGUST	57
IMPACT COPOLYMER	93-95
POLYSTYRENE (railcar)	
G-P CRYSTAL	109-111
HIPS	115-117
PVC RESIN (railcar)	
G-P HOMOPOLYMER	83-85
PIPE GRADE	82-84
PET (truckload)	
U.S. BOTTLE GRADE	77-78

PP PRICES UP

Polypropylene prices moved up 8¢/lb in June, following May's 7¢/lb hikes, though this time the increase was penny-for-penny in step with propylene monomer contract increases, with no margin expansion added by suppliers. "I think margin expansions have quieted down for the near term," said Scott Newell, RTi's vp of PP

markets. He ventured that PP prices may have peaked in June and saw prices in July and August as likely to be flat or lower.

Newell noted that monomer contracts had been expected to move up 12-13¢/lb as spot prices climbed rapidly, but those prices began to drop in mid-June. Still, he cautioned that monomer will continue to be an issue, owing to factors like higher oil prices. Another key issue since the end of 2017 is that ethane has been advantaged in steam crackers, which favors less propylene production. Further tightness has resulted from planned and unplanned propylene outages, along with considerably higher propylene exports to Mexico and Colombia and some to Europe. "It's been difficult to build a supply cushion, so we remain vulnerable to volatility," said Newell.

Polypropylene Price Trends

Homopolymer	
JUNE	JULY
▲ 8¢/lb	◀▶

Copolymer	
JUNE	JULY
▲ 8¢/lb	◀▶

PCW reported spot PP prices as generally firm and supply as balanced to tight, driven by strong demand and June production interruptions at Total and Braskem. It also noted that domestic PP prices were sufficiently elevated over global price levels to invite imports of both resin and finished goods. The Plastics Exchange's Greenberg characterized the overall domestic PP market as still fairly tight, with branded prime resin prices at a sharp premium to good offgrade resins. He expected an easing of cost-push pressures in July and beyond, as indicated by dropping spot monomer prices.

PS PRICES FLAT-TO-DOWN

Polystyrene prices remained steady in June, but downward pricing pressure was underway, with processors aiming to negotiate for price concessions of 2-3¢/lb, based on lower feedstock costs and an improved supply/demand balance, according to both *PCW* and Robin Chesshier, RTi's v.p. of PE, PS and nylon 6 markets.

Both cited falling prices of benzene and ethylene. According to *PCW,* implied styrene production costs based on a 30/70 formula for spot ethylene and benzene were 1.3¢/lb lower toward June's end—at 30¢/lb. That brought the monomer's price to more than 2¢/lb below the May 18 implied cost of 32.4¢/lb. Chesshier also cited suppliers' difficulty in exporting styrene monomer due to tariffs from China. She also cited the recent New York City ruling that upheld a ban on PS foam cups and containers, which is likely to have an impact on PS demand. At the same time, she ventured that July was the last opportunity for processors to get some price concession, as the August-September time frame is typically when suppliers push for increases due to global demand—particularly from Asian appliance markets.

Polystyrene Price Trends

GPPS	
JUNE	JULY
◀▶	▼

HIPS	
JUNE	JULY
◀▶	▼

PVC PRICES FLAT

PVC prices remained flat through June, despite good domestic demand and high operating rates—now above 90%, according to Mark Kallman, RTi's v.p. of PVC and engineering resin markets. Both he and *PCW* predicted continued flat pricing for the remainder of the summer, and possibly beyond.

Downward pressure from very low ethylene costs has been ignored by suppliers, so far. According to *PCW,* suppliers appear to be telling processors that high export demand is squeezing the market, while at the same time telling traders that high domestic demand is the culprit. Kallman noted that global PVC demand is not as strong as in previous years and that while domestic suppliers have increased their export activity due to their low ethylene cost, PVC export prices have not increased commensurate with the volume exported. He hazarded that some upward pressure on ethylene contract prices is likely due to higher oil prices and trade tensions. Still, *PCW* ventured that ethylene capacity additions coming on stream this year—which will boost U.S. ethylene production by 15.3% from current levels—are likely to push PVC prices lower. Another factor is possible imposition of tariffs on U.S. PVC by current importing countries (especially China).

PVC Price Trends

Pipe	
JUNE	JULY
◀▶	◀▶

Gen. Purpose	
JUNE	JULY
◀▶	◀▶

PET PRICES UP

PCW reported increases of domestic bottle-grade PET prices in June by 2¢/lb to 78¢/lb for non-contract spot business, delivered Midwest. Key drivers included higher cost for feedstocks PTA, MEG, and MX, combined with strong demand from the U.S. packaging sector during the high-consumption summer season.

Meanwhile, PET imports from Asia were offered at 78¢/lb, up from 72-74¢/lb in the previous month. *PCW* reported that imports are rising despite the anti-dumping fees imposed in May on imports from five countries—Brazil, Indonesia, South Korea, Pakistan, and Taiwan—because of a global glut of PET, and the U.S. is one of the largest PET markets in the world. PT

PET Price Trends

Bottle Grade	
JUNE	JULY
▲ 2¢/lb	▲

Plastics Processing Ends Best Six-Month Period in Recent History

June 2018's reading of 56.3 pulls half-year index to 57.1.

By Michael Guckes
Chief Economist

With a reading of 56.3, the Gardner Business Index (GBI): Plastics Processing revealed slowing growth in June after registering several all-time high records earlier in the year. During the first half of 2018 the Plastics Processing Index averaged 57.1, the best six-month performance in the six-and-a-half-year history of the index, which is calculated based on monthly surveys sent to subscribers of *Plastics Technology* magazine

The latest reading is up 6.6% from June 2017. It was driven higher primarily by employment and supplier deliveries, followed by production and new orders. Exports and backlogs all pulled the index lower. This suggests that supply-chain and production mechanisms are being expanded to handle greater levels of orders. Since the beginning of 2017, the average new-orders reading of 58.5 represents the highest average reading for any 18-month period since at least 2012. Unexpectedly, backlog readings, which have been strongly expansionary since February, issued their first contractionary reading since late 2017.

The June index among only Custom Processors fell slightly to from 59.9 to 59.7, suggesting that business conditions are still well above average.

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*.

Gardner Business Index: Plastics Processing

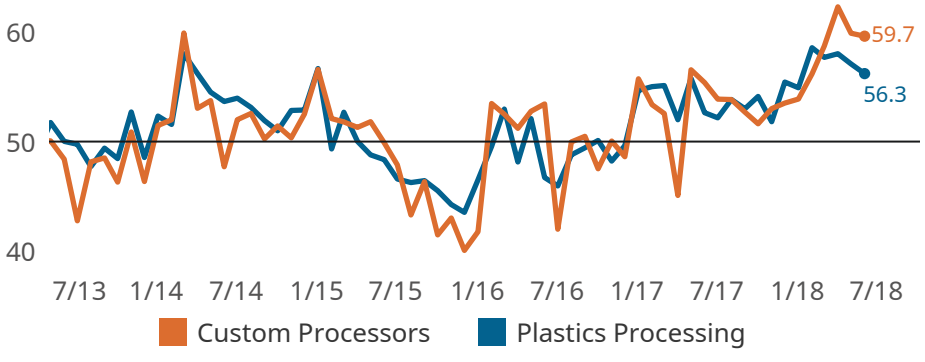


FIG 1

The Plastics Processing Index set several records for growth in the first half of the year with an average reading of 57.1. The largest growth in the index came from supplier deliveries and employment.

Gardner Business Index: Plastics Processing—Supplier Deliveries and Employment

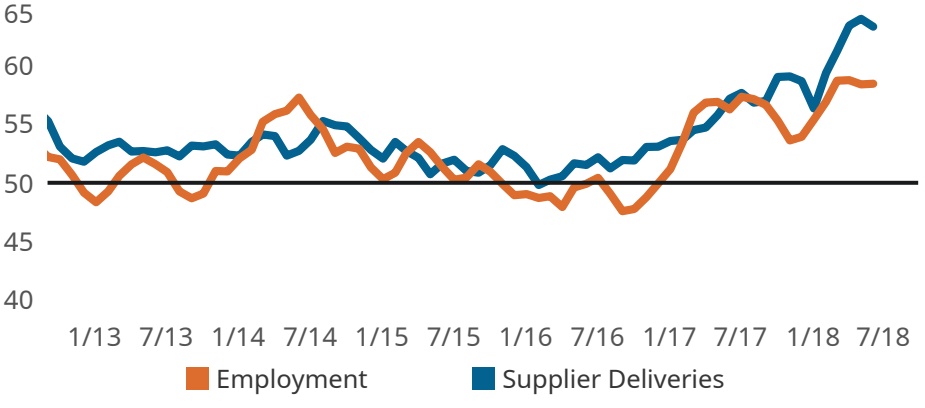


FIG 2

The primary drivers of the Plastics Processing Index shifted from new orders and production to supplier deliveries and employment. If future months indicate the same change, this may indicate a maturing of the current business cycle.

Plastics Technology®

KNOWLEDGE CENTER

Blending and Dosing

Best Practices, Cost Saving Tips, Product Technology

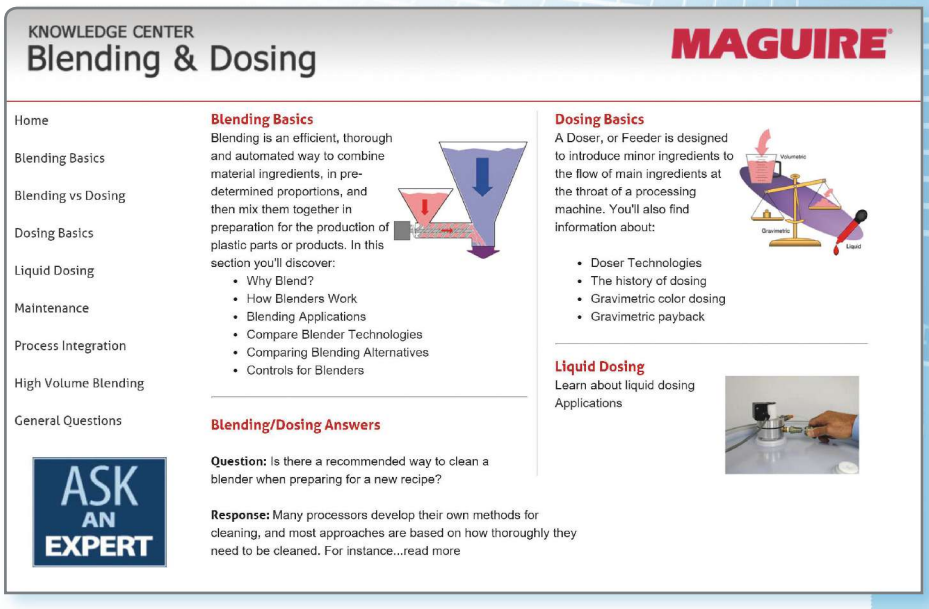
Comprehensive collection of technical content

On-Demand Videos & Webinars

The latest technology in action and explained by industry experts

Ask Experts

Connect with industry leaders for immediate answers

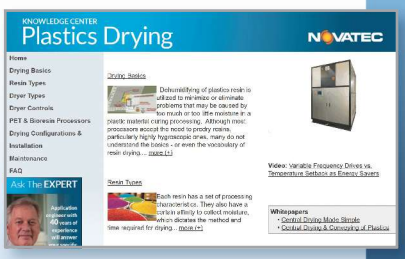


Find Blending and Dosing Solutions at:
short.ptonline.com/KC-blend

Get more KNOWLEDGE

Plastics Drying

- Drying Basics
- Resin Types
- Dryer Controls Today and "The Power of Touch"



short.ptonline.com/dryingkc

Plastics Feeding

- Learn about Various Types of Continuous Feeders
- Key Aspects of Operation
- How to Select a Feeder

short.ptonline.com/feed

Electronics Industry Reports Growing Revenue, Capital Expenditures

First-quarter numbers show electronics is growing more than twice as fast as overall economy.

By Michael Guckes
Chief Economist

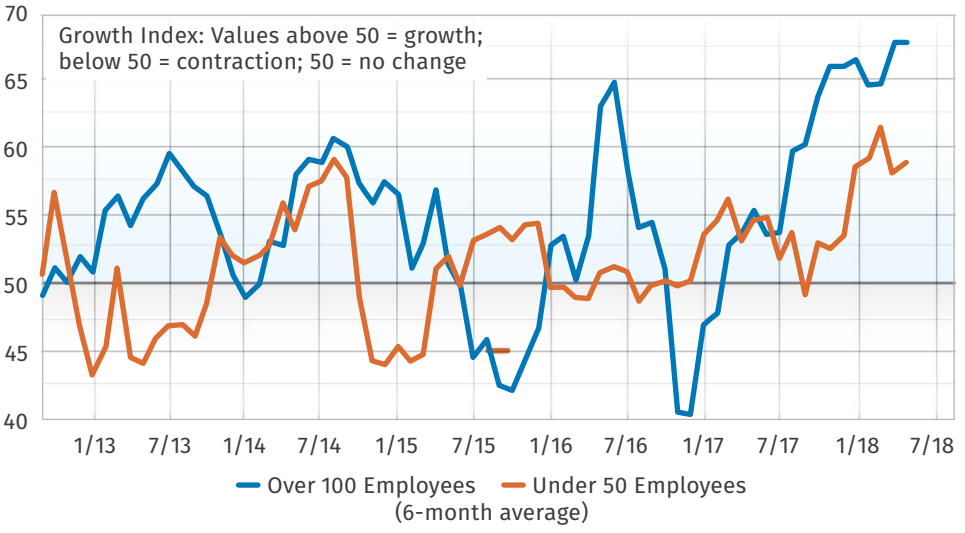
Gardner Intelligence's collection and review of the reported financial results of more 90 publicly traded electronics firms through the first quarter of 2018 points to an industry that has been experiencing above-average growth, a trend that's expected to continue. Calculated on a year-over-year basis, inflation-adjusted revenue growth in the electronics market at the end of March was 6.9%. Earnings before interest, taxes, depreciation, and amortization when measured using the same technique was up 4% at the end of the first quarter. By comparison, U.S. total economic growth according to the Federal Reserve as of May was 2.48%, suggesting that electronics grew more than twice as fast as the overall economy.

Among all firms reviewed in this study, 56 are tracked by one or more Wall Street analysts who also provide forecasts for revenues and earnings. Aggregating these forward-looking results, revenue growth will slow from nearly 7% in mid-to-late 2018 to nearly unchanged between the third and fourth quarters of 2019. Similarly, earnings growth is projected to climax in late 2018 at just over 8% before slowing to a low of just above 2% in late 2019. A 2% growth rate would place the industry's growth approximately on-par with overall U.S. economic growth.

One area of concern is the under-performance of small (under 20 employees) suppliers—including plastics processors—serving this market. Since early 2017, these companies have reported periods of both modest expansion and contraction. In comparison, larger companies with more than 100 employees have experienced record growth during this same period.

Applying Gardner's multi-lens analytics approach to the electronics industry, the combination of actual and forecasted financial results, macroeconomic data, and proprietary survey data all suggest that industry growth will exceed overall economic growth for the country. Supplier companies of all sizes are likely to benefit over the next 18 months, with a bias towards larger plants experiencing greater opportunities for growth.

Larger Plants Receive Greater Share of New Orders Growth



Year-on-year capital-expenditure growth ending in the first quarter of 2018 showed more than an 11% increase. However, these results are in part because electronics capital expenditures contracted between the fourth quarter of 2016 and the third quarter of 2017. Capital-spending data independently collected by Gardner Intelligence from shops and fabricators serving the industry corroborate this view. Gardner's data indicates that spending hit a recent low in mid-2017 and has since rebounded through the latest available data collected in May.

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*

infoNET

This is *Plastics Technology*'s online listing for plastic processing equipment builders, material suppliers, auxillary manufacturers and more.

WWW.CVI.CANON.COM/MFG

Canon

From concept to market, Canon Virginia Inc. is uniquely qualified to be your outsourced manufacturing partner in a range of industries, including medical. Learn more about our full range of services at *cvi.canon.com*/mfg.

WWW.PPE.COM

PPE®

With a continually expanding range of products, PPE is the largest supplier of molding accessories to the plastics industry. With offices in Ohio, Nevada and Florida, PPE provides fast delivery and the personal attention that your order deserves. Contact us at 1-800-362-0706, *sales@ppe.com* or visit *www.ppe.com*

WWW.MAGUIRE.COM

MAGUIRE®

Intelligent Simplicity

Over 100 pages of easy browsing packed with useful information on Maguire Blenders, Loaders, Granulators, Feeders, and Liquid Color Pumps.

WWW.DAVIS-STANDARD.COM

DAVIS-STANDARD®

Where your ideas take shape.

Davis-Standard is the global leader in the design and manufacturing of high-performance plastics and rubber processing equipment, extrusion technology and converting systems. We are committed to engineering equipment that is cost effective, durable, and offers a high return on investment.

WWW.WHCORP.COM

WINDMÖLLER & HÖLSCHER

Flexographic and gravure printing presses, blown and cast film extrusion systems, multiwall equipment, plastic sack and bag making machines, form-fill seal machinery for the converting and packaging industry — all from one leading source.

WWW.ENGELGLOBAL.COM

ENGEL

Visit our website for information on ENGEL's machine and automation concepts, innovative technologies and applications, and extensive customer support. With global service, production and sales resources, ENGEL is a partner you can count on for long-term quality and technology solutions that support innovative products and effective production.

WWW.ADVANTAGEENGINEERING.COM

ADVANTAGE® MAKING WATER WORK.

Manufacturer of high quality water and oil temperature controllers, portable chillers, central chilling systems and cooling tower systems.

WWW.WITTMANN-GROUP.COM

Wittmann Battenfeld

Wittmann Battenfeld's website provides global access to the full range of Battenfeld injection molding machines, process engineering, customer service, training and turnkey solutions, in addition to automation and auxiliary equipment including Wittmann robots and automation, material conveying, drying, blending, granulating and water temperature controllers.

WWW.RAPISTAK.COM

RAPISTAK CORPORATION

Managing molds and dies can be time consuming and difficult, that's where our Mold Management Systems help you manage your inventory, become better organized, protect your investment and create a safer working environment. For more information email us at ptsales@rapistak.com.

WWW.NOVATEC.COM

NOVATEC™

The Power of Touch

World's largest selection of dryer technologies and blenders with unmatched system design and control capabilities. 1-800-BESTDRY (1-800-237-8379)

infoFILE

Monthly Resource Guide

You can get copies of literature from suppliers listed on these pages by sending an e-mail to the address provided at the end of each writeup. Or, where provided, contact the company by phone or fax.

PPE GATE CUTTERS - LOWER PRICES

PPE offers the best variety of Gate Cutters at the lowest prices in both our Economy and Premium styles. With 74 different cutters to choose from including heated & pneumatic, you're bound to find what you needed right here at PPE. www.ppe.com

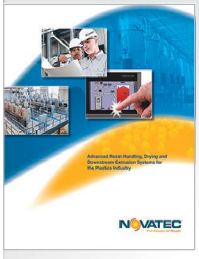
Macedonia, OH • sales@ppe.com

DRI-AIR INDUSTRIES, OUR NAME SAYS IT ALL

The industry leader in proven desiccant dryer technology, Dri-Air offers the highest quality at competitive pricing. Our constant attention to detail and incredible response time helps us sell thousands of drying systems worldwide. We offer solutions to a wide range of industries from simple to complex custom applications.

East Windsor, CT • sales@dri-air.com

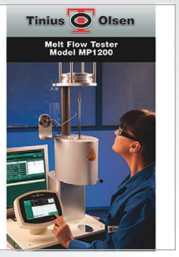
DRY-CONVEY-BLEND-EXTRUSION



Novatec is one of the largest U.S. based manufacturers of resin drying and conveying equipment for the plastics industry. Together, with Maguire Products, we offer the largest line of manufactured resin handling equipment in North America.
Product Overview: www.novatec.com/about

Baltimore, MD • sales@novatec.com

MELT FLOW TESTERS



Melt indexer comes in manual or motorized versions and loaded with capability and efficiency: three-zone heaters; touch screen control; tapered weight design; simple die release; USB connectivity and Horizon software for SPC analyses; optional manual or motorized extrudate cutter.

Horsham, PA • sales@tiniusolsen.com

SINGLE AND TWIN SCREW EXTRUDERS

20mm Clamshell Segmented Twin-Screw Extruder: Compounding, Pilot Scale & Nanocomposites applications for product development. Clamshell barrel allows visual processing assessment, easy screw mounting, quick cleaning. Segmented screws offer numerous processing possibilities..

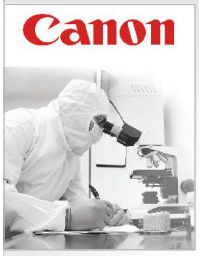
S. Hackensack, NJ • cwbi@cwbrabender.com

FILMEX® CAST FILM EXTRUSION SYSTEMS

W&H's modular cast film line for PP, barrier, stretch and specialty film up to 11 layers. Designed for widths up to 142" with a film thickness of 0.4 – 12 mil. Maximum output of 3,600 lbs/hr.

Lincoln, RI • info@whcorp.com

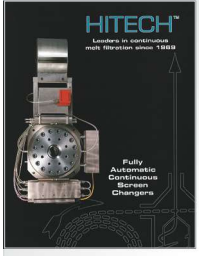
MEDICAL DEVICE CONTRACT MFG.



Canon Virginia, Inc. offers Medical Device Contract Manufacturing. ISO 13485 certified, Canon Virginia has 30,000 square feet of manufacturing space, including a class 8 clean room, dedicated to new business. For an overview of all Canon Virginia, Inc.'s services visit cvi.canon.com/mfg.

Newport News, VA • cvi.canon.com/mfg

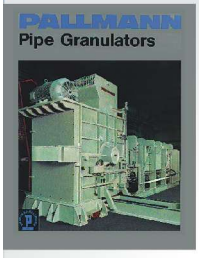
FULLY AUTOMATIC SCREEN CHANGERS



HITECH™ screen changers operate on a truly continuous principle in harmony with the rest of the extrusion process. The screen, in the form of a long ribbon, moves slowly through the screen changer at an infinitely adjustable rate to blend smoothly with the polymer flow.

Hackensack, NJ • aalroy@screenchanger.com

PLASTIC PIPE GRANULATORS



Original Pallmann Pipe Crushers can be used for size reduction of plastic pipes consisting of PE, LD, HD, MD, PP, PVC, ABS, etc. down to extrudable granules. Proven horizontal feeding system handles full length & up to 36" d. pipes, as well as cutoffs. Custom models also available.

Clifton, NJ • info@pallmannpulverizers.com

CLEAR-VU™ LOADING SYSTEM

Provides all the benefits of a central loading system with the added convenience of portability & low maintenance. Brochure & video describe this complete vacuum conveying system that will control up to eight stations. Receivers allow full view of the loading action.

Aston, PA • info@maguire.com

THE SOLUTION TO KNIT/FLOW LINES

Per-Fix™ Flaw Repair Coatings—The Solution to Knit/Flow Lines. Chem-pak's patented line of coatings helps you eliminate most cosmetic flaws common to injection molded plastics. Designed specifically for matte-finished, color-coded, textured, interior parts.

Martinsburg, WV • info@chem-pak.com

AQUATHERM TEMPERATURE CONTROLLERS

RQE Series Temperature Controllers are built for dependable operation using quality components such as high flow pumps, twin tank assemblies, and Incoloy sheathed heaters. The large, user-friendly controller interface makes operation simple and also provides a wide array of system and diagnostic information.

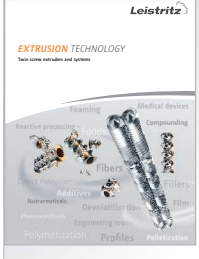
Niles, IL • info@thermalcare.com

PROGRESS THROUGH INNOVATION

Complete overview of the company, its history and the relentless product developments that have made it the leading manufacturer for plastics processors worldwide. Its innovative products include injection molding machines, robots and automation systems, auxiliary equipment .

Torrington, CT • info@wittmann-ct.com

TWIN SCREW EXTRUDERS AND SYSTEMS



Twin screw extruders (TSE's) and systems—Leistritz manufactures twin screw extruders (12 to 260 mm) used for compounding, reactive extrusion, devolatilization and direct extrusion. Services include a fully equipped process laboratory and TSE workshops.

Somerville, NJ • sales@leistritz-extrusion.com

SPECIAL SERVICES

MATERIALS WANTED/FOR SALE

PURGING COMPOUNDS

For additional product information, refer to this company's Advertising/Data Sheets in *PLASTICS TECHNOLOGY's 2018 PROCESSING HANDBOOK & BUYERS' GUIDE*

SALES OFFICES

MID-ATLANTIC/NORTHEAST
Lou Guarracino
District Manager
215/327-9248
Fax: 513/527-8801
loug@ptonline.com

MIDWEST/MOUNTAIN/ SOUTHWEST/WEST
Ryan Mahoney
District Manager
513/766-5863 Fax: 513/527-8801
303/903-0220 (mobile)
rmahoney@gardnerweb.com

OHIO/INDIANA/MICHIGAN/ SOUTHEAST/WESTERN PA/ UPSTATE NY, CANADA
Jackie Dalzell
District Manager
(513) 338-2185; Fax: 513/527-8801
216/233-6794 (mobile)
jdalzell@gardnerweb.com

CLASSIFIED/RECRUITMENT ADVERTISING
Chris Brock
440/639-2311
Fax: 513-527-8801
cbrock@gardnerweb.com

JAPAN
Toshiro Matsuda
Director of Overseas Operations
Plastics Age Co. Ltd.
(03) 256-1951

KOREA
Chang-Hwa Park
Far East Marketing Inc.
(02) 364-4182
Fax: (02) 364-4184
femchp@unitel.co.kr

TAIWAN
May Hsiao
J&M Media Corp.
886-4-2296-5959
Fax: 886-4-2293-9730
may@jandm.com.tw
www.jandm.com.tw

CHINA
Lucy Xiao
Beijing Vogel Consulting Co. Ltd.
(86-10) 63326100
Fax: (86-10) 63326099
lucy@vogel.com.cn

EUROPE (except Italy)
Edward Kania
RGH International (UK)
44-1663-750242
ekania@btopenworld.com

ITALY
Nicola Orlando
Com 3 Orlando sas
39 (02) 4158056
Fax: 39 (02) 48301981
ppoint@com3orlando.it

INDIA
Paresh Navani
Vogel Business Media India Pvt. Ltd.
91 22 4123 4715
paresh.navani@vogel.de

Plastics Technology

PLASTICS TECHNOLOGY (ISSN 0032-1257) is published monthly and copyright © 2018 by Gardner Business Media Inc. 6915 Valley Ave., Cincinnati, OH 45244-3029. Telephone: (513) 527-8800. Printed in U.S.A. Periodicals postage paid at Cincinnati, OH and additional mailing offices. All rights reserved.

POSTMASTER: Send address changes to Plastics Technology Magazine, 6915 Valley Ave., Cincinnati, OH 45244-3029. If undeliverable, send Form 3579.

CANADA POST: Canada Returns to be sent to IMEX Global Solutions, P.O. Box 25542, London, ON N6C 6B2. Publications Mail Agreement #40612608.

Printed in the U.S.A.

BPC TOLL COMPOUNDING & BLENDING — MEREDOSIA, ILL.

Growing Compounder Targets Tolling

Illinois-based compounder BPC boosts capacity with high-output twin-screw to target more toll-compounding business.

A young company with state-of-the-art compounding capabilities has expanded with the addition of a high-capacity extruder it will use primarily to expand its services in tolling.

By Jim Callari
Editorial Director

Based in the tiny Midwestern town of Meredosia, Ill, BPC Toll Compounding & Blending produces a wide range of compounds based on PP, PE, TPOs, TPEs, and engineering polymers. Materials are formulated in variety of colors using a gamut of additives that include talc, mica, calcium carbonate and flame retardants. BPC was founded in Houston in 2007 to conduct testing services for major chemical companies. It moved to Illinois in 2012 and expanded into custom compounding. Today, BPC employs 20 in an 80,000 ft² plant with a rail siding that can handle 24 cars. BPC is an acronym for Brown Pike County, said to be the best bow-hunting area in Illinois.

Recently, BPC saw its business increase to the point where the company was running at full capacity, making it necessary to expand by adding new machinery and equipment. As it happens, over the years BPC has run numerous trials at machine builder ENTEK's In-House Pilot Plant in Lebanon, Ore., testing a wide variety of fillers and formulations.

BPC Toll Compounding & Blending recently accepted delivery of ENTEK's high-output HR3 73-mm, 48:1 L/D twin-screw extruder. Pictured (l-r) Mike Krause, general manager; Reggie Dunn, process manager; and Austin Castleberry, operator.

Mike Krause, operations manager at BPC, also had a history with ENTEK that dates to his time at wood-plastic composites processor Fiber Composites Inc. (FCI), the makers of Fiberon decking and railing products. FCI had numerous ENTEK twin-screw extrusion lines in operation, running what Krause describes as "high-quality materials with very low downtime." Krause adds, "ENTEK's service and support was instrumental in FCI's growth. I saw this firsthand and wanted the same thing for BPC." So when the time came to purchase new machinery, the compounder chose ENTEK's high-output HR³ 73-mm, 48:1 L/D twin-screw extruder, which was on display at ENTEK's booth during May's NPE2018 show in Orlando, Fla.

Since BPC began its compounding operations in Meredosia, it has grown steadily, with a recent shift of focus more to toll compounding. Says Krause, "Custom compounding was our focus over the past five years. We still do a lot of development with clients to develop custom compounds. But now we are opening the business to do true toll compounding as well, taking a customer's materials and running to their specifications. We saw a need in the market for this service."

Adds Greg Larson, BPC's v.p. of business development, "Toll compounding helps our customers increase their compounding capacity without having to invest in new machinery and equipment. We can do the materials production for them and provide a full range of other services, very cost-effectively."

The new ENTEK HR³ 73-mm twin-screw extruder is BPC's second production line. It is equipped with K-Tron Coperion feeders and a Gala underwater pelletizer, all integrated by ENTEK on a turnkey basis. BPC expects the line will allow it to gain more customers and increase its toll compounding capacity dramatically, from 22 million lb to 60 million lb/yr. BPC's lab in Meredosia has a compounding line with a strand pelletizer; lines for five-layer blown film and cast film/tape; and an injection molding machine.

Larson said that BPC has deliberately kept a low profile in the past, a posture that is changing. "We have traditionally stayed under the radar, but our growth has led our owners to invest heavily in our plant," he states. "We've added staff and are about to launch a new corporate identity. NPE2018 was a big show for us. While we were not exhibitors, we were proud to show off our new machine at ENTEK's booth."

Larson, Krause, and Robin Fourness, BPC's v.p. of sales and marketing, all have many years of plastics industry experience, and joined BPC to promote and grow the business. "I believe a real strength is our independence; we aren't owned by a larger company," says Larson. "We are very lean, and we are very successful." PT

HONEYCOMB DESICCANT ROTOR DRYERS

FEATURING THE LATEST HONEYCOMB MATRIX DESICCANT ROTOR TECHNOLOGY

PPE DRYERS BRING YOU CURRENT STATE-OF-THE-ART DRYING TECHNOLOGY

ONE FLORIDA CUSTOMER'S COMMENT:

"THE BEST DRYER I HAVE EVER USED!"

Delivers Constant - 40° Dew Point Air with up to 25% Energy Savings!

MAX-Dry*® *World Class Resin Drying Solution.

MAX-Dry ® Standard Features:

- Process Heater included.
- Digital dewpoint display for accurate drying performance.
- Return air cooling coil included.
- Two-year warranty on desiccant rotor wheel. Wheel should last up to 5 years under normal use!
- Easy-to-use operator controls.
- 7-day timer for increased control.
- Rotation alarm and dirty filter alarm.
- Process temperature alarms.
- Circuit breakers eliminate the need for fuses.
- Remote thermocouple ports.
- Maximum drying efficiency at minimal operating cost.
- Easy access panels for maintenance - no tools required.
- Durable powder coat finish.
- No dust or desiccant beads to change.

Model MD-30220
30 lbs/hr **$4,821.00**

11 MODELS IN STOCK SIZED FROM 30 TO 500 LBS/HR

With *MAX-Dry* ® you will get:

- Delivers precise and consistent, **- 40° Dew Point Air** and process temperatures.
- The latest desiccant honeycomb matrix drying technology.
- Seven standard sizes from 30 - 500 lbs/hr.
- Easy-to-use operation and maintenance.
- Higher performance in a smaller machine footprint.
- Lower operation costs.
- Easier maintenance.
- Instructions included.
- A machine built to last.
- Delivery: From Stock.

NO PEAKS AND VALLEYS

Our unique honeycomb matrix wheel has a series of channels or air passages that form our matrix. These passages are coated with molecular sieve and silica gel that are permanently bonded to ceramic fibers inside the rotor thru special chemical crystallization.

TO ORDER CALL TOLL FREE 800-362-0706
CALL 1 NUMBER FOR 3 LOCATIONS.

PLASTIC PROCESS EQUIPMENT, INC. www.ppe.com • sales@ppe.com

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

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

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

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

Wittmann Battenfeld

Solutions for ALL Your Robot Needs

NEW LOW COST PRIMUS Series

– for 40–400 ton molding machines

- Same high quality with basic features
- Designed for simple pick & place applications
- 7 models for up to 400 ton molding machines
- Payloads up to 22 lbs
- WITTMANN's R8.3 controller with PRIMUS software
- Easy Wizard programming & Open Text programming

NEW ROBUST PRO Series

– for 500–5000 ton molding machines

- Dual Bearing Rails for all axis
- 30% more sturdy axis profiles
- Reduced cabling
- Reduced noise and vibration
- Gear Box designed for enhanced durability
- LED Status Lights on horizontal beam
- New servo drive controller
- Designed for easy access maintenance

world of innovation
www.wittmann-group.com

WITTMANN BATTENFELD, INC.
One Technology Park Drive | Torrington, CT 06790
Tel: 860 496-9603 | info.us@wittmann-group.com

Midwest Tech Center
South Elgin, IL | Tel: 847 531-0015

West Coast Tech Center
Placentia, CA | Tel: 860 496-9603

Wittmann 4.0

Contact Us Today
for More Details!