PT
PTonline.com

Plastics Technology®

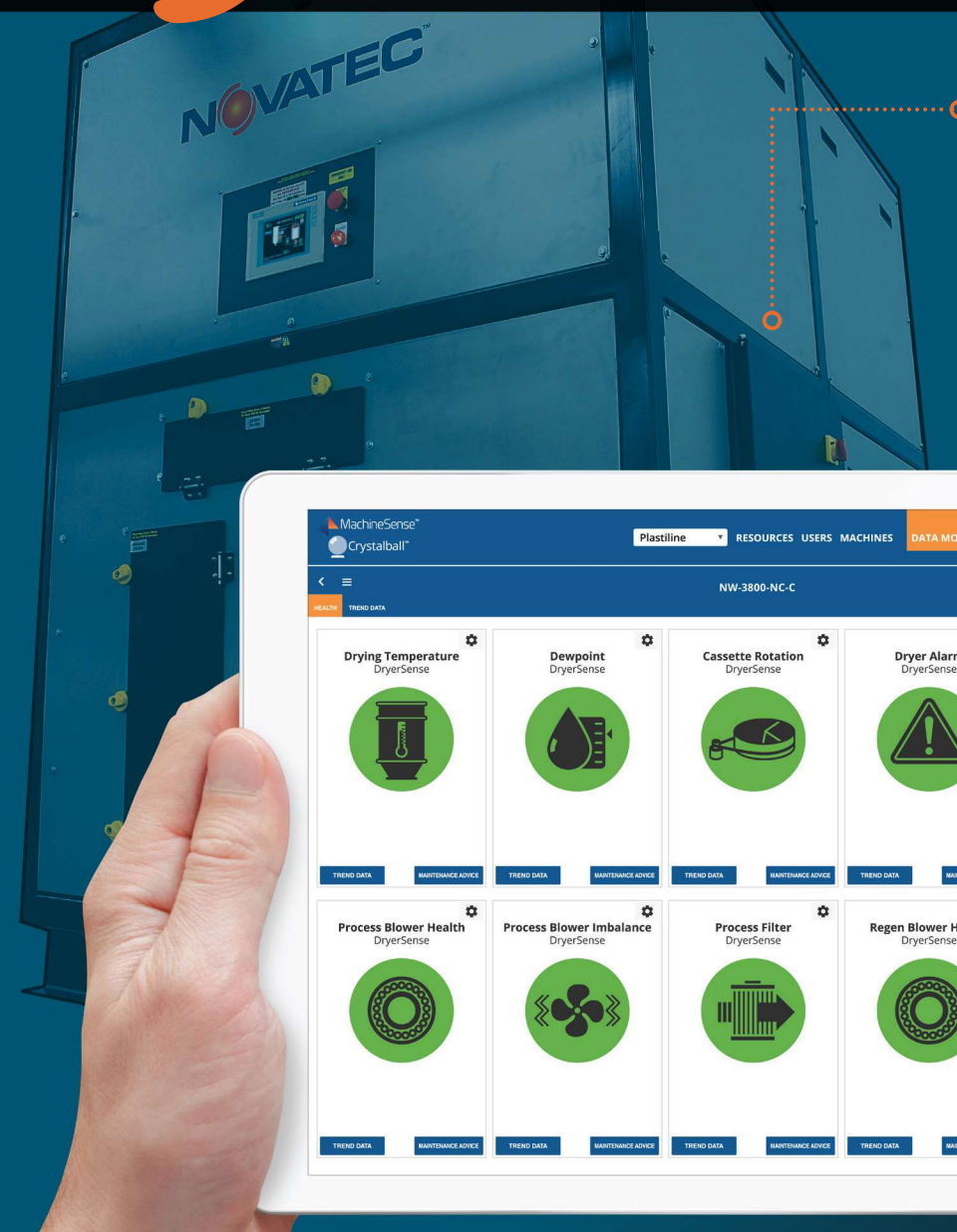
Pursuing the Perfect Gauge

Impact Plastics brings value with thin-gauge, ultra-tight-tolerance sheet

A property of Gardner Business Media JANUARY 2018 № 01 VOL 64

DryerSense® 24/7 Analytics

Now on NOVATEC Central Dryers



Onboard Sensors for:

- Process Blower Monitoring
- Regeneration Blower Monitoring
- Cassette Rotation Monitoring
- Heater Box Monitoring
- Dewpoint and Temperature Monitoring

Making You Smarter with Actionable Intelligence to Avoid Unplanned Downtime.

NOVATEC

POWERED by MachineSense®

800-237-8379 | sales@novatec.com
www.novatec.com

CONTENTS

VOLUME 64 • NUMBER 01

Plastics Technology

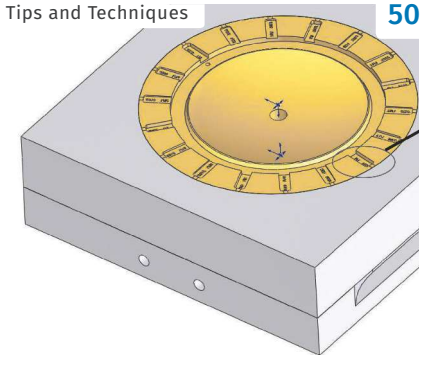
On-Site

Making an Impact in Thin-Gauge Sheet

Creating a 'virtually integrated supply chain' that connects with suppliers and customers has helped Impact Plastics add value to a wide range of sheet products, with a growing emphasis on PP.

By Jim Callari, Editorial Director

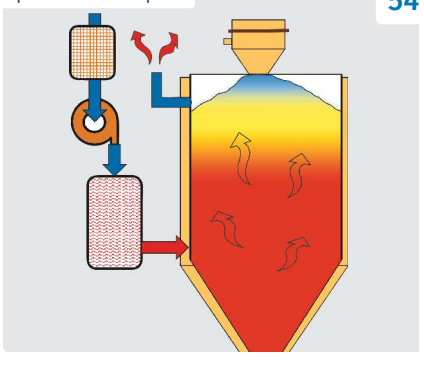
(Cover: Impact Plastics' Natalie MacVarish and Bill J. Burke Jr.)



Determining Vent Depths in Injection Molding

Experiments reveal the relationship between vent depths and part thickness, allowing molders and moldmakers to more precisely determine vent dimensions.

By Suhas Kulkarni
FimmTech



Why Drying Polyolefins Might Be Right for Your Process

From a technical standpoint, drying non-hygroscopic materials such as polyethylene and polypropylene is not necessary. However, doing so may be advantageous to your process. Here are details.

By Pete Stoughton
Polymer Drying Services

There's more on the web at PTonline.com

BLOG: Automotive Innovation in the Spotlight

Plastics Technology Senior Editor Lilli Sherman, who also acted as a judge for the prestigious awards, blogged about SPE's Automotive Innovation Awards. Always packed with plastics processing firsts, the 2017 edition of the awards doesn't disappoint when it comes to innovation.
short.ptonline.com/SPEauto1

BLOG: Customized Kicks Via 3D Printing

Plastics Technology Senior Editor Heather Caliendo details the rapid adoption of rapid manufacturing by some of the world's leading athletic shoe manufacturers. Read about the latest application of additive manufacturing in shoes by Under Armour, adidas, Nike, and New Balance.
short.ptonline.com/3Dkicks

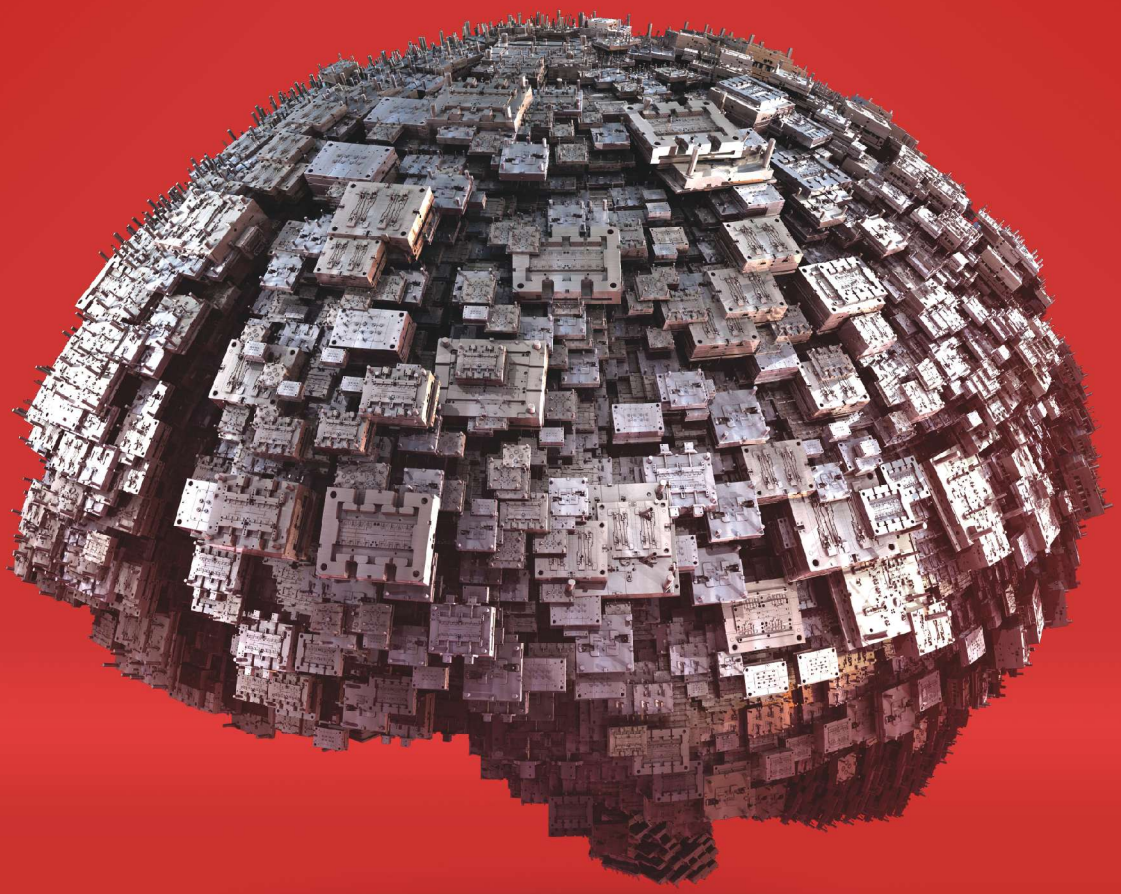
Plastimagen 2017 Marches On

Despite natural and manmade challenges, including an earthquake just 49 days prior and the impending renegotiation of a crucial trade agreement, Mexico's preeminent plastics event—Plastimagen 2017—was a marked

success. Get market updates from the Mexican plastics trade association, ANIPAC, as well as leading suppliers.
youtu.be/EsCKfxIp-EQ

YouTube ***short.ptonline.com/yfZBD0uY***

Follow Us on Social Media
short.ptonline.com/PT Twitter ***short.ptonline.com/PTFacebook*** ***short.ptonline.com/PTLinkedIn***



Imagine the most complex part you can. Then come to us for its mold.

At Canon Virginia, we've been designing, making and using high-precision, high-volume injection molds for more than 20 years. This expertise has been the foundation of our world-class products, and it's available to support your business as well. We provide personalized engineering to help solve manufacturing challenges and develop the mold you need for your complex plastic part. When you trust in Canon, you're partnering with a mold maker like no other.

Canon

cvi.canon.com/mfg | 1.866.99.CANON

Plastics Technology®

ptonline.com @plastechmag

PUBLISHER	Rick Kline, Jr. *rkline2@gardnerweb.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 Helton *bhelton@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.

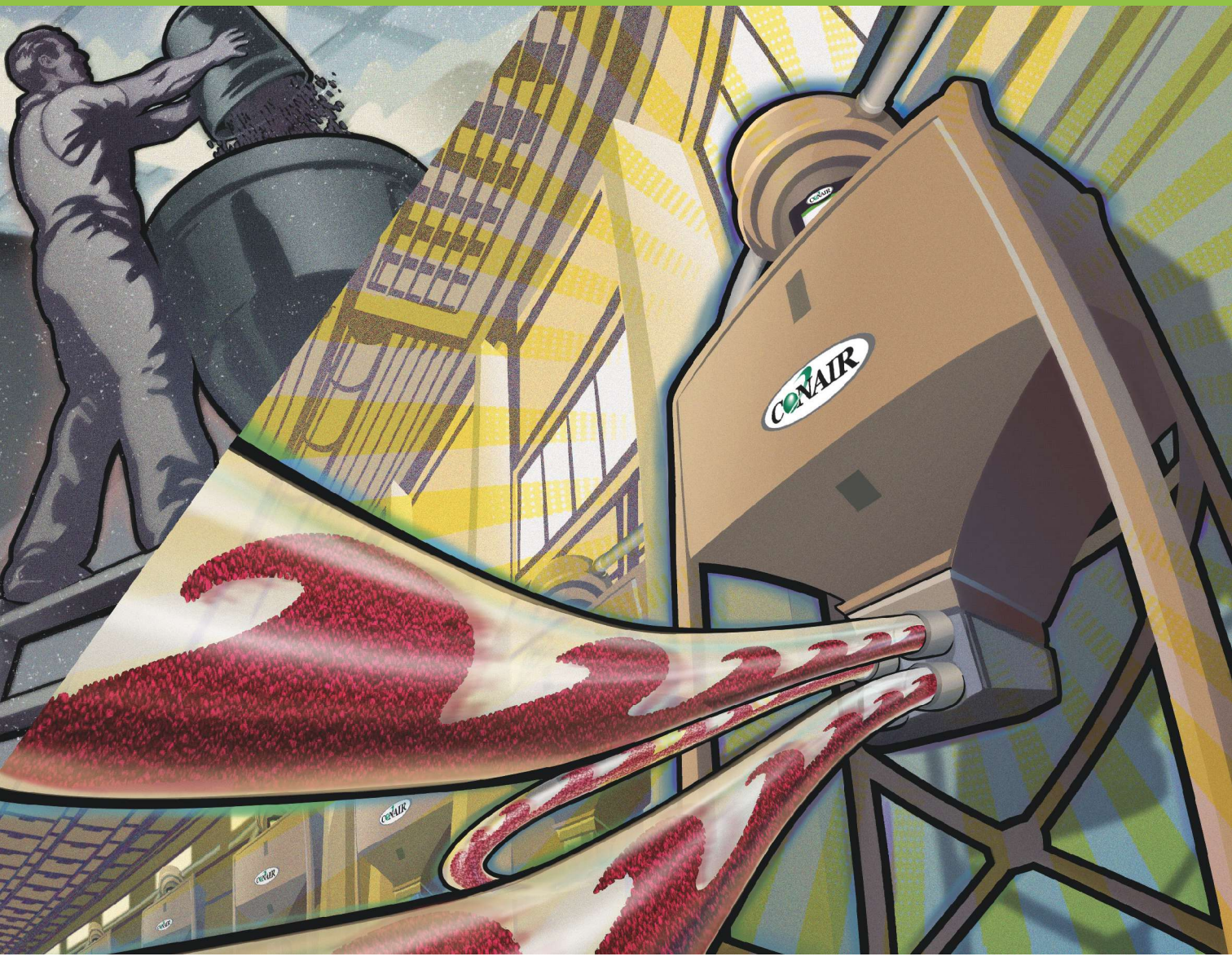
HEADQUARTERS	*NEW YORK OFFICES*
6915 Valley Avenue	1441 Broadway, Room 3037
Cincinnati OH 45244-3029	New York, NY 10018
Phone 513-527-8800	Phone 646-827-4848
Fax 513-527-8801	Fax 513-527-8801
gardnerweb.com	*ptonline.com*

CEO	Rick Kline
COO	Melissa Kline Skavlem
President	Rick Kline, Jr.
Director of Custom Content	Tom Beard
Chief Data Officer	Steve Kline, Jr.
Treasurer	Ernie Brubaker
Chief Technology Officer	Phil Louis
Advertising Manager	Bill Caldwell
Director of Editorial Operations	Kate Hand
Creative Director	Jeff Norgord
Creative Department Manager	Rhonda Weaver
Director of Marketing and Events	Dave Necessary

GARDNER BUSINESS MEDIA ALSO PUBLISHES

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

NO MORE ANGEL HAIR.
CONVEYING REVOLUTIONIZED.



You can't eliminate every possible problem. But you have to try. So, how does an organization like yours plan for success in a highly competitive age? Conair has created a truly revolutionary experience for customers with the help of Wave Conveying™. Wave Conveying, a new method of conveying material, eliminates angel hair in a whole new way. What if you had a method to eliminate the expected problems?

CONAIR™

Download the white paper at conairgroup.com/therevolution

AMERICA'S Best Selling Brand | MADE IN THE USA

Educational Event Targeting Executives Is New for NPE2018

Plastics Industry Association adds new series of half-day symposia with networking lunches featuring speakers from financial institutions, consumer brands, plastics manufacturing companies, and national associations.

Over the next six months or more, this magazine will be devoting a hefty amount of editorial coverage to the NPE2018 show, to be held May 7-11 in Orlando, Fla.

Jim Callari
Editorial Director

Our reporting will focus heavily on new technology that will debut at the exhibits. Because that's what NPE2018 is all about, for the most part: a giant showcase of new technology on display to help plastics processors make better products.

But what about the business side of plastics processing? What about something that helps plastics processors make strategic decisions that make their companies more profitable? This year, for the first time, NPE2018 has that covered as well.

PLASTICS president and CEO William Carteaux and well-known industry consultant Jay Gardiner of New York-based Gardiner Plastics Inc. have worked together to develop The Plastics Leadership Summit. The intent is to provide senior management—so called "C Level" executives—from processors and other industry concerns with an educational program, as well as a chance to network with peers and speakers at NPE2018.

> ***"Executives who attend can come away with ideas that can improve their profit margin."***

The summit, for which there is a separate registration fee, will run Tuesday, Wednesday, and Thursday—May 8-10—from 8:30 am to 1:30 pm. Speakers and presentations are organized through what Gardiner calls "three unique lenses," assigned to each day: Profit (Tuesday), Product (Wednesday) and Production (Thursday). Dow Chemical is the event's Platinum Leadership sponsor.

On Tuesday, May 8, the Profit track will cover topics such as capital sourcing for growth and acquisition, company valuation, and corporate financial strategies. Speakers and panelists include:

- Sharon Miller, managing director, head of small business, Bank of America
- Charlie Gailliot, managing director, Goldman Sachs
- Craig P. Staub, managing principal, Odyssey Partners
- John Hart, managing director, P&M Corporate Finance
- Sam Smith III, senior v.p., Customers Bank Commercial Finance

On Wednesday, May 9, the Product track is geared towards senior business development, sales and marketing, and product/divisional business managers, with insights into projected demand for markets like aerospace, medical, food and beverage, lawn and garden, etc. Speakers and panelists for that morning include:

- Theresa Hermel-Davidock, worldwide director, Core Technologies, Becton Dickinson
- Stephen Livernois, v.p. procurement of direct materials, Becton Dickinson
- Rene Lammers, senior v.p., Global Beverage R&D, PepsiCo
- Catherine Hawkins, senior director of procurement, The Boeing Company
- Jay Olson, global manager, Materials Engineering and Technology, John Deere

On May 10, the Production track will cover topics such as workforce development and additive (3D and 4D) manufacturing, as well as "smart manufacturing." Speakers and panelists include:

- Jay Timmons, president and CEO, National Association of Manufacturers
- Greg Haye, general manager Materials & Process Development Center, Local Motors, Inc.
- Cheryl MacLeod, global head of 3D Fusion Science, Hewlett Packard Inc.
- Peter Stansky, digitalization development manager, Siemens Inc.

Adds Gardiner, "The Plastics Leadership Summit is an education event aimed at top management that looks at plastics from a business perspective. Executives who attend can come away with ideas that can improve their profit margin."

You can learn more and register for the event at ***npe.org/summit***.

FOLLOW US
@plastechmag
@jimcallari

MAGUIRE®
Intelligent Simplicity

6x FASTER THAN DESICCANT DRYERS

*COLD START TO **DRY POLYMERS** IN JUST **35 MINUTES!***

- **Faster & Less Energy**
  Dries resin six times faster than desiccant dryers and uses 60% less energy.
- **Zero Maintenance**
  Unique, patented 3-stage drying technology.
- **Smart Drying**
  Load cell control matches the drying rate to the process rate.
- **No Material Degradation**
  High speed, no stress drying.

VBD-150

5 YEAR WARRANTY

GET YOURS IN TIME FOR **DRYER SEASON!**

NPE2018 THE PLASTICS SHOW

NPE2018: THE PLASTICS SHOW
May 7-11, 2018 | Orlando, Florida USA
NPE.org | **BOOTH: #W5747**

MODELS AVAILABLE:
VBD-150 / 300 / 1000

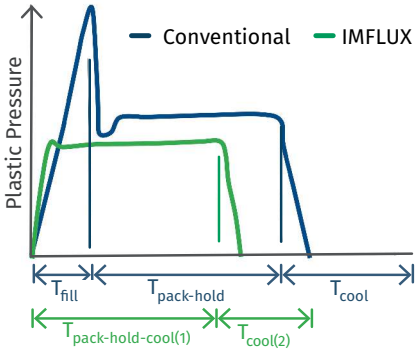
@MaguireProducts | Maguire-Products | info@maguire.com | www.maguire.com

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

Low-Pressure Injection Molding Technology Boasts Faster Cycles, Better Parts

Low-pressure injection molding technology developed at Procter & Gamble and now being offered for license is said to offer advantages in molding productivity, part quality, and design freedom. iMFLUX Inc., Hamilton, Ohio, is a new subsidiary of P&G created in 2013 to market the technology. It was born of a challenge issued by former P&G CEO A.G. Lafley, who asked why a company like Toyota could design and build a whole new car model so much faster than P&G could change the cap on a shampoo. From that emerged a goal to build injection molds for P&G products in half the time and cost of conventional methods. P&G engineers identified the high pressures of injection molding as a major cost and time driver in building molds and pursued ways of overcoming this hurdle.

The public debut of iMFLUX was at an October open house hosted by KraussMaffei Corp., in Florence, Ky. In a technical presentation there, Gene Altonen, chief technical officer for iMFLUX, said this low-pressure technology offers economic advantages: 10-25% or more faster cycles, 25-50% or greater reduction in melt pressure, up to 50% lower clamp tonnage, and ability to mold thinner walls without freeze-off and to increase mold cavitation. Altonen showed how two parts 0.045-in. and 0.025-in. thick could be molded at the same pressure, saving energy. Quality advantages with iMFLUX, he said, include reduced molded-in stresses, more uniform filling of multi-cavity molds, and elimination of flow-front hesitation for improved part aesthetics.



The iMFLUX process breaks many of the rules of conventional injection molding. The key is filling at a constant, lower pressure, without the usual reliance on shear thinning to facilitate flow. Slower filling without hesitation yields faster cycles. This also allows for a cooler melt that can flow farther through thinner channels. Whereas conventional injection molding separates mold filling, packing, and cooling into sequential steps, iMFLUX combines them all simultaneously. "If you stop a short shot, you'll see that it's fully packed, with a fully formed surface at every point during fill," Altonen said.

The firm's proprietary software and controls utilize a pressure sensor in the machine nozzle as the primary control point to ensure consistent filling without flow hesitation, based on sensing melt pressure every 1.2 millisec. Altonen showed a 3-in.-long runner only 0.030-in. thick: "Any hesitation would cause it to freeze off." A single cavity-pressure sensor—regardless of how many cavities there are in the mold—is also used to detect end of fill. This approach is said to adjust immediately and automatically to any change in resin viscosity—caused, for example, by changes in regrind quality or percentage, or by a color change. Altonen said the cost of installing a cavity sensor could be saved by means of an iMFLUX invention called Nighthawk, which is installed on the outside of the mold to detect strain and deflection as a proxy for measuring melt pressure inside the mold. Nighthawk gives readings all during fill, not just at the end like a cavity sensor.

Altonen cited the case of a 16-cavity mold that experienced intermittent short shots. Adding pressure sensors to each cavity showed a 3439-psi range of pressures at end of fill. With iMFLUX, that range shrank to 1113 psi without modifying the mold or hot runner. Other examples of what iMFLUX has achieved include one customer that was able to shift a mold from a 700-ton to a 400-ton press. Another reduced cold-runner volume by more than 50% while trimming cycle time. Still another trimmed resin use by more than 25% with thinner walls than were possible with conventional technology.

iMFLUX can be installed on any existing mold and machine. iMFLUX also designs and builds molds to take advantage of its process technology.

513-488-1017 • imflux.com

Two Acquisitions in IML And Packaging Automation

Two recent acquisitions involve major players in in-mold labeling (IML) and packaging automation:

• CBW Automation, Ft. Collins, Colo., has become a sister company of H. Müller-Fabrique de Moules SA within the newly formed Mold & Robotics Group in Switzerland. CBW Automation (***cbwautomation.com***) is well known specialist in robots and other automation for IML and handling containers and lids in takeout, orientation, assembly, stacking, and packing. Müller (***muller-iml.com***) is a Swiss leader in injection molds and robotics for packaging IML, takeout, assembly, quality inspection, and stacking/packing.

• Verstraete IML of The Netherlands, a leading supplier of in-mold labels, is now part of Multi-Color Corp., Batavia, Ohio. Verstraete (***verstraete-iml.com***) was acquired from Constantia Flexibles, an Austrian packaging producer. Multi-Color Corp. (MCC; ***mcclabel.com***) is a global printer of labels and one of the world's largest in that business. Verstrate plans to open its first U.S. production facility at a MCC location in the greater Cincinnati area by the second quarter.

Priamus Relocates

Priamus System Technologies, LLC has moved from Brunswick, Ohio, to Sterling, Va. It is now co-located with Gammaflux Controls, Inc., a leading supplier of hot-runner temperature controls and a sister company within Barnes Group Inc., Bristol, Conn. Priamus makes sensors and process-monitoring/control systems for injection molding.

877-774-2687 • priamus.com

SENTRA®

THE GOLD STANDARD

FOR PRECISE & PROVEN MOLD TEMPERATURE CONTROL UNITS

- Improve processing with precise fluid temperature control
- Unsurpassed warranty reduces total cost of ownership
- Eliminate water hammer with modulating AVT™ cooling valve on T & G models
- Reduce start-up time by choosing from a wide range of heater capacities – 6-34 kW
- High efficiency, high flow pump minimizes electrical consumption and improves heat transfer – ½ to 7 ½ horsepower
- Process with a wide range of fluid temperatures from 32˚ - 300˚F
- More than 40,000 units in service with a 40 year proven track record
- Custom designed units with many options

Choice of controls to meet your specific needs

T-Series Temptender® | **G-Series** | **VE-Series**

ADVANTAGE®
MAKING WATER WORK

525 East Stop 18 Road
Greenwood, IN 46142
317.887.0729

www.AdvantageEngineering.com

Engel Establishes New Unit for Project Planning of Composites Systems

Engel Austria (U.S. office in York, Pa.) has created a new sub-division to support customers in project planning and commercial launch of production systems for fiber-reinforced plastic composites. Previously, this activity was part of an Engel R&D unit, the Center for Lightweight Composite Technologies. But the increasing demand for integrated lightweight construction

solutions requires a separation of the actual project business from development work, states Dr. Christoph Steger, chief officer of the Engel Group.

The new Engel Composite Systems sub-division is located in St. Valentin, Austria, as is the Center for Lightweight Composite Technologies. Engel Composite Systems will be an interface for customers between the composites R&D center, the business units, and the automation division. Engel is exploring a wide variety of composites technologies, including HP-RTM, SMC, injection overmolding of thermoplastic fabric and tapes, and in-situ polymerization of nylon from Caprolactam (T-RTM).
717-764-6818 • engelglobal.com

Solvay Starts Up Nylon Production In Mexico

Solvay Performance Polyamides (U.S. office in Alpharetta, Ga.) has begun production of the Technyl range of nylons in San Luis Potosi, Mexico. The 22-million-lb/yr facility will service the company's regional customers in automotive and consumer goods. Solvay acquired the Technyl line with the acquisition of Rhodia in 2011.
800-621-4557 • solvay.com

3D Printing Achieves 'Break-Even' Point Versus Injection Molding at 110,000 Parts

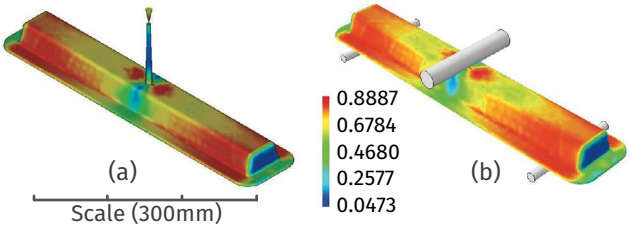
A new milestone on the path to volume manufacturing with 3D printing: HP Inc., Palo Alto, Calif., claims to have raised the limit at which its Multi Jet Fusion process is cost competitive with injection molding now to 110,000 parts. HP claims to have "unlocked economies of scale" with its new Jet Fusion 3D 4210 machine for its modified inkjet-style process (see Sept. '17 Close-Up). It raises the economic break-even point from 50,000 parts for the previous model 4200. The model 4210 employs various hardware and software upgrades (retrofittable to 4200 models) to improve productivity and reduce piece cost—notably the ability to feed materials from bulk packaging (e.g., 1000 liters). HP claims "the industry's lowest cost-per-part—up to 65% less than other 3D printing methods." HP also claims its Jet Fusion system is up to 10 times faster than other methods.

By continuing to drive down piece costs, HP aims for a break-even point of 1 million parts. Essential to that goal is driving down the cost of thermoplastic powder raw materials, which HP is pursuing through an expanding range of partnerships with materials companies. HP's Open Materials Platform already includes Arkema, BASF, Evonik, Henkel, Lehmann & Voss, and Sinopec Yanshan Petrochemical Co. of China. HP recently added two new partners: One is Lubrizol, which will bring TPU elastomers as the next major addition to HP's Jet Fusion materials line. The second is Dressler Group, a specialist in grinding and refining chemical products. It will offer HP's materials partners preferred access to its toll grinding capabilities, helping to reduce one of the main barriers to materials development, HP says.

HP also announced three additions to its "high-reusability" materials range, referring to the ability to reuse up to 80% of leftover powder. Added to the original nylon 12 powder, there's now also a nylon 11 for parts requiring ductility and flexibility; nylon 12 with 40% glass beads for parts requiring high stiffness; and PP (available by midyear), for parts requiring low cost, light weight, and good chemical resistance. In future, HP is aiming to add more nylon materials, more varieties of filled grades, and additional high-performance materials. HP says it is working with more than 50 materials companies, including Dow and DSM, which are still at the development stage.
877-468-8369 • hp.com

Automotive Composites Get a Boost From New Predictive Engineering Tools

Adoption of weight-saving polymer composites in auto body structures will be made easier with new predictive engineering software. The development effort behind it was led by researchers at the U.S. Dept. of Energy's Pacific Northwest National Laboratory in Richland, Wash., along with industry and academia. Other key players were PlastiComp, Winona, Minn., a specialty compounder of long-fiber thermoplastics (LFT); Toyota; modeling software supplier Autodesk; tier one molder Magna; and university researchers from Univ. of Illinois, Purdue, and Virginia Tech.



Fiber-orientation map (left) and resulting flexural properties (right).

PlasticComp (***plasticomp.com***) provided 30% long-carbon-fiber PP and nylon 66 materials and molded sample plaques that were used to evaluate fiber orientation and length attrition during injection molding. Also, some of the algorithms used by Autodesk's software (***autodesk.com***) were updated to better model long-carbon-fiber orientation in computer-aided analysis of design concepts to predict performance properties.

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

"We studied 4 or 5 brands in deciding where to source our dryers and Dri-Air came out on top. We found them to be so much more energy efficient than any wheel dryer — by at least 40%! As soon as we placed an order, they came right into our plant to train our facilities people on Dri-Air equipment — they partnered with us immediately. Nobody else before had ever offered to do that. They have really integrated Dri-Air staff with our Empire staff. ***Dri-Air is the most reliable supplier that we have found."***

— Neal Elli, President, Empire Precision

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**

Sepro Launches Apps for Enhancing Robot Software

In addition to three new, smaller six-axis robots, Sepro of France introduced the first two software apps for its injection molding robots at the recent Fakuma show in Germany (see also this month's Keeping Up section). Sepro (U.S. office in Warrendale, Pa.) says downloadable apps for existing robot controls offer an incremental way of updating capabilities between launches of entire new control systems.

One of the first two apps is OptiCycle, which helps fine-tune robot and machine cycles for maximum productivity. It was developed with key global accounts, one of which has upgraded 400 of its 800 Sepro robots with this app. OptiCycle reportedly offers "expert logic" that makes it easier for programmers of all experience levels to evaluate and continuously improve robot and machine cycle times. A plug-in for Sepro's Touch 2, Visual 2, and Visual 3 controls, OptiCycle requires the operator to answer a few questions and teach the main points in the Visual software. OptiCycle does the rest, such as finding an optimal standby position and anticipating the ejector action. The app also offers suggestions for optimizing end-of-arm tooling and injection-machine strokes. Results are said to include up to 40% faster robot in/out cycles and about 5% faster overall molding cycles—up to 10% faster on larger presses.

The second new app is Live Support, also developed with global customers. Available later this year, it will provide tech service, troubleshooting, and hotline support via smartphone. A USB stick provides a WiFi connection to send robot data to the phone and then to the cloud and Sepro hotline. Customers will be able to initiate service requests, list concerns or questions, and add detailed robot status simply by scanning a QR code.

Also coming later this year will be ability to use 3D simulation to make programming and maintenance even easier. This is already used to some extent for programming simple pick-and-place routines on Visual 3 controls.

412-459-0450 • sepro-america.com

Foster Distributes Resirene's SMMA Copolymers

Foster Corp., Putnam, Conn., is the new exclusive distributor of CET SMMA copolymers from Resirene of Mexico (***resirene.com.mx***) for the U.S. and Canadian medical markets. Foster will also now offer custom compounds based on SMMA copolymers, including custom colors and impact-modified grades.

CET SMMA copolymers reportedly combine the ease of processing of styrene polymers with the crystal clarity of acrylic. They are also said to provide a high degree of chemical resistance, crack resistance, and temperature performance not available with SAN or acrylic. Key applications include IV connectors, dialysis filter housings, surgical kits and trays, and labware. They are also said to offer an alternative to PC resins in medical devices.

860-928-4102 • fostercomp.com

Injection Molding Clamp-Force Booster Proven to Save Energy, Money

Ironjaw LDA, Lisbon, Portugal, says trials of its product, which boosts the clamping force of an injection molding machine by up to 60%, point to average savings of nearly $12,000/month. Trials at early adopters of the technology point to return on investment in less than 6 months. Ironjaw was started by a cofounder of RocTool and has a demonstration center at RocTool's office in Charlotte, N.C.

Ironjaw notes that savings generated by the clamp-force booster will vary, depending on the molding machine, energy costs, automation levels, and number of machine hours. The company says its technology is compatible with all brands and types of injection machines, giving molders an option to mold larger parts on smaller machine.

As we reported earlier (July '17 Starting Up), Ironjaw technology uses steel jaws to grip the mold along its parting line, activating when the mold closes and then unclamping prior to mold open. Four sizes are currently available, boosting injection molding machine clamp force by 25, 50, 125, and 200 tons.

980-938-0586 • ironjaw.tech

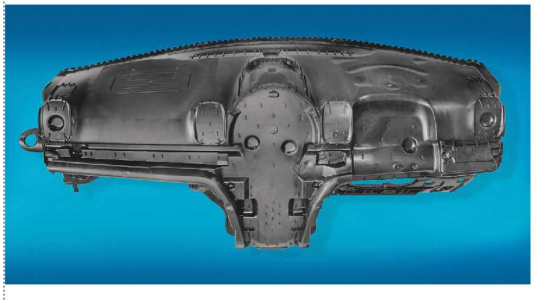
Winners of 2017 SPE Automotive Awards Wow with Many 'Firsts'

Innovative, transferable, and intelligent use of thermoplastics capture eight of nine categories.

By Lilli Sherman
Senior Editor

Spanning nine categories, the winners of the SPE Automotive Division's 2018 Blue Ribbon Automotive Innovative Awards (which this editor helped judge) represent a number of "firsts" in metal replacement and in replacing earlier plastics solutions with better options. In this 47th annual competition—the oldest and largest such event in the automotive and plastics industries, all but one category entailed the use of thermoplastics.

A PP LFT structural active grille shutter won the Grand Award.



The LGF-PP instrument-panel carrier was chemically foamed with a core-back process, reducing weight by 15%.

This engine clevis bracket is said to be the first thermoplastic composite mount for a six-cylinder engine

Enhanced with PTFE, this nylon 46 replace nylon 66 in the chain-tensioner arms of the 2017 Ford F-150.

BODY EXTERIOR: PP-LFT STRUCTURAL GRILLE

This PP long-fiber-thermoplastic (LFT) structural active grille shutter (AGS) with integrated loose-layer construction, was also the Grand Award Winner. It appears on the 2018 Ford Expedition luxury SUV and is said to be the largest two-shot AGS in production today. It was designed with an integrated locating and attaching system for consistent fit between the grille and headlamps, which eliminates the need for FEM (finite-element method) assembly, dunnage, and shipping. The material used by injection molder Magna Plastcoat is Celstran 40% long-glass PP from Celanese Engineered Materials (***celanese.com***), Irving, Texas.

The use of LFRT (long-fiber-reinforced thermoplastic) to develop a structure with PP offset an estimated 3 lb of weight over alternative nylon-overmolded metal hybrid designs. An equivalent all-steel structure would weigh 18 lb more than the LFRT design, which delivers the required durability. In addition to reducing variable and piece costs by an estimated $5 with an all-thermoplastic solution, the enhanced design saved $16 in assembly cost per vehicle and eliminated around $45 auxiliary costs. Improved parts consolidation also eliminated four separate fasteners and associated labor. Ford will be using similar parts on all of its trucks.

BODY INTERIOR: LGF-PP IP CARRIER

The instrument-panel (IP) carrier in the 2017 BMW Mini Countryman utilizes Stamax 60YK270E high-flow, long-glass-fiber (LGF) PP copolymer from SABIC, Houston (***sabic.com***). International Automotive Components (IAC) injection molded the part via chemical foaming with a core-back process. Use of 60% long glass achieved a 1.9-mm wall thickness, increasing stiffness at lower weight. Use of foaming resulted in a 15% weight saving vs.

New Product Announcement

HIGH EFFICIENCY
Central Chiller

Invest in today, expand in the future

AEC's High Efficiency Central Chiller is designed to handle the most demanding process cooling needs and on average will save up to 60% energy annually. The compact chillers come in 20 to 60 ton capacity and can be combined to offer up to 600 tons of chilling capacity. Multifaceted redundancy virtually eliminates downtime to keep your process up and running.

ENERGY EFFICIENT

- Up to 60% energy savings when compared to traditional systems
- Improved fan motor and compressor energy usage

MODULAR & EXPANDABLE

- Parallel one to ten units within the same control platform
- Invest in additional units as the process needs grow

VIRTUALLY ELIMINATE DOWNTIME

- Advanced control platform provides live monitoring and remote serviceability
- Automatic mechanical & electrical redundancy through intuitive controls

ACS GROUP

P: 1.262.641.8600 E: info@acscorporate.com

aecinternet.com

Heat-stabilized, glass-reinforced nylon 66 turbocharger outlet T-joint achieves a 42% weight savings and 35% cost reduction.

The 2018 Ford Fiesta subcompact features a unique two-shot interior decorative bezel, said to be a first for a part of this size and geometry.

a comparable solid part. Extensive CAE work predicting warpage of the foamed part provided valuable insights, allowing for modification of tooling in advance. Going forward, BMW and partners see this as an industry benchmark for IP carriers.

CHASSIS/HARDWARE: POWERTRAIN BRACKET

Appearing on the 2017 GM Cadillac XT5 crossover SUV, this engine clevis mounting bracket is reportedly the first composite mount designed for a six-cylinder engine. Injection molded by Hutchinson, the part is made from Ultramid A3WG10 CR BK00564, a 50% glass-reinforced nylon 66 from BASF Engineering Plastics, Budd Lake, N.J. (*basf.com*). It replaces the stamped, welded, and die-cast metals used previously, resulting in a 45% weight reduction, as well as improved NVH (noise, vibration and harshness) due to the damping characteristics of the nylon. Corrosion resistance is also improved, and the part can be recycled at end of life. Seven clevis brackets were developed for different powertrain combinations and have experienced no warranty claims after 1.5 years of production.

Thermoplastics gain serious ground in new automotive applications.

MATERIALS: LOW-FRICTION NYLON FOR CHAIN TENSIONER

Stanyl HGR2, a nylon 46 modified with PTFE from DSM Engineered Plastics, Troy, Mich. (*dsm.com*), is used for chain-tensioner arms on the 2017 Ford F-150 pickup and Ford Mustang sports car. The material was a drop-in replacement for nylon 66 to provide enhanced wear and friction performance. The resultant fuel-economy savings (0.4%) from rotational torque reduction in the cam shaft was equivalent to a 40-lb weight reduction, at 10% of the cost.

This innovation is highly transferable to provide affordable fuel-economy improvement, and will be utilized on more Ford vehicles beginning in 2018.

POWERTRAIN: TURBOCHARGER OUTLET T-JOINT

Featured on the 2018 Hyundai Genesis G80 and Kia Stinger sedans, this turbocharger outlet T-joint is injection molded from Zytel XT, a new 35%-glass, heat-stabilized nylon 66 which was developed for long-term retention of properties at up to 220 C/428 F by DuPont (now, DowDupont; *dow-dupont.com*). Molded by Hwaseung R&A Ltd., this part achieves a 42% weight savings and a 35% cost reduction, along with improved airflow, reducing the pressure drop to increase fuel economy and improve NVH performance compared with the previous die-cast aluminum part.

Airflow noise is also reduced and long-term durability increased via the rib pattern design. Special three-gate tooling was designed to minimize stress in the weld-line area for strength and durability and for processing optimization.

PROCESS/ASSEMBLY/ENABLING TECHNOLOGIES: TWO-SHOT INTERIOR BEZEL

The unique 3D decorative effect on this interior bezel, which appears in the 2018 Ford Fiesta subcompact, is achieved with ►

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

rotary two-shot "reverse" injection molding. The first shot is Infinol LT1220 tinted PC, overmolded with a textured/grained surface in a second shot of a effect-pigmented ABS, both from South Korea's Lotte Advanced Materials (U.S. office in La Palma, Calif; *lotteadms.com*.). The grain is lasered into the mold.

Tier 1 supplier Faurecia Interior Systems molded the part, which represents the first time this process was used to achieve the 3D visual effect (color and texture) for a part of this size and geometry. A 30% cost savings was achieved versus in-mold decorating and high-gloss painting, and there was a 20% scrap reduction versus conventional two-layer, high-gloss, piano-black appearance.

This low-cost, low-mass nylon head restraint is featured on the 2018 Ford D-150.

SAFETY: 4-WAY HEAD RESTRAINT

The low-cost, low-mass head restraint on the 2018 Ford F-150 pickup is made from Hylon N1000STHL nylon 66 from Belgium's Ravago Manufacturing (U.S. office in Manchester, Tenn.; *ravagomfg.com*) and injection molded by Windsor Machine and Stamping. It provides exceptional rigidity for whiplash protection. Its flexible design allows the front surface of the head restraint to be moved closer to or farther from the occupant by 60 mm, allowing for the precise balancing of comfort and safety.

Replacing steel with plastic as the primary load-bearing component is new to front-row head restraints. The part design eliminates manufacturing complexity. A $10.73 million savings ($2.80/vehicle) is projected by the end of 2020 as this technology is extended to new vehicle programs.

AFTERMARKET: BEDLINER DIVIDER

Designed for GM's 2017 Chevrolet Silverado pickup, this "first-time" twin-sheet thermoformed bedliner divider is

Another "first" is a twin-sheet thermoformed bedliner divider that's integrated into the bedliner as one piece.

integrated into the bedliner as one piece. By not having to manufacture a separate floor divider part, there was a cost savings of $275. Manufactured by Penda Durakon, the divider is made of TPP 1026EU TPO from A.Schulman Inc., Fairlawn, Ohio (*aschulman.com*). It incorporates a molded-in locking feature to secure the divider to the truck wall when it is raised.

BIO PUR FOAM FOR IPS

Featured in the 2018 Ford Fusion sedan, this IP application provides a sustainable alternative to conventional petroleum-based foams—at lower weight and cost, and greater design flexibility. This next-generation castor-oil-based polyurethane (PUR) foam (Elastoflex 3496/102 PUR from BASF Polyurethanes & Plastics, Wyandotte, Mich. (*basf.com*), provides for lower molded density, foam cross sections as thin as 4 mm, and superior bond strength to mating materials.

Foamed 60% long-glass PP produced an IP carrier with wall thickness as low as 1.9 mm.

Foam-in-place tooling—where a cast PVC, TPE, or TPU skin is placed in the mold with a hard plastic retainer and the foam is injected between these two components—is used for processing by International Automotive Components (IAC). Weight savings of 20-40% (depending on foam thickness) and cost savings of $2 per average IP are achieved. PT

3D Printing Start-Up Competes with Injection Molding

A year-old company is devoted to large-scale custom 3D printing at prices competitive with injection molding to 20,000 parts.

Gabe Bentz, president and founder of Slant 3D with some of his dozens of custom-designed and built 3D printers that can produce 5000 to 10,000 parts a week.

By Matt Naitove
Executive Editor

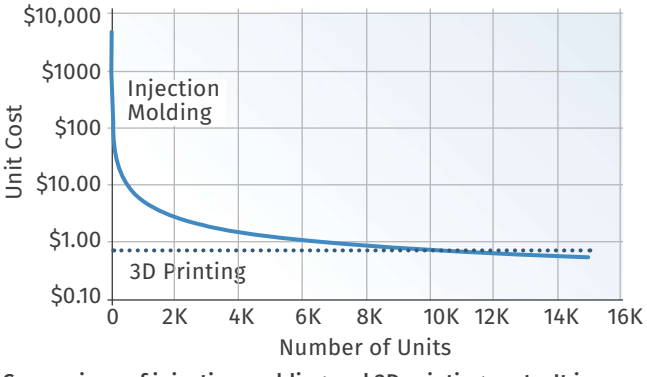
A growing number of injection molders have adopted 3D printing for prototyping or making conceptual models to present to clients. Some are even making 3D-printed parts for internal use, such as jigs, fixtures, or robot grippers. But few have pursued this technology as a means of commercial production of custom parts. For the most part, injection molders have left that field open to companies specializing in low-volume, high-value parts for aerospace and medical uses.

There are growing signs that injection molders need to watch their backs. Innovative start-up companies are emerging with large "farms" of 3D printers organized to compete with injection molding for orders of 10,000, 20,000, or even 100,000 parts. We reported in a September 2017 Close-Up on one example of this new type of competition, Voodoo Manufacturing in Brooklyn, N.Y. That article brought a response from a similar new venture, clear across the country. We were contacted by Gabe Bentz, president and founder of Slant Concepts in Nampa, Idaho. His mechanical design and engineering firm had spun off a second venture in October 2016, called Slant 3D, devoted to custom 3D printing in small to medium volumes. He claims it can produce parts that are less expensive than injection molding in volumes under 10,000 parts and reasonably competitive in price at up to 20,000 parts (see accompanying chart).

> *"We are working to make 3D printing a large-scale manufacturing option."*

"We are working to make 3D printing a large-scale manufacturing option," says Bentz. "We are doing this by developing hardware, software, and techniques to allow 3D-printing devices to produce parts in volume."

Injection Molding vs. 3D Printing Unit Cost



Comparison of injection molding and 3D printing costs. It is assumed that the injection mold costs $5000 and the cost per part, exclusive of mold-amortization, is 20¢. Total cost per molded part, including mold amortization declines with volume, while 3D-printed part cost is constant at an assumed 70¢.

HOME-MADE PRINTERS WITH AUTOMATION

Slant 3D (*slant3d.com*) operates a production printer "farm" with close to 100 printers, a number expected to grow to 500 in the next year or two. Bentz claims capacity to produce 5000 to 10,000 parts a week.

His printers are self-manufactured to the firm's own design. They utilize an FDM-type of process in which extruded thermoplastic filaments are deposited in thin layers. Called the SlantBox, these "commoditized" printers are mounted in racks and all connected to the cloud for maximum productivity. They have a build volume of 10 × 8 × 9 in. and precision of 100 to 300 microns. They are designed to run continuously with much greater reliability than standard 3D printers. "We design them to be assembled and implemented quickly, but also rigid and tough enough to produce 95% good parts," Bentz says. By addressing typical 3D manufacturing defects stemming from bed inconsistency or nonuniform extrusion rates, Bentz claims his production is more consistent from part to part and throughout an individual part than is commonly found in the market. ►

Brabender® CWB

...where quality is measured.

Quality Laboratory Extrusion

Intelli-Torque
Plasti-Corder

MetaTorque
Plasti-Corder

20mm TSE
Stand Alone

NPE2018
PRODUCED BY SPI

These instruments and *MORE* will be on display in Booth #W1802

ADVANTAGES:

- Small sample sizes means that several extrusion runs can be performed in a day
- Clamshell barrels and segmented screws make these units customizable to meet your testing needs
- Requires only a small laboratory footprint
- Single-screw and twin-screw extrusion systems available

201-343-8425
www.cwbrabender.com
chemicalsales@cwbrabender.com

What's more, he notes, his printers are fully automated so they can operate 24/7 without human intervention. "We have no need of robotic systems, because our printers remove the parts themselves (free dropped into bins) and are still lower cost to produce than most desktop 3D printer kits." Bentz expects to begin marketing the SlantBox to others in the near future, at an anticipated price of $1000 to $1500.

Slant 3D's primary material is PLA, though it also uses ABS and TPU to a lesser extent. Twelve colors are offered at present. His clients include robotics companies, architecture firms, and numerous companies looking for promotional items and prototypes in substantial volumes.

GOING AFTER INJECTION MOLDING

According to Bentz, price isn't the only reason to consider 3D printing. "Traditional manufacturing techniques," he says, "require high up-front expenses for tooling and long-term, high-volume production of a component to amortize those initial expenses. But if there is a mistake in the product, or the market changes, so that the product must be modified, companies may lose the entire investment in molds and tooling. This high risk also makes entry into high-volume production challenging for small or new businesses.

"3D printing allows an idea to go from conception to manufacture quickly and much more affordably. There are no tooling costs or lead time. A company wishing to produce a product need only design it and then pay for the raw materials used to produce it. 3D printing puts physical products on equal footing with software products in production costs. Printing allows products to be produced at very low cost and constantly updated with no large capital expenditures."

All that's necessary is to email Slant 3D a design file, and it can be put into production with little delay. However, Slant 3D also offers design services help get new products ready for production. Slant can do design consultation to judge printability and works with clients to tweak existing designs for optimum printability.

Slant 3D can produce anything from promotional items to small mechanical components at prices competitive with injection molding in volumes up to 20,000 parts.

3D printing can make "impossible" parts like these gear shafts with a metal bearing inside. The gear, toothed pulley, and shaft are one plastic part that was built around the bearing instead of manufactured separately.

Bentz concedes that surface smoothness is one area in which injection molding has an advantage over most 3D printing. Because 3D printed parts are typically produced in a sequence of layers, they can be weaker in the Z-direction than injection molded parts. However, Slant 3D has produced some structural parts. The key, Bentz notes, is that such parts must be designed specifically for 3D printing, not simply converted from an injection molded design.

He adds that 3D printing has advantages for making so-called "impossible" parts. An example is the gear shafts shown in the photo above. They are built around a metal bearing, making the entire assembly effectively a single part. Injection molded parts for this assembly would have to be designed to interlock and pull apart so that a bearing could be inserted. In this case, what is now manufactured as a single assembly would have to be split into the gear, toothed pulley, shaft, and metal bearing, all of which would be manufactured separately and then assembled together.

"3D printing puts physical products on equal footing with software products in production costs. They can be constantly updated with no large capital expenditures."

But since this part was 3D printed, the gear, pulley, and shaft were combined into a single part. During production, the build would pause to insert the metal bearing. Then the build would continue and the part would be built around the bearing. 3D printing reduced four parts to two. Manufacturing cost was dramatically reduced because there was no assembly and none of the tooling that would have been required for the three plastic parts combined with the bearing. Slant 3D is using this approach to develop a "fidget spinner" with an internal bearing.

Bentz will give a talk on 3D printing at *Plastics Technology*'s Molding 2018 Conference, Feb. 27-Mar. 1 in Long Beach, Calif. A representative of Voodoo Manufacturing will also speak there. Details and registration are at ***moldingconference.com***.

The world of ENGEL

Efficient. Reliable. Innovative.

As the world market leader, we offer our customers integrated system solutions. This means: injection molding technology from a single source. Machine, mold project engineering, automation, process, training and service are all perfectly integrated with ENGEL. And we always look to the future. Innovation and technology leadership offer our customers a decisive competitive advantage. **be the first.**

See what's new at **ENGEL booth W3303**

NPE 2018
May 7-11, 2018
Orlando | Florida

ENGEL
be the first

www.engelglobal.com

Switching Hydraulic Oil Saves Energy & Machine Downtime

Test at leading molder shows a high-viscosity, zinc-free oil improves pump efficiency and runs longer, cleaner, and quieter.

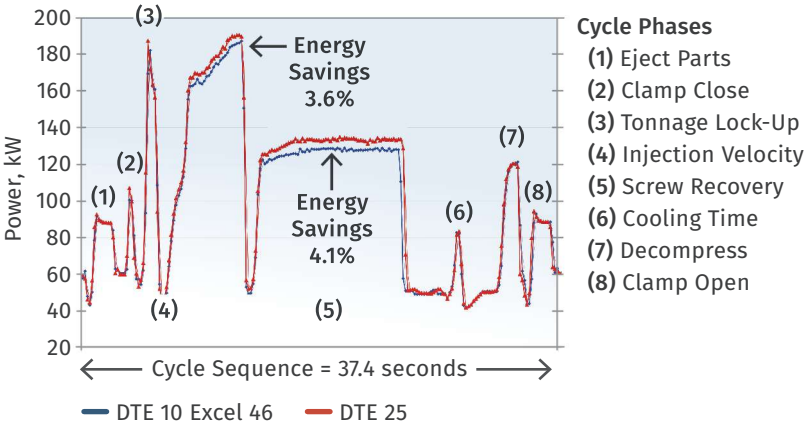
This 300-ton 1996 toggle press was tested with the new oil in an environmentally controlled lab where the machine's power factor is isolated from that of other equipment.

By Matt Naitove
Executive Editor

Injection molders and other plastics processors may think of hydraulic oil (when they think of it at all) as a necessary evil rather than a resource for improving their manufacturing efficiency. Perhaps they should think again. Experience at one prominent molder indicates that a premium shear-stable, high-viscosity-index (VI) hydraulic oil can be well worth the additional cost in energy savings and reduced downtime for oil changes and valve maintenance. And it can make machines run quieter, to boot.

Injection Molding Cycle

2.2% Continuous Operation Energy Savings



Cycle Phases
(1) Eject Parts
(2) Clamp Close
(3) Tonnage Lock-Up
(4) Injection Velocity
(5) Screw Recovery
(6) Cooling Time
(7) Decompress
(8) Clamp Open

Comparison of high-efficiency Mobil DTE-10 Excel hydraulic oil with Mobil DTE-20 series oil, showing energy savings during mold filling and screw recovery.

A NEW WAY TO SAVE ENERGY

Mobil DTE 10 Excel is a family of premium hydraulic oils that has been used for over 10 years in high-load applications such as large foundry presses and off-highway vehicles. However, 2017 marked its debut as a certified source of energy savings, having been tested at eight U.S. injection molders and one metalworking machine shop).

According to Michelle Ruiz, field engineer for ExxonMobil Fuels & Lubricants, Spring, Tex., Mobil DTE 10 Excel is a zinc-free, highly refined mineral oil with a low traction coefficient and shear-stable, high VI that allows it to run cooler and more efficiently than standard hydraulic fluids. It is formulated to provide both reduced internal friction among the oil molecules and less variation in viscosity with temperature. In other words, it flows easier at lower temperatures, such as at machine startup, and "thins out" less at elevated temperatures, as when the oil warms up during continued press operation. She adds, "It is designed for a balance of mechanical efficiency—maximum pump rotations from energy input—and volumetric efficiency—maximum fluid transferred from energy input—which tend to counteract each other but can be balanced by reducing internal leakage. That translates into up to 6% greater pump efficiency, in controlled bench testing with a typical vane pump, than with ExxonMobil's Mobil DTE 20 series oils.

Ruiz notes that Mobil DTE 10 Excel is also designed for long oil- and filter-change intervals, to keep systems running clean up to three times longer than conventional mineral-based oils.

TESTING AT MOLDERS

EVCO Plastics, DeForest, Wis., is a $150 million custom injection molder with over 1200 employees and 170 machines at nine plants in the U.S., Mexico, and China. It has pursued energy-saving projects such as more efficient LED lighting and a new air-handling system. The company has even considered solar panels. As explained by Bernie Degenhardt, automation and maintenance manager, discussions with EVCO president Dale Evans raised the question of why the firm couldn't look for savings at the most basic level of its operations, such as the hydraulic oil that powers most of its machines. ►

RiverdaleGlobal®
Changing the way you think about color

Our revolutionary business model, **Global**Local™, has global reach with local satellite supply and service.

100% Color Used

- Riverdale Global HQ Single Source Pigment Distribution
- Riverdale Global Satellite Facility
- Local Delivery
- Your Facility
- Return For Refill™
- No Landfill

- **Faster Speed from Product to Market**
- Sustainable Savings™
- **Precision Processing**
- Global Supply / Local Service
- **Reduced Warehouse Space**
- Zero Waste

#ComputerizedColor

It's not just automated, it's personal.

NPE2018 THE PLASTICS SHOW

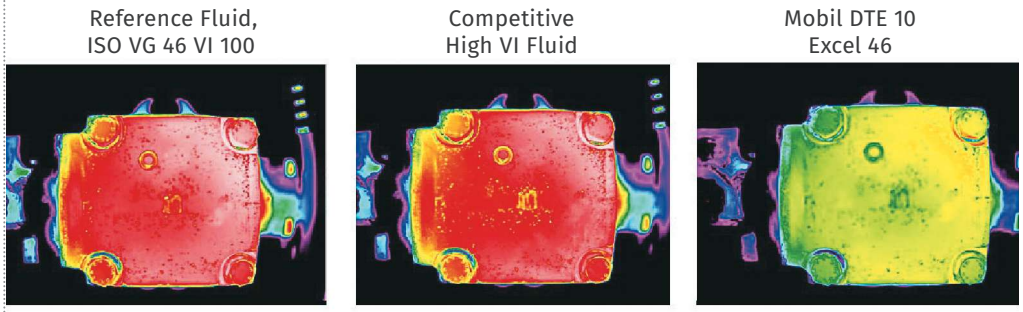
NPE2018: THE PLASTICS SHOW
May 7-11, 2018 | Orlando, Florida USA
NPE.org | **BOOTH: #S22023**

Get In Touch
sales@riverdaleglobal.com
Tel. 610-358-2900
www.riverdaleglobal.com

Partnered With
MAGUIRE®
Intelligent Simplicity

Thermal Imaging Efficiency Demonstration

Simply Hydraulic Circuit without Heat Exchanger (No Cooling)



Thermal images of hydraulic pump with different oils shows greater pump efficiency, and therefore less heat generation, with Mobil DTE 10 series. Pump cooling was turned off for this experiment. "Reference Fluid" is a market standard fluid. "Competitive High VI Fluid" is Mobil DTE 20 series.

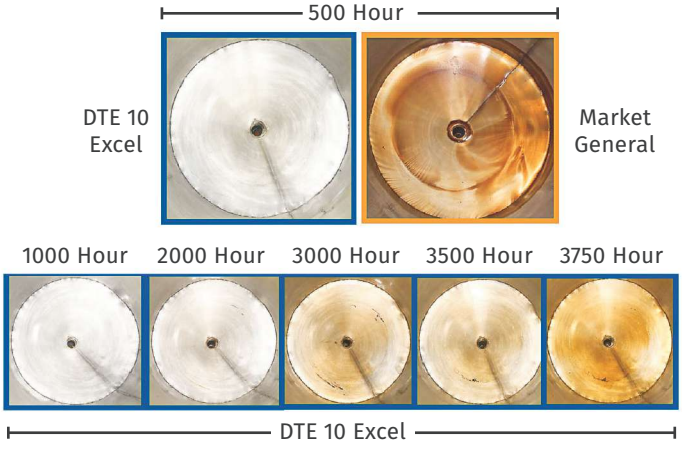
Engineers from EVCO (***evcoplastics.com***) and ExxonMobil (***mobil.com/hydraulics***) worked together on controlled testing at EVCO's Innovation Center at DeForest. "It was an ideal situation for controlled testing," says Ruiz. "The molding test area is environmentally controlled and, most important, the machine's power factor is isolated from other electrical equipment."

The week-long test involved a 1996 Van Dorn injection press with a 300-ton toggle clamp. Polypropylene parts were molded on a 1-min cycle. The test demonstrated a 3.2% reduction in electricity demand on that machine. Also participating in the test were engineers from Focus on Energy, a program of Wisconsin electrical utilities that provides businesses in the state with information, resources, and financial incentives to implement energy-saving projects (***focusonenergy.com***). EVCO has worked with Focus on Energy on previous projects such as its upgrades of lighting and air-handling systems. As a result of the test at EVCO, Mobil DTE 10 Excel is believed to be the first hydraulic oil to qualify as an energy-efficient technology under a statewide incentive program.

Another result of the test is that EVCO plans to use the more efficient hydraulic oil in additional machines. "We're taking it in stages," says Degenhardt, starting with six new tiebarless, servo-hydraulic Engel victory presses of 55 to 130 tons that will be going into a newly expanded medical molding plant in DeForest. Degenhardt is also eager to test the oil in a larger press with a more complex hydraulic system, where the energy savings could be greater. "I really want to get it into the 2000-ton press, which wasn't available for the earlier test." If that trial is also successful, Degenhardt foresees a gradual program of introducing Mobil DTE 10 Excel in more and more of EVCO's machines, starting with the largest tonnage models.

"Ultra Clean"Performance — Mobil DTE 10 Excel 46

Mobil Hydraulic Fluid Durability Test Reservoir



Greatly reduced varnish deposits with zinc-free Mobil DTE 10 series saves costly downtime to clean or change valves. "Market general" oil contains zinc anti-wear additive.

QUICK PAYBACK

One obvious reason why plastics molders haven't adopted this more efficient hydraulic oil sooner is that it costs up to twice as much as standard oils. Part of that additional cost can be defrayed by programs such as Wisconsin's Focus on Energy, which, in Ruiz's experience, has paid 26% to 27% of the incremental cost for energy-saving technologies.

According to Ruiz, prior experience at another injection molder and a metalworking plant showed payback in 18 to 24 months from energy savings alone.

Both Ruiz and Degenhardt agree that molders have to look at much more than energy savings to justify switching to a premium hydraulic oil. "Varnish buildup on valves is a big problem," notes ►

QUESTIONS ABOUT INJECTION MOLDING?

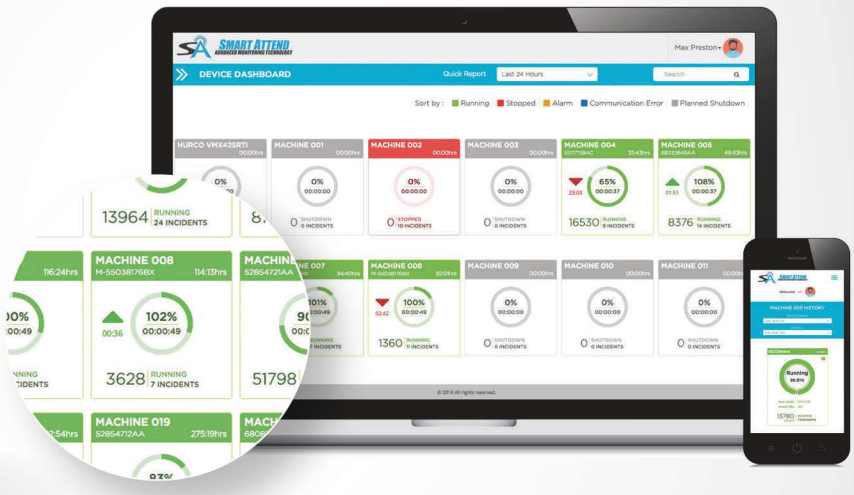
Learn more at PTonline.com

Visit the Injection Molding Zone.

SMART ATTEND
ADVANCED MONITORING TECHNOLOGY

Experience the award winning solution to

DRIVING PROFITABILITY



On average, productivity gains from real-time monitoring information can be as much as 10 – 15% per machine.

Real Time Monitoring provides the unmatched advantage of making key decisions faster and smarter than ever before. Generating instant, accurate reports, and viewing your performance from anywhere around the world can help quickly identify inefficiencies throughout the workplace.

info@smartattend.com

WWW. SMART ATTEND .COM

(866) 210 - 9630

Trend to More Efficient Hydraulic Oils

ExxonMobil's Ruiz says there has been an industry-wide trend toward improving the energy efficiency of hydraulic oils. Other evidence of that trend that has appeared in *Plastics Technology* includes these articles:

- "New Hydraulic Fluid Trims Energy Consumption," a case history of custom injection molder Niigon Technologies, which saved 13.6% in energy use with Tellus EE, a new synthetic oil from Shell Lubricants, Houston. (Keeping Up, Nov. '09)

- "Oil Additive Helps Hydraulic Presses Save Energy," about a new Dynavis oil additive from Evonik, Parsippany, N.J., that improves the viscosity index of hydraulic oils. It has been licensed to a number of oil suppliers and has been tested in Engel and Boy machines, yielding energy savings of 6% to 10%. (Starting Up, Feb. '17)

Degenhardt. Not only does that require downtime to remove and clean or replace dirty valves, but a much more concerning factor is that while varnish is accumulating on the valves, the machine's performance is gradually drifting, affecting quality and cycle time.

Degenhardt also credits the substantial advantage of up to three times longer periods between oil and filter changes promised by Mobil DTE 10 Excel. That again saves costs of downtime and disposal of waste oil. Ruiz says typical hydraulic oils used in molding machines contain zinc as an anti-wear additive. But zinc is responsible for sludge and varnish accumulation as the oil ages in use. Mobil DTE 10 Excel is zinc-free.

Three times longer between oil changes and greatly reduced varnish deposits on valves help pay for a premium hydraulic fluid.

And there's one other, quite unexpected, benefit from changing to the new oil: "When I entered the lab, I couldn't hear the machine. I had to ask, 'Is this thing running?' It was so quiet." Ruiz explains that Mobil DTE 10 Excel contains air-release additives that prevent micro-cavitation, which accounts for noise in operating hydraulic systems.

BANDERA
EXTRUSION INTELLIGENCE®

USA CONTACT: Mr Ajay Beniwal
beniwal@extru-techsolutions.com
Mobile: +1-647-687-0859

luigibandera.com

MATERIALS

PART 1

A Processor's Most Important Job

Many processors don't realize that preserving material characteristics is crucial to product success and failure. The focus here is on molecular weight.

By Mike Sepe

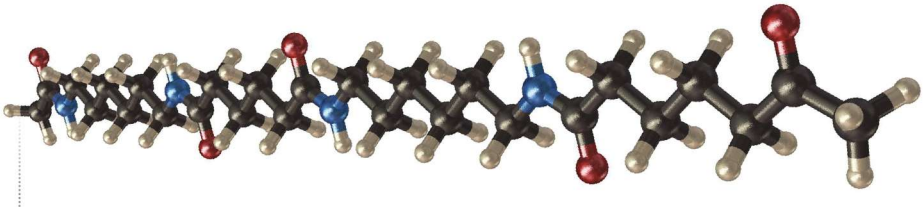
When I ask processors about their most important responsibility, the answers usually focus on factors relating to productivity. These typically include some conversation about cycle time, machine utilization, making parts to print, maintaining process capability indices (C_{pk}) of 1.33 or greater, etc. It is rare to hear any mention of molecular weight, crystallinity, preservation of additives, or minimizing molded-in stress. While these factors are the foundation for the success or failure of a product, processors often do not appreciate their own role in controlling them. But if these characteristics are not given the proper attention, then all the aspects associated with productivity matter very little.

The first material characteristic we will address here is molecular weight. It has been recognized for almost 100 years that the unique characteristics exhibited by polymers are due to the large size of the molecules and their extended-chain configuration. This combination of characteristics gives rise to something called chain entanglement. It is the foundation of mechanical performance. Short-term properties such as impact resistance are particularly sensitive to changes in molecular weight. But long-term properties such as fatigue resistance and environmental stress-crack resistance are also closely correlated with the length of the chains that make up the material.

The manufacturers of plastics raw materials pay close attention to the molecular weight of the products they produce, and they capture this with a measurement of properties such as melt flow rate and intrinsic viscosity. It is then up to the processor converting the raw material to a molded article to preserve that molecular weight. This does not happen automatically. The elevated temperatures associated with melt processing, combined with the time that the material spends in the barrel, can have a significant effect on the molecular weight of the compound. The higher the melt temperature and the longer the barrel residence time, the greater the chances are that the molecular weight of the polymer will be negatively affected. The response in most materials is a process called chain scission, where the length of the chain is shortened by the thermal stress of processing.

Not a week goes by when I do not work on a failed product where polymer degradation is at least a factor.

In addition to the dual influences of time and temperature, the processing of some materials involves the potential hazard of degradation due to the presence of excess moisture in the material at the time of processing, a process known as hydrolysis. Condensation polymers such as polyesters, polycarbonate, nylon, and polyurethane are particularly susceptible to this problem. Drying these materials down to a moisture content that prevents hydrolysis is essential. Proper control over melt temperature, residence time, and—where appropriate—moisture content ensures that the molecular weight of the polymer will be properly maintained as the material undergoes conversion from pellets to parts. ►



Preserving the molecular weight of a polymer—in this case, nylon—through appropriate processing conditions is a primary responsibility of the molder or extruder. The problem is that technology for assessing the molecular weight of processed materials is not often found in a typical molding plant. (Image: Malvern Instruments)

KNOW HOW MATERIALS

Learn more at PTonline.com

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

The perfect blend. Every time.

Standardize/Customize.

The Plastrac dynamic.

We believe in rewarding customers with the best of both worlds: a highly standardized, modularized product line that enables lower cost through mass production and inventorying of readily available mechanical and electronic parts. And a product line that can be easily adapted and expanded to tailor to each processor's needs. There is no contradiction here. Just a well-thought-out business strategy that delivers overall value and highly specific performance results.

Attracting Trouble.

Inlet magnets=damage control.

It is not always easy or possible to second guess what Murphy's Law will throw your way out on the shop floor. But Plastrac has one excellent catch-all solution for averting damage caused by ferrous "tramp" material in the form of nuts, bolts, broken granulator knives, and other debris. Our inlet tube magnet option eliminates the need for a separate magnet box. These powerful rare earth units install in seconds, clip directly to either a 1.5" or 2" inlet tube, prevent potential damage, and enable you to reduce overall height requirements.

Blender Maintenance 101:

Always have Right Tools on Hand.

Keeping customers up and running is a specialty of ours. We know that when down time happens, short cuts get taken and fasteners often get stripped or worse. To speed up and simplify maintenance (both urgent and routine), Plastrac developed a complete tool kit containing every type of tool required for fast dis- and re-assembly of our equipment. Having the kit always handy ensures that customers can easily address issues whenever they arise, stay up and running, and keep our equipment in tip-top shape.

MADE IN U.S.A.

NPE2018

Visit us in
WEST HALL 2
BOOTH #W129

plastrac

610-356-3000 • Plastrac.com

While this sounds simple, not a week goes by when I do not work on a failed product where polymer degradation is at least a factor. Part of the problem is that product made of degraded material can often look just as good, can be made at the same cycle time, and, when critical dimensions are measured, the parts are to print. Unless some type of mechanical performance test is performed by the processor, changes in molecular weight will go unnoticed until something fails after the product has moved farther down the supply chain. In a worst-case scenario, the part is in use by the final customer when it fails. Typically, the observed response is a brittle failure under stresses that are consistent with normal use.

In a proper failure analysis on anything made of a polymer, a molecular-weight determination should be performed, and ideally this result should be compared with that of the raw material used to make the part. If this test reveals that the molecular weight has been reduced to an excessive degree, the process parameters should immediately become the focus of the investigation. In some instances, it is necessary to demonstrate to the processor that orchestrated changes in the process variables mentioned above can turn the molecular-weight problem on and off. When these experiments are performed, the results are often surprising because they reveal an interaction between these process conditions.

Recently we performed such an exercise on a highly glass-fiber-reinforced nylon 66. A failed part returned from the field exhibited excessive reduction in average molecular weight. A review of product that had not yet been assembled showed that the problem was greater than just an errant start-up part; the molecular weight of the product varied widely from marginal to considerably worse than what had been returned from the field.

In response, we conducted a relatively simple experiment: We molded parts at two different melt temperatures, 525 F (274 C) and 575 F (302 C); both are within the limits of the suggested processing conditions. At each of these temperatures we produced parts from material that was above the maximum recommended moisture content, material that was dried to just below that upper limit, and material that was dried to a level considerably below the upper limit, what some in the industry might refer to as "overdried."

At the lower melt temperature, parts with a good retention of average molecular weight were produced from all three moisture levels. Even the wet material yielded parts with no excessive reduction in molecular weight and there was no evidence of the cosmetic defects that are often associated with incompletely dried material. However, at the higher melt temperature, only the very dry material gave acceptable results. The material dried to a marginally "safe" level produced parts that exhibited a slightly higher-than-recommended change in molecular weight, while the wet material produced the type of change that had been observed in the field failure.

Once again, all parts had an acceptable appearance. Dimensional checks across all the experimental groups showed no statistically significant variations. Even some of the mechanical tests showed a negligible change in performance. However, when tests were performed that involved an impact loading, the problems with the parts molded from the degraded material became more evident.

Having been through an event such as this changes a processor's focus—or at least it should. New attention is given to the process conditions and there is a heightened awareness that good parts cannot simply be defined by appearance and dimensional compliance. The condition of the material from which the parts are made is important, though it cannot always be verified with the techniques that are typically employed in a molding facility.

In many instances, there is outright denial that the decisions made on the molding floor can influence the integrity of the polymer at a molecular level.

For processors who have never made the connection between their process conditions and the health of the polymer in the molded part, their role in that outcome remains a mystery. In many instances, there is outright denial that the decisions made on the molding floor can influence the integrity of the polymer at a molecular level. This is despite the fact that we have known about the relationship between molecular weight and plastics performance for almost 100 years.

Molecular weight is just one of the material characteristics influenced by the process conditions. Next time we will look at another one: crystallinity.

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*.

EXTRUSION | PRINTING | CONVERTING

3X FASTER
Changeovers!

VAREX

The intelligent blown film line with TURBOCLEAN.

Experience "Passion for Innovation"

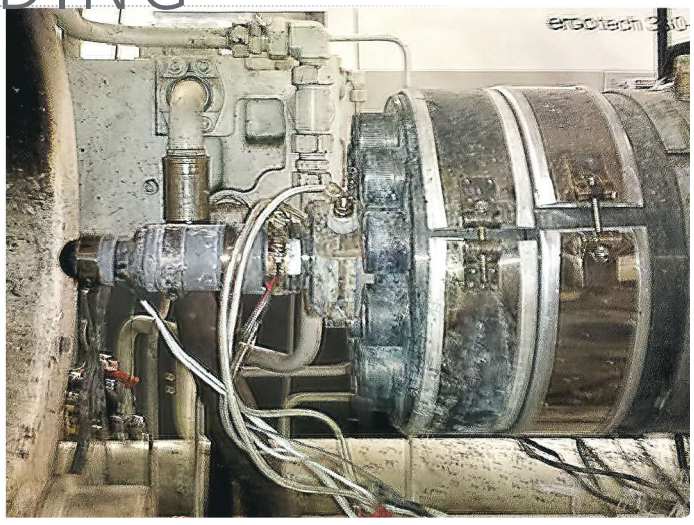
WINDMOELLER & HOELSCHER CORPORATION
Lincoln, Rhode Island 02865-4252
Phone 800-854-8702
info@whcorp.com · www.whcorp.com

WINDMÖLLER & HÖLSCHER
PASSION FOR INNOVATION

INJECTION MOLDING

Nozzle Heaters & Thermocouples: A Case of Wiring Done Wrong

Incorrect placement of wires for these components frustrates molders and costs them money to boot.



This shows the wires that supply power and temperature control to the nozzle body and tip. Note the wires are dangling at the bottom of the nozzle body and tip.

By John Bozzelli

If you work with injection molding machines making parts all day long, what would you like to see redone to make them better or easier to use? My list is long. Molding machines are complex and each of us has our preferences. In my evaluations, I have nearly 100 criteria to review and evaluate before purchase. Far too many to discuss, so let's keep it simple and consider just one. At first glance, this issue seems trivial, but it often sends me into a rage.

I'm talking about the placement of the wires for the thermocouple and heater bands. These wires supply power and temperature control for the nozzle body and tip. Why does the placement set me off? It is not a complex issue, but in my observation, they are misplaced 98% of the time. Not only do I consider the standard placement dangerous, but it also causes downtime, wastes processors' time, builds frustration, and costs molding shops big money.

My bet is that this trivial item costs each molding plant $100,000 a year, perhaps double that. Further, this dollar value does not address the frustration and safety issues that hamper the efficiency of every processor and scheduler in your shop. This is a consistent and significant problem in the industry, and yet it gets little attention. It starts with the machine builder and gets worse after use in the plant. We are talking about a problem that would save hundreds of thousands of dollars and a few injuries for little to no cost, if done correctly when building the machine. The accompanying photos show the problem.

The photo above shows the wires that supply power and temperature control to the nozzle body and tip. Note that the wires are dangling below the nozzle body and tip. This may seem OK to a non-user. However, there is the force of gravity, and if you couple it with what has to happen in this area of the molding machine, you begin to see the bigger picture. A short list of normal production routines done in this area, and this does not include common nozzle leaks, include:

1. Changing colors;
2. Changing resins;
3. Changing molds;
4. Purging;
5. Opening a plugged or frozen nozzle tip;
6. Changing a nozzle tip;
7. Removing a stuck sprue;
8. Checking the match between nozzle-tip radius and orifice to those of the mold's sprue bushing;
9. Checking melt temperature;
10. Checking nozzle-tip or body temperature;
11. Checking heater bands.

Two major points about all the tasks done in this area of the machine: First, processors deal with this area of the press almost anytime the machine goes down. Second, nearly every time we do any of the above routines—or when there is a leak in the nozzle-body assembly or junction of the nozzle tip and sprue bushing—molten plastic ►

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

During normal production, gravity will pull hot plastic down, where it will build until it completely covers the wires, making them impossible to clean. (Photo-right: Bill Hartwick, Filter Specialties Co. & Enersavecontrols Inc.)

comes out and gravity works to allow the plastic to cover the wires. The results are evident in the photos above.

When this happens, there is no easy way to clean the molten plastic off the wires. The electrical wires have 120 V or 220 V on them, so most processors just leave them alone and hope they don't break or short out during their shift. If you are thinking about turning off the power and cleaning things up, that would shut the job down, and ***that*** is a no-no.

The norm is to let it ride, and with time, more plastic builds up until a wire breaks or shorts. Then the job ***is*** shut down and maintenance is called to replace all the wires, heater bands, and thermocouples. They cannot be salvaged. Things are often not labeled well, so there are times when the wrong voltage heater band and/or type of thermocouple is installed. Then "Murphy" shows up and more time is wasted as troubleshooting takes on some serious downtime. When finally fixed, the processor turns on the heaters, waits for everything to come back up to temperature, and then spends significant time starting up the process, sampling parts etc., etc., etc.

What does it take for the industry to understand that plastic is subject to gravity? Somebody explain to me why these wires are not in a protective cable (one that can be easily removed for replacement) and are routed ***not down***, but to the non-operator side of the machine to avoid the plastic getting on them in the first place. In addition, everything should have plugs or quick disconnects, as these components are replaced often.

The standard placement of the wires for the thermocouple and heater bands is dangerous, causes downtime, wastes processors time, builds frustration, and costs molders big money.

To add injury to insult, there is accompanying frustration. More than half the time this area has guards, brackets, or some physical barrier that severely restricts access—to the point that the processor or maintenance person needs to be a gymnast to get the work done. This difficulty can and does cause accidents. It's not unusual to get burned, even with the best of protection.

Yes, it is critical to shield this area to prevent molten plastic at 20,000 psi (1500 bar) or higher from harming those in the vicinity. Safety first, no question, but some machine builders do provide an easy-to-use mechanism whereby the shield slides, lifts, or folds so that it is easy to move it out of the way for work to be done safely. This "room to work" issue is so frustrating. I often wonder if the people who design the machine ever have worked on it. With a little thought, maybe a little extra time in putting it together, there would be less machine downtime and lower maintenance costs, along with fewer injuries and stressed-out processors. 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*.


Raise your expectations
Touch the color
#touchthecolor
www.touchthecolor.com

TOOLING

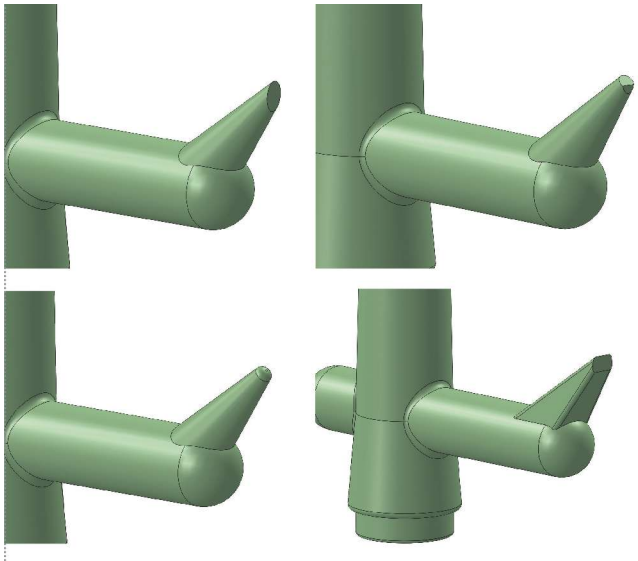
PART 1 Tunnel Gates for Mold Designers

Of all the gate types, tunnel gates are the most misunderstood. Here's what you need to know to choose the best design for your application.

By Jim Fattori

There are many different types of cold-runner gates used to fill the cavities in a two-plate mold. Here I will be focusing on just one type—the tunnel gate—because of all the gate types, tunnel gates are the most misunderstood.

An angled, conically shaped tunnel gate, also known as a subgate or submarine gate, is one of the best—and worst—types of gating methods. One of the reasons it's the best is because a tunnel gate automatically separates or degates from the part when either the mold opens or when the parts and runner are ejected. This reduces labor—often from the equivalent of one operator down to just a quarter of an operator. And those savings add up fast. Another advantageous feature is their ability to be machined at almost any angle. This is very convenient when you want to gate into a location that would be inaccessible with other gate types, such as in the thickest section of the part.



The four most common types of tunnel gate designs are (r-l) eliptical gate, D-gate, ball-gate and chisel gate.

There are various types of tunnel-gate designs. The four most common are:

- Full conical gate, which leaves an elliptical gate mark;
- Truncated cone or D-gate, which leaves a "D"-shaped gate mark;
- Spherical or ball-nosed gate, which leaves a perfectly round gate mark;
- Chisel gate, also called a flare gate, which leaves a rectangular gate mark.

Avoid tunnel gating into a part that has a large taper.

All four have a knife-edge section of steel on the side nearest the parting line. That's the edge that does the shearing. But the D-gate and ball-gate also have a knife edge on the opposing side. Those edges can wear out quickly during injection, especially if the material is filled or abrasive.

Tunnel gates have a bad reputation for freezing off too early, not being able to fill or pack out a part, or generating excessive shear. Those reported problems are almost always due to the tunnel gate being undersized. It's common practice to make the depth of a standard edge gate 60% to 70% of the part's wall thickness, and the width of the edge gate is typically twice the depth. The width affects the length of material flow, while the depth affects the ability to pack out the parts.

Let's say you have a part with 0.080-in. wall thickness. You might design an edge gate that is 0.050 in. deep × 0.100 in. wide. The flow area for this gate is therefore 0.0050 in.^{2}. If you wanted to use a tunnel gate instead, you would probably use the same 0.050 in. as the "diameter," because you assume that the same rule of thumb as an edge gate applies: 60% to 70% of the wall thickness. And that's where the error occurs.

For these two gate styles to have an equivalent flow area, you have to do the math. The flow area of an elliptical tunnel gate is equal to:

(Pi × Height)/2 × Width/2, or
(Pi × Height × Width)/4

If the tunnel gate in this example were on a 45° angle, the height (major diameter) of the ellipse would be 0.096 in. and the width (minor diameter minus the size the tool maker measures with a gage pin), would be 0.067 in.—not 0.050 in. If you used the 0.050-in.

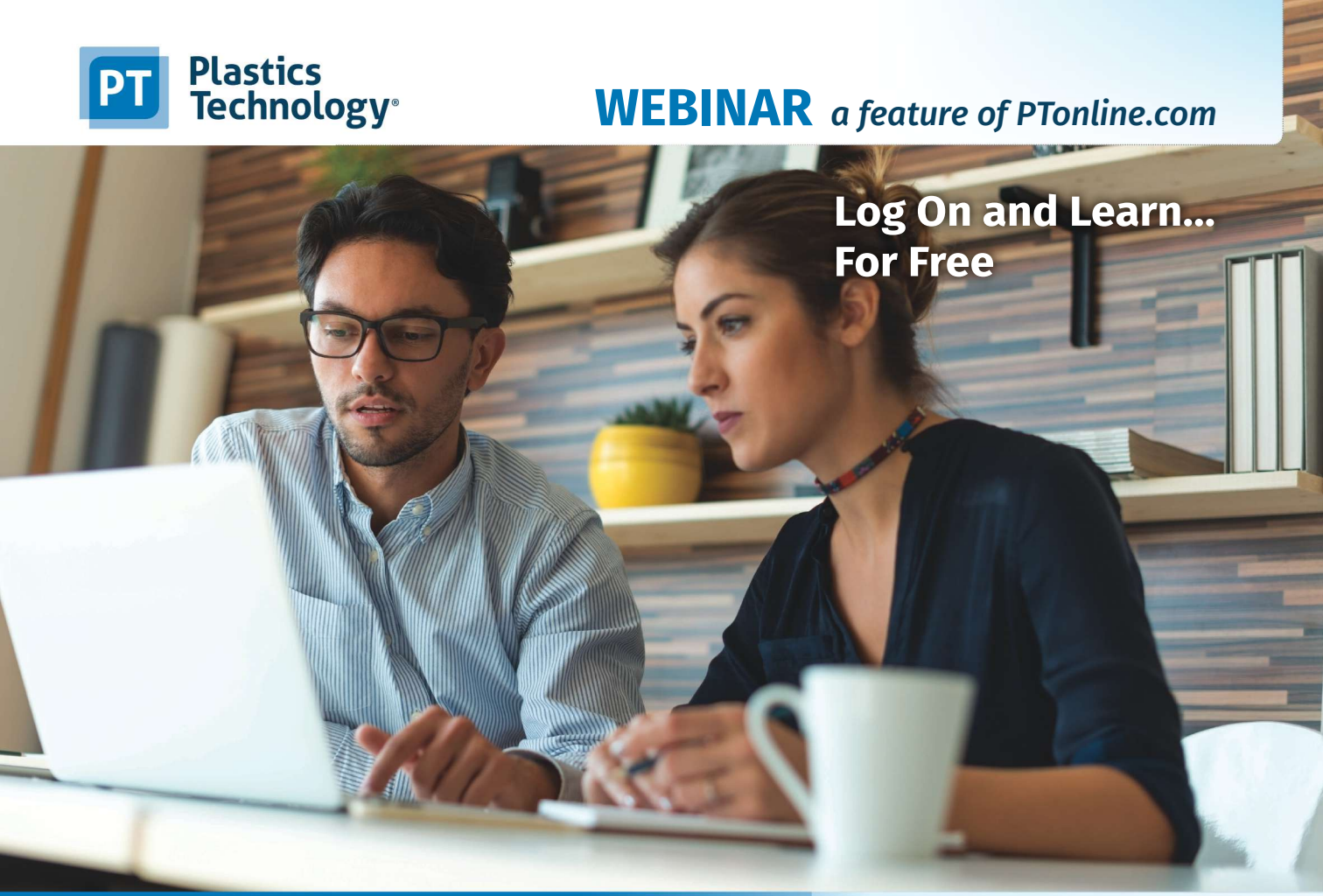
KNOW HOW TOOLING

Learn more at PTonline.com

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

Plastics Technology®

WEBINAR *a feature of PTonline.com*



Wednesday, January 31st

2:00 PM ET

Register for this webinar at:
short.ptonline.com/Snvntv0131

Processing With Synflow®:
A Guide to Using Advanced Pin Control Technology to Improve Part Quality

Learn how to use advanced pin control technology to improve part quality with Synflow® - which is now available through a simple, upgradable solution.

Your systems can now come standard equipped (at no cost) with the ability to upgrade to pin control technologies, installed only if you find during tryout that your process requires them. No more spending up front on expensive technology you may never need or use.

PRIMARY TOPICS:

- Process Theory Overview
- Solving Defects with Synflow®

PRESENTER

Bill Rousseau
Director, Applications and Technical Services

Synventive® molding solutions
A business of BARNES GROUP INC

Bill Rousseau is director of applications and technical services at Synventive Molding Solutions, a business of Barnes Group Inc. He has a Master's Degree in Plastics Engineering from the University of Massachusetts—Lowell and over 20 years' experience in the plastics industry, most of them dedicated to hot-runner technology. He has held several positions with Synventive, including engineering manager and chief engineer.

"diameter," the flow area would only be 0.0028 in.², almost half of the presumed "equivalent" edge gate. The interesting thing is that when these two gate types are designed with equivalent flow areas, the edge gate is the one that has less of a chance to pack out the parts, because it is shallower.

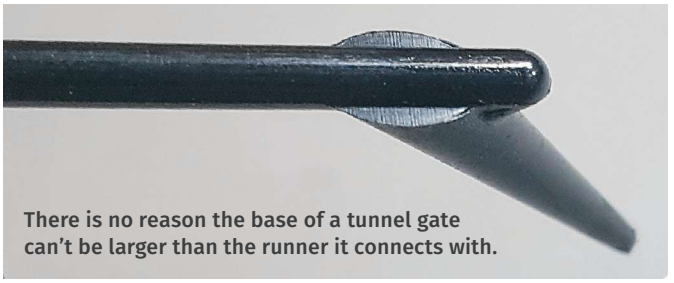
Some people think tunnel-gate orifices should be kept as small as possible so as not to increase the gate-seal time. That's nonsense. Would you make an edge gate as small as possible for the same reason? What does it matter if the gate-seal time has to be increased? The parts are still solidifying, so the time required to cool the parts doesn't change. The worst-case scenario is you have get the screw back a little faster to maintain the cycle time.

Using a separate gate insert for short tunnel gates is always a good idea.

Other people think the base of a tunnel gate should never be larger than the diameter or width of the runner. That's just total nonsense and should not even be considered when designing a mold. I have seen dozens and dozens of molds where the base of the tunnel gate was considerably larger than the runner—and they worked great. In fact, I often prefer a tunnel gate larger than the runner. There's a larger mass that stays hotter longer and is more flexible. The material flow is less restrictive. And such gates are less prone to sticking in their bore.

Tunnel gates also get a bad reputation for leaving a high gate vestige, especially when the size of the gate is large. That's partly nonsense. While the size of the gate usually affects the size of the vestige, the predominant controlling factor on how "clean" or how high a vestige you get is based on the angle of the wall it's gated into. Tunnel gates typically don't break away from the part. They are sheared off. The edge of the hole in the steel that is closest to the parting line does the shearing. There are exceptions to this rule, such as if the material is highly flexible, the mold design has some flaws, or if there is some type of two-stage ejection system.

Using the previous example, if the tunnel gate was gated into a part with 4° of taper on the side, you can expect to get a gate-vestige height of 0.007 in. Draft



There is no reason the base of a tunnel gate can't be larger than the runner it connects with.

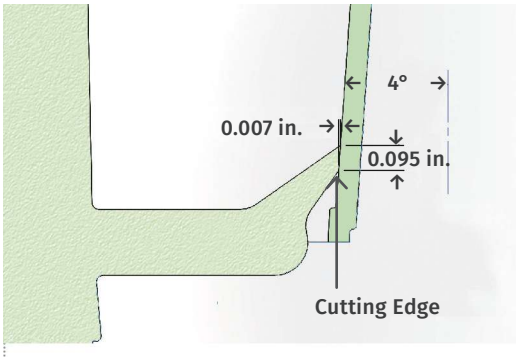
angles are more commonly down around 1°, which would make the vestige height just 0.001 in. Where you get into trouble is when you gate into a part with a large taper, or almost any radius. In these cases, the gate-vestige height can be fairly large. As the gate wears and needs to be sharpened, the size of the vestige gets even higher. Always try to avoid tunnel gating into a part that has a large taper, or into a radius.

The length of a tunnel gate can be very short or very long. Shorter tunnel gates can often be machined at shallow angles, whereas longer tunnel gates require larger angles for easier removal. Keep in mind, longer gates start out farther away from the cavity, which makes for a stronger mold. Gates that have a shallow angle have to be machined close to the cavity wall. Since the injection pressure at the gate is extremely high, it is often the first place to flash. Using a separate gate insert for short tunnel gates is always a good idea. It will save you from having to do a lot of welding down the road.

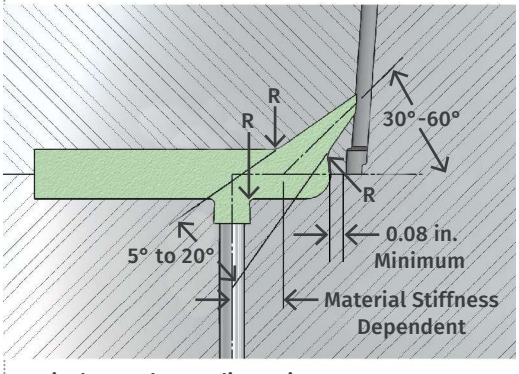
Tunnel gates also get a bad rap for being the cause of "jetting." That's usually nonsense. No matter what type of gate you have—edge, tunnel, cashew, fan, pinpoint, even hot-runner—unless the material is crawling into the cavity, they all jet to some degree until they hit an obstruction. The most common obstruction is the wall opposite the gate.

A small gate does increase the chance of jetting. And because tunnel gates are frequently undersized, a 0.030-in. gate will jet more into a 0.100-in.-wide cavity than a 0.060-in. gate will. There's more room for the small stream of material flowing through the gate to snake around between the cavity walls. The distance between the gate and the first obstruction usually determines whether you are going to jet or not.

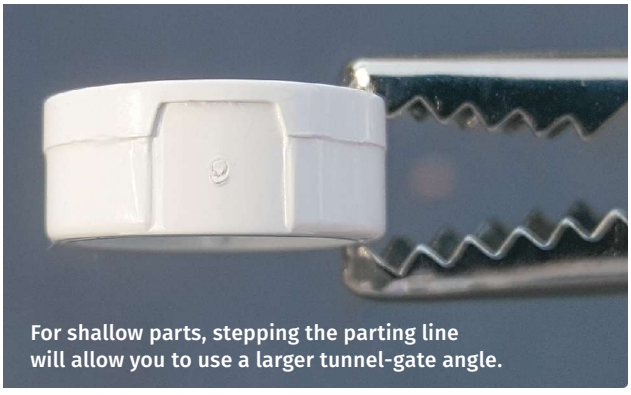
The reason I say tunnel-gate jetting is usually nonsense is because it depends on the angle of the tunnel gate. The angle of a tunnel gate's center line usually ranges from 30° to 50° from the parting line, but I've seen that angle as low as 20° and as high as 60°. The higher the angle, the



The height of a tunnel-gate vestige is predominantly a function of the angle of the part it is gated into.



Typical tunnel-gate dimensions.



For shallow parts, stepping the parting line will allow you to use a larger tunnel-gate angle.

greater the chance of jetting. Instead of the material slamming into the opposing core right away, it's shooting up into the open void. But material type, injection velocity, mold temperature, and a dozen other factors contribute to a jetting problem—not just the gate type. In fact, I've seen a giant edge gate as large as ¾ in. wide by ¼ in. deep, jet into a wide-open cavity. As the tool designer, think about the potential for jetting and what you can change to minimize the risk. Sometimes you have to compromise between a large angle that may cause jetting, and a shallow angle that weakens the mold.

Plan on things going wrong, and have an option in mind to overcome the problem in case it does.

Regardless of the length, angle, or type of tunnel gate you chose, the bore must be polished—in draw. The exception to this rule is if the material is soft or elastomeric. Those materials release better with a matte finish. I also recommend all tunnel gates be machined by EDM, especially in multi-cavity molds. Since tunnel gates are often used on small parts, the gates are usually small. If the orifice size of the gates are not within 0.001 or 0.002 in. of each other, the part dimensions could vary.

In this business, it's always helpful to think in terms of percentages. Let's say one gate has a 0.030-in. diam., and another gate has 0.027-in. diam. That tiny 0.003 in. just choked off over 20% of the flow area. That particular cavity may have sink or voids because the gate froze off too early—all because of the thickness of a sheet of paper.

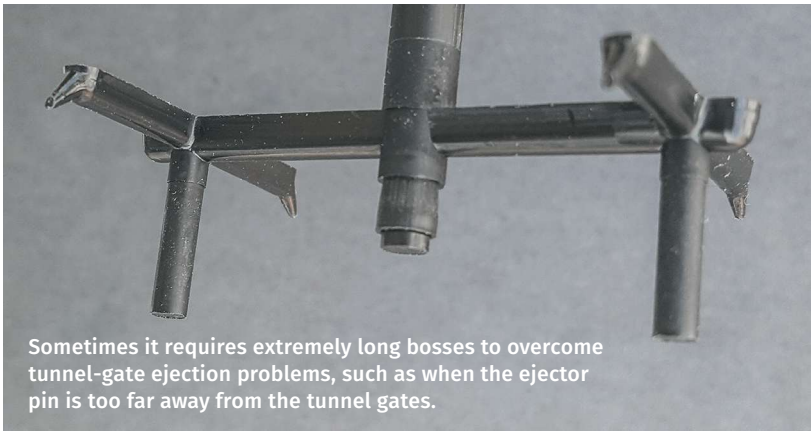
D-gates and chisel gates are much better than elliptical gates for gating into shallow parts. While I don't recommend it, a chisel gate can also be machined to form a type of rectangular D-gate. But if you have concerns about the shallow angle required to gate into a shallow part, which can cause the gate to break off, you might be able to shift the parting line at the gate location to allow for a steeper angle.

When a tunnel gate is machined into the stationary side of the mold, some mechanical means is required to pull it out of its bore. Typically, a shortened ejector pin with an undercut or reverse taper is used for two-plate molds, and a sucker pin is used for stripper-plate molds. When the tunnel gate is machined into the moving side of the mold, some mechanical means is also required to pull it out of its bore. Again, a shortened ejector pin is typically used, but without the reverse angle.

Regardless of on which side of the mold the tunnel gate is installed, the distance between the ejector pin and the tunnel gate is critical, as well as the length of the boss formed by the shortened ejector pin. If the pin is too close, the tunnel gate cannot flex. If it's too far away, it flexes excessively. Either condition can cause a problem. Every mold design is different, as is every type of molding material. There are no carved-in-stone rules on where to locate these ejector pins. It all depends on the rigidity of the tunnel gate and runner when the mold begins to open. The more rigid they are, the farther away the ejector pin needs to be.

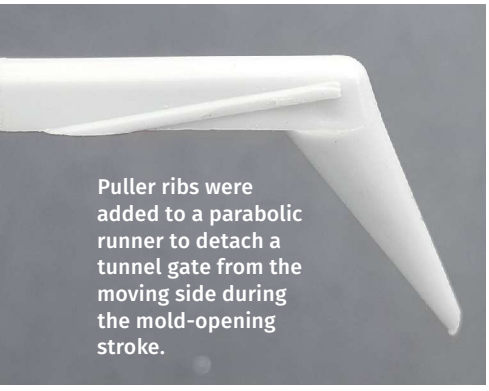
When tunnel gating into the stationary side of the mold, the boss formed by the shortened ejector pin does not have to be very long—typically only about the diameter of the runner. But when tunnel gating into the moving half of the mold, the boss must be at least the same length as the tunnel gate—not the depth of the gate, but its hypotenuse.

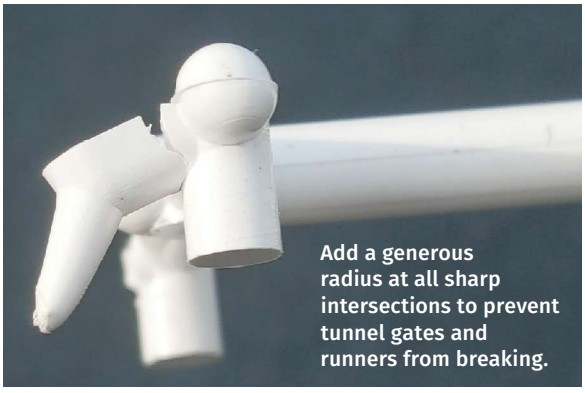
One of the best lessons I was ever taught was to plan on things going wrong, and to have an option in mind to overcome the problem in case it does. When it comes to tunnel gates, rule number one is to leave a lot of bearing surface on the runner ejector pins. If you need to increase the length of the boss, but the pin is relieved, now yous have to install a stationary sleeve.

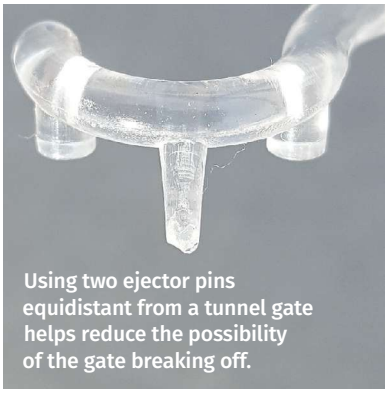


Sometimes it requires extremely long bosses to overcome tunnel-gate ejection problems, such as when the ejector pin is too far away from the tunnel gates.

I once had a mold where I wanted a tunnel gate that was machined into the moving side of the tool to detach from the part during the mold-opening stroke. Instead of incorporating an expen-►

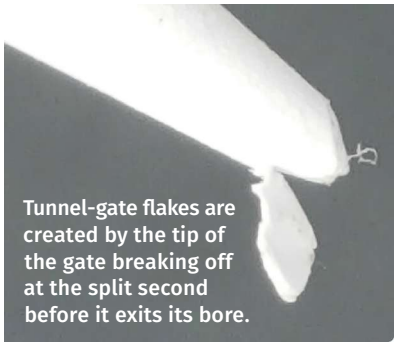

Puller ribs were added to a parabolic runner to detach a tunnel gate from the moving side during the mold-opening stroke.


Add a generous radius at all sharp intersections to prevent tunnel gates and runners from breaking.


Using two ejector pins equidistant from a tunnel gate helps reduce the possibility of the gate breaking off.

sive two-stage ejection system, a parabolic runner was machined into the stationary side of the mold. The end of the runner had undercut or "puller" ribs with a slight angle machined into the side of the runner. As the mold opened, the runner flexed at the same time the ribs pulled the tunnel gate out of its bore. As the mold continued to open, the undercut ribs disengaged from the stationary side. A center sprue puller retained the runner, so that it could be ejected on the moving side when the mold was fully open.

Just like any other type of gate, tunnel gates should be fed from a runner that has an overflow, or cold, well to prevent the gate from becoming blocked or unwanted material from entering the cavity. And just like any other gate, tunnel gates should have generous radii where the gate intersects the runner and where the runner intersects the ejector pin. If the material is brittle, there is a good chance it will break off in one of those two locations. Instead of using one shortened ejector pin per tunnel gate, I like to use two shortened ejector pins mounted equidistant from the gate. It costs a little more, but I have had great success with this design.


Tunnel-gate flakes are created by the tip of the gate breaking off at the split second before it exits its bore.

Now let's discuss gate flaking, or as I call them, mold killers. To repair an injection mold that has been damaged by flaking, you must grind the parting line to remove the hobbed surfaces and refit any shutoffs. But now the overall height of the part is shorter and possibly out of specification. Additionally, the wall thickness at the top of the part is now thinner, which can lead to a "racetrack" or a "back-fill" condition. To eliminate that condition, you must grind off the top of the cores, but you are still left with a shorter part. To get back into specification, you also must machine the cavities deeper and re-polish. Therefore, to correctly repair the damage caused by flaking tunnel gates, you almost have to rebuild the entire mold. That's why I call them mold killers. So how do you prevent flaking?

To correctly repair the damage caused by flaking tunnel gates, you almost have to rebuild the entire mold.

To understand how to prevent flakes, you have to first understand what causes them. The photo below left shows a small flake at the tip of an elliptical tunnel gate. As the tunnel gate is withdrawn from its bore, it flexes. This flexing "spring loads" the tunnel gate, which will try to spring back to its original shape when it's fully out of its bore. The flake is created at the split second before the tunnel gate is withdrawn. The spring force is greater than the strength of a small segment of rigid plastic at the tip of the tunnel gate, which causes it to fracture. Sometimes it's held onto the tunnel gate by a whisker. Sometimes it falls down into the chute. But thanks to that devil, static electricity, it usually adheres to the face of the parting line.

Elliptical tunnel gates are the biggest culprits for flaking, especially if the gate is long and the angle from the parting line is over 45°. That's when the major diameter of the ellipse is the largest and the structural integrity of the tip is the weakest. D-gates are pretty good at not flaking. But chisel gates are the best because they are wide, and their structural integrity is considerably stronger. Chisel gates also leave the least amount of gate vestige because they are the shallowest of any tunnel-gate type—assuming they have equivalent flow areas.

But before you make your selection of the type of tunnel gate to use, check the material supplier's design manual. Some types of materials demand a particular gate, and it may not be one of the four described in this column. 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*.

DROP AND GO

This is no normal machine. This is a Republic Shredder – a shredder you can drop scrap into and walk away. Walk away because your rotor is **guaranteed for life**. Walk away because you trust this machine to handle any bails, oversized parts, boxes, bins or loads of scrap while your operator safely moves on to his next task. Why have someone stand next to a granulator all day? With a bulletproof design made in the USA, a Republic Shredder will increase your uptime today and many tomorrows. Learn more at **www.republicmachine.com**. No more babysitting – time to **drop and go**.

YOUR ROTOR, GUARANTEED FOR LIFE

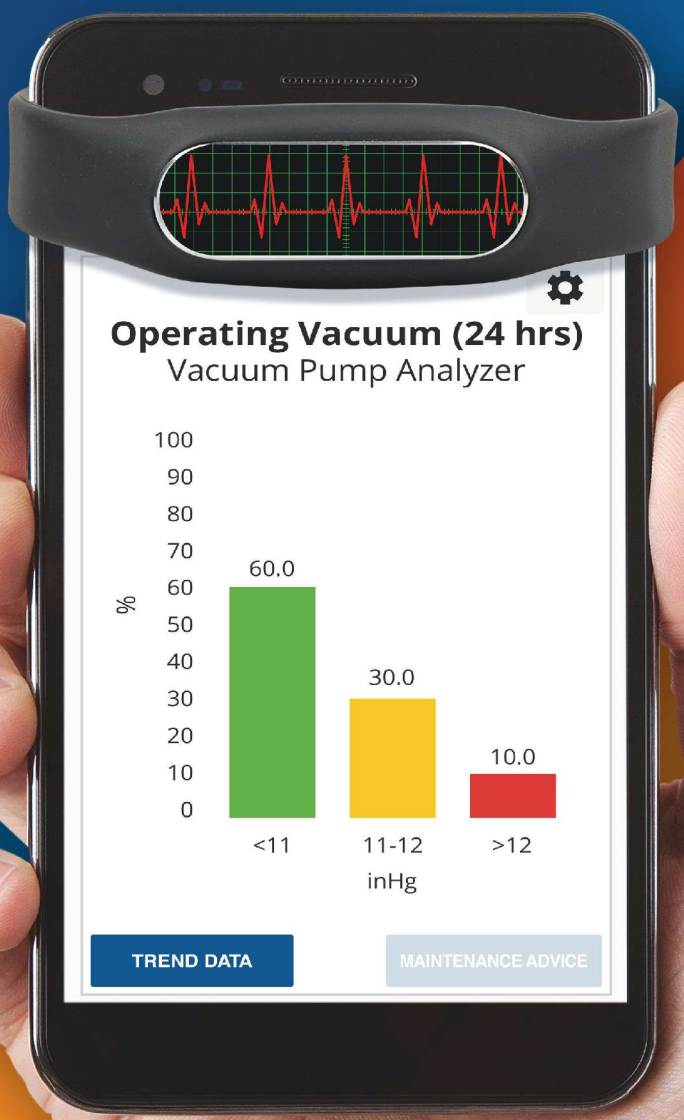
Republic Machine™

1.877.637.6778 • 4215 Produce Road, Louisville, KY 40218 • www.republicmachine.com

Retrofit Your Vacuum Conv

Introducing the Patented Retrofit Vacuum Conveying Pump Fitness Tracker

- **Easily Retrofits** on Most Positive Displacement Vacuum Conveying Pumps
- **Measures Key Fitness Vitals**
  - Sensor Installation
  - Filter Condition
  - Low Oil & Viscosity
  - Blower Health
  - Pump Utilization
  - Operating Vacuum & Usage
- **Hand Held & Desktop Apps** Keeps You Up to Date Plus Sends You Messages



eying Pump in 4 Easy Steps

STEP 1: Place the Sensor on the Blower

STEP 2: Attach the Vacuum Sensor

STEP 3: Plug In the Data Hub

STEP 4: Sign In and Register for 24/7 Updates

Buy it Today...Install it Tomorrow

Starter Pack For 2 Positive Displacement Pumps

Only $999.00

MachineSense.com/Shop

MachineSense™

PH: +1-410-968-6988 | **MachineSense.com**

By Jim Callari,
Editorial Director

Making an Impact *In Thin-Gauge Sheet*

Impact Plastics' latest addition to its extruder fleet is this 130-mm Welex line from Graham Engineering Corp., used primarily to produce thin-gauge PP sheet for a medical device.

Creating a 'virtually integrated supply chain' that connects it with suppliers and customers has helped Impact Plastics add value to a wide range of sheet products, with a growing emphasis on PP.

For custom extruder Impact Plastics, the gauge is all the rage. It's been that way since the company was founded in the 1960s. Today, with plants in Putnam, Conn., and Hamlet, N.C., this privately held, family-owned and operated processor specializes in carefully formulated, thin-gauge sheet made from a range of materials serving markets that include food packaging, foodservice, medical, cosmetics, automotive, and custom thermoforming.

That might be how a lot of plastics processors describe themselves. But, perhaps because of the materials background of several of its key executives—both David Kingeter, company president, and Bill J. Burke Jr., general manager, spent years working for a major resin producer—Impact Plastics has a rather unique business model for a mid-sized custom extrusion house. This is not your grandfather's sheet extrusion company, where, at times, product is run, packaged, and shipped without detailed knowledge of the application. Instead, Impact Plastics seeks to establish a collaborative network that allows it to help develop the application with its customers.

> ***"We are a market-driven company, not driven by what we can manufacture but what the customer tells us they want."***

Burke, who operates out of the Hamlet facility, puts it this way: "We are a market-driven company. We listen to what our customers want, and work as a team to solve problems and help our customers achieve their goals." As a result, rather than attempt to shoe-horn an application based primarily on what it can make, Impact Plastics works up and down the supply chain—teaming with material and equipment suppliers and thermoformers to engineer products that solve problems. "This requires us to have direct contact with the market, to deal with brand owners not from the top down, but from the bottom up," states Burke. "Our idea is to create a virtually integrated supply chain that links us in the middle with all of our suppliers upstream and customers downstream. We operate with our customers as though our capabilities are part of their own.

"We collaborate through the entire supply chain," Burke continues. "We almost always know the end-use application for our product, and by focusing on the end-use application we are able to better understand how to create value for our customers."

The firm (***impactplastics-ct.com***) is co-owned by well-known industry veterans Steve Ryan and Kingeter, who serves as president. The company is beginning its transition to second-generation ownership: Kingeter's daughter Natalie K. MacVarish is the Mid-Atlantic sales representative as well as the company's marketing director. Her brother, Blake Kingeter, is the regional sales representative for the Southeast. Chris Ryan is Steve's son and he handles sales in the Northeast. David Kingeter spends as much time in sales and product development as he does running the operation. Notes Burke, who calls himself a salesman, "Everyone is customer focused, from the president to the sales people, to the operators on the manufacturing floor. Getting to 'yes' and meeting our customers needs is the most important thing."

Putnam serves as the company's headquarters, where six sheet lines operate in a 110,000 ft² facility. The plant has a rail siding that accommodates 26 railcars. Coextrusion jobs are run out of Connecticut, where structures of 90/10 to 50/50 in both AB and ABA have satisfied most of the needs of the markets Impact Plastics serves, says MacVarish. That said, the firm is open to new development projects and is positioned to produce either ABC or ABCBA configurations, depending on market demand.

Operators are a key part of Impact Plastics' customer focus and are incentivized to improve quality.

The company opened its plant in Hamlet 12 years ago. At 55,000 ft², it houses three extrusion lines and has a rail siding that ►

QUESTIONS ABOUT SHEET EXTRUSION?

Learn more at PTonline.com

Visit the Sheet Extrusion Zone.

Auto dies for sheet are common, but Impact Plastics prefers manually adjusted dies to give operators true control over the process.

can handle up to 26 cars. Between the two plants, Impact Plastics employs about 100 people; approximately 60 are involved in manufacturing. Each manufacturing facility is equipped to handle both custom and proprietary applications. Companywide, operators typically focus on specific lines, though they are cross-trained so they can work on any setup. Products currently range from 8 to 250 mils, with the majority of the business focused on 10-90 mil roll stock.

Eight of the nine sheet lines were furnished by Gloucester Engineering (now part of Davis-Standard, Pawcatuck, Conn.).

NEW PUSH TO PP

The newest line was installed in the fall of 2016. Furnished by Graham Engineering Corp., York, Pa., this single-layer Welex line is significant for a number of reasons, notably that it aims to support Impact Plastics' focus on high-value PP sheet. "Our company's early growth was built on selling PS into various thin-gauge packaging markets, but within the last five years we have directed much of our marketing and development efforts towards polyolefins, with a focus on polypropylene," states MacVarish. Interestingly, around this same time, Impact Plastics began to ramp up its investments in R&D related to its customers' application demands.

Among sheet extruders—particularly those serving packaging—it might be considered unusual not to have APET capacity. But at Impact Plastics, that's by design. Burke explains the philosophy: "We made a decision about six years ago that we could not create value in the marketplace providing PET sheet. We asked ourselves, 'What would we add?' We answered, 'Not a lot.' While we are a custom extruder, we don't try to be everything to everyone. We made the determination that PET was commoditized, and that a better path for us was to focus on high-value niche applications like thin-gauge PP."

"We made the determination that PET was commoditized, and that a better path for us was to focus on high-value niche applications—namely, thin-gauge PP."

As Burke explains, PP offers a significant density reduction over PS and PET. In thermoforming, this lower density often translates to a higher yield and a lighter part for the customer. In addition, there's a gap in the market for high-clarity, microwavable food packaging, and the thermal characteristics and high heat resistance of polypropylene make it an ideal material. Impact Plastics produces a range of PP sheet for packaging, including high-clarity sheet utilizing NX UltraClear PP additive from Milliken Chemical, Spartanburg, S.C., as well as calcium carbonate-filled and talc-filled PP sheet.

Additionally, the new Welex line, engineered specifically for PP, is being utilized for an undisclosed medical-device application where even the slightest variation in thickness can result in a critical misdiagnosis. The product was developed jointly by the medical OEM and the thermoformer, which, having worked with Impact Plastics on other projects, turned to the sheet processor specifically to develop a 15-mil product where gauge control is critical to the success of the application. The gauge tolerance to meet the requirements of the application is ± 0.33 mil (or 0.00033 in.), with an acceptable gauge range of 0.01470–0.01530 in. With the help of the new Welex line, Impact has been able to successfully hold the gauge tolerance to ± 0.25 mil (or 0.00025 in.) generating a yield of 98%.

"We've always prided ourselves in maintaining tight gauge control," says Burke. "We are always in pursuit of the perfect gauge. But running so thin at high rates is not easy."

The Welex Evolution line was delivered on Labor Day 2016. Line components include a 130-mm extruder, XSL Navigator integrated controls, Cloeren die, specialized hydraulic roll stack with auxiliary cooling rolls and a jumbo winding system.

While automatic gauge-control dies are fairly common technology in sheet extrusion, Impact Plastics opted for a manually

controlled die, consistent with the tooling on its older sheet lines. Comments Burke, "We felt that manually controlling the die met our needs better than an auto die. In our experience auto dies tend to trend and wouldn't meet our tight gauge requirements. Instead, we rely on operator vigilance. We develop process parameters every time we set up a line, and we prefer that our operators make adjustments based on the feedback from the gauge-monitoring device. We could never run a line without the dedication and skill of our operators. Our philosophy is that everyone must think of the customer. Everybody must execute to deliver a product that meets or even exceeds their expectations.

"We're agile, and manufacturing is committed to meeting customer needs," Burke adds. "We'll interrupt the production schedule, run on a Saturday, or deliver on a Sunday if that is what a customer needs. This past summer, we had a customer that had a very pressing high-volume order with a short lead time that we needed to fill, and our dedicated team rose to the occasion"

"We rely on operator vigilance. We develop process parameters every time we set up a line, and we prefer that our operators make adjustments."

At Impact Plastics, operators also have a vested interest in improving quality. The company has set up a quarterly bonus program that's tied to customer complaints and product returns. MacVarish notes that Impact Plastics currently has a return rate of 0.5% of total virgin material sales. Its goal is to reduce that to 0.25%.

Impact Plastics did its due diligence before ordering the new Welex line. Burke commented that the project was yet another example of collaboration in Impact Plastics' "virtual supply chain." Wanting to deliver a line that would not only meet the tight tolerances required by the medical project, but would also provide maximum flexibility for future projects, the Welex team led Impact through a detailed specification-gathering process that generated dialogue and enabled data-driven decisions. "The ultimate design was finalized in quote revision H," Burke recalls. "Welex listened to what we said we needed. But the real reason we'd buy from them again is the way they worked with us every step of the way to make sure the line did what they said it would do. You never really know how good your supplier is until they rise to a challenge. When they pull out all the stops to deliver the required results, that's a good supplier. We hold ourselves to that standard as well."

PRODUCT DIVERSITY & SUSTAINABILITY

While Impact Plastics has positioned itself to grow on the polyolefin side of its sheet business, and has a long history in processing PS, it also runs what it calls "Class 'A' surface" ABS sheet that is used as a lamination substrate that is insert injection molded for decorative automotive interior components. The firm also has a robust sustainability program, repurposing post-industrial scrap into utility applications as a way to maximize the amount of plastic recycled at both facilities. In addition, Impact Plastics recycles heat generated from the sheet extruders to heat the plant at both manufacturing facilities. The Putnam plant is also in the process of implementing a solar energy system, which will generate some 451,876 kWh of energy in the first year alone. PT

Impact Plastics prides itself on its ability to maintain tight tolerances of thin-gauge film, as evidenced by this off-line reading.

Impact Plastics' next-generation team includes (l-r) Chris Ryan, Natalie K. MacVarish, and Blake Kingeter.

Determining Vent Depths in Injection Molding

Experiments reveal the relationship between vent depths and part thickness, allowing molders and moldmakers to more precisely determine vent dimensions.

By Suhas Kulkarni
FimmTech

In injection molding, air inside the cavity needs to be evacuated for the plastic to fill the cavity. Vents are therefore machined in the cavity blocks in the mold. If the air is not evacuated, it will cause inadequate filling, resulting in several defects such as short shots, poorly packed-out parts, burning of the plastic, voids in the parts, dimensional variation, and so on (see Fig. 1). Over time, the mold steel can get damaged because of the excessive air pressures in the local area at the end of fill or in corners where the air and plastic tend to get pressurized. Lack of vents can also create excessive pressures in the cavity, causing the mold to open sufficiently to cause flash on the parting line.

Good venting leads to robust, repeatable, and reproducible processes.

WHAT YOU WILL LEARN

1. **WHY VENT?:** To evacuate air that might otherwise cause part defects.
2. **VENT SIZE:** Make them large enough to develop a robust process without causing flash.
3. **MATERIAL SUPPLIER INPUT:** Tends to be generic.
4. **PART THICKNESS:** Thicker parts tend to need deeper vents.

The vents are machined typically on the parting lines, from where the plastic reaches the end of fill to the outside of the mold. The end of fill here must not be confused with the end of fill during filling of the part. End of fill for this discussion refers to the stopping of the polymer flow in the particular local area. The viscosity of the plastic should be high enough to prevent it from flowing out of the mold through the vent.

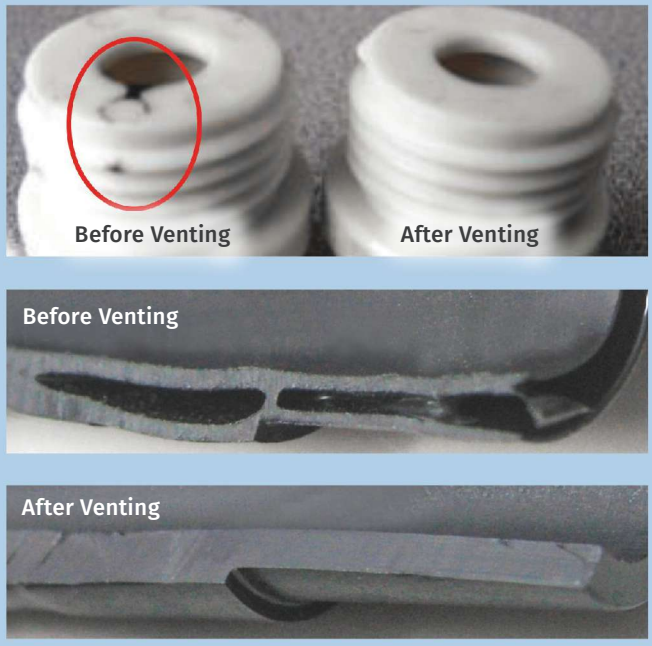
Figure 2 shows the cross section of the mold, indicating the vent area and types of vents. The relieved section that is closest to the cavity steel (and part) is the primary vent. The dimensions of the primary vent are the most critical. First, the vent depth (D), should be such that it helps the evacuation of air but not let the plastic escape. Second, the vent land (L), should not be large enough to cause a substantial drop in pressure and prevent air from being pushed out nor should it be so short that the plastic easily finds its way out to the secondary vent. Typical land lengths should be around 0.060 to 0.080 in. (1.2 to 1.5 mm), assuming the vent depth is designed correctly. For larger parts such as car bumpers or doors, the land lengths need to be higher, depending on the volumetric flow rates.

Third, the vent width (W) should be at least 0.25 in. (5 mm). On the high end, it can be as wide as desired, and in some cases, it can run around the entire perimeter of the part (ring vents). Vents in

QUESTIONS ABOUT MOLD VENTING?

Learn more at PTonline.com

Visit the Molds & Tooling Zone.



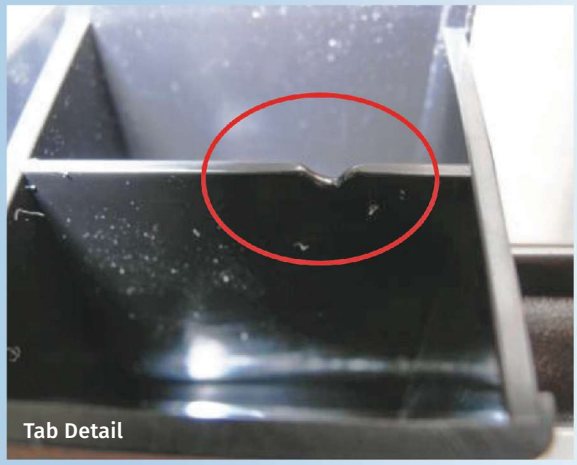


FIG 1 If air is not vented from the mold, it will cause inadequate filling, resulting defects that include short shots, poorly packed-out parts, burning of the plastic, voids in the parts, and dimensional variations.

localized sections that do not run around the perimeter of the part are called spot vents.

The secondary vents are also called vent reliefs. The dimensions of the secondary vents are larger than the primary vent and therefore help in easy transport of air inside the mold out to atmosphere. They are mainly used as a dump area for the air as it exits the mold. Secondary vents should be at least 0.010 in. (0.25 mm). In all cases, the vents must be well polished to avoid any buildup of residue from the gases. The vents must also be draw polished in the direction of air flow.

For larger parts such as car bumpers or doors, the land lengths need to be higher, depending on the volumetric flow rates.

An article authored by Randy Kerkstra, *Venting: Where and How Deep?* (see Tooling Know How, May '15) discussed this topic. The processor needs to have the biggest vents possible so that the plastic can flow into the mold with the least restriction and help with developing a robust process. However, if the vents are even slightly oversized, the result is flash in the part. The moldmaker will then have to weld the area and rework it to get it back to where it was. This is a very difficult and time-consuming process, so moldmakers tend to stay conservative with the vent depths.

The dimensions of the primary vents depend on a number of factors. Molders and moldmakers rely on the material manufacturers to provide info on the vent depths. Moldmakers typically follow these recommendations when building an injection mold and tend to stay on the lower end of the recommendation for fear of flashing the mold. Since the recommended vent sizes always come with a disclaimer, FimmTech Inc., with the help of Distinctive Plastics, a custom molder in Vista, Calif., built a special mold to study the factors that determine the vent depths. (The mold is available to material suppliers for determining the vent sizes for their materials.)

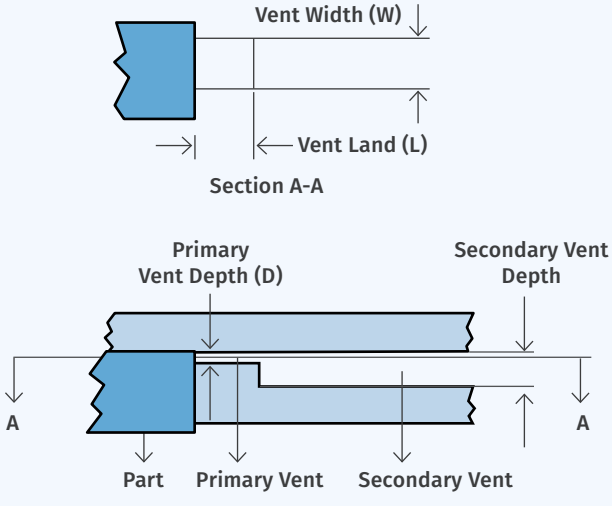


FIG 2 Shown here is the cross section of the mold, indicating the vent area and types of vents. The relieved section that is closest to the cavity steel (and part) is the primary vent. Its dimensions are the most critical.

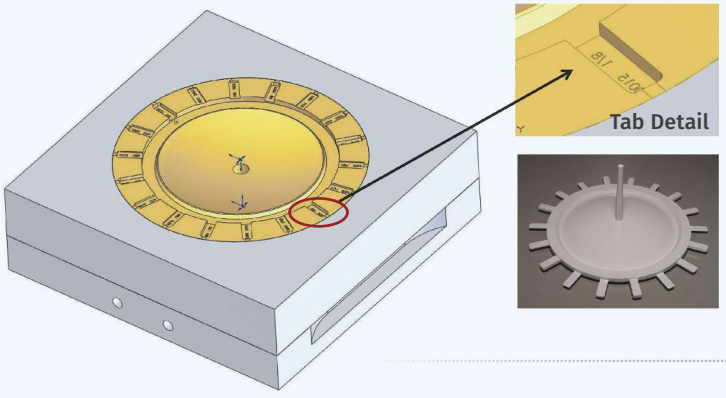
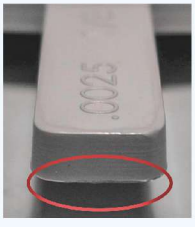


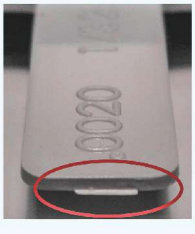
FIG 3 An experimental mold built to study the factors that determine the vent depths was center gated and had 18 tabs of varying combinations of tab thicknesses and vent depths.



Tab Thickness = 0.125 in.
Vent Depth = 0.0025 in.
No Flash

Tab Thickness = 0.125 in.
Vent Depth = 0.0030 in.
Evidence of Flash

Tab Thickness = 0.03125 in.
Vent Depth = 0.00015 in.
No Flash



Tab Thickness = 0.03125 in.
Vent Depth = 0.0020 in.
Evidence of Flash

EXPERIMENTAL DETERMINATION OF VENT SIZES

A mold was constructed for a part that is center gated and has 18 tabs of varying combinations of tab thicknesses and vent sizes (Fig.3). The center gate delivered the melt to each of the tabs at the same time. There were three different tab thicknesses: 0.125 in., (3.175 mm); 0.0625 in. (1.587 mm); and 0.0312 in. (0.792 mm). There were six vent sizes from 0.0005 in. (0.0127 mm) to 0.0030 in. (0.0762 mm) in steps of 0.0005 in. (0.0127 mm). Different materials were molded, and for each tab the minimum vent size where no flash was seen was recorded.

The results show primarily that the thickness of the tab also plays an important role in determining the vent size. The thicker tab was able to accept larger vents without flashing. For example, with an ABS material, at the 0.125-in. tab the vents flashed at 0.0030 in.; whereas at the 0.0312-in. tab, the vents flashed at 0.0020 in. (Fig 4). There are two reasons for this. As the plastic is forced into thinner sections, the flow rate of the plastic in the area increased. The increased flow rate increased the shear rate and led to a reduction in the viscosity, making the plastic flow easier, resulting in flash. The reduced viscosity also allowed a reduced pressure drop, increasing the end-of-fill pressure, resulting in flash. The graph in Fig. 5 summarizes the results.

FIG 4 Vent-depth combinations in experiments showed that tab thickness plays an important role in determining the optimum vent depth.

The published vent depth for ABS is 0.002 in. (0.0508 mm), but the test results from the vent mold showed that a vent size of 0.003 in. (0.0762 mm) is acceptable if the part thickness is 0.125 in. This value was used on several molds successfully. Naturally, parts thicker than 0.125 in. can have larger vents, but there will be a plateau point and the increase will not be linear. Caution is required. Tests on nylons also showed surprising results. The published value for nylons is a vent depth of 0.0005 to 0.0007 in. (0.0127 to 0.017 mm); but for thicker sections, experiments showed a vent depth close to 0.0015 in. (0.038 mm) could be used. In all cases, it is important that proper scientific molding and scientific processing techniques be followed.

Adding vents is an important step in mold design and mold building. Good venting leads to robust, repeatable, and reproducible molding processes. Although material suppliers provide recommendations for vent depths, the they mostly seem to be generic numbers. The method described above is a scientific way of determining vent sizes. For a given mold, the all the vents are usually machined to the same depth. Based on the data above, for maximizing the efficiency of venting, the vents could be machined to different depths based on their location and the wall thickness in the local area.

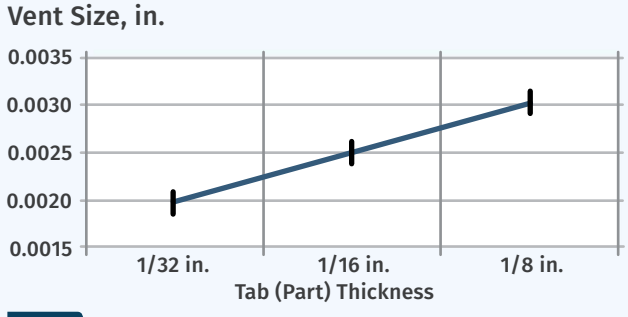


FIG 5 This graph shows the combination of tab thickness and vent depth where flash begins to occur when molding a medium-flow ABS.

ABOUT THE AUTHOR: Suhas Kulkarni is the president of FimmTech Inc., Carlsbad, Calif., a firm that provides resources for Scientific Molding and Scientific Processing. The firm provides training, software, and consulting. He has 26 years of experience in injection molding and is the author of the book, *Robust Process Development and Scientific Molding*, published by Hanser Publications and now in its second edition. Contact: (760) 525–9053; suhas@fimmtech.com; fimmtech.com.

Plastics Technology®

KNOWLEDGE CENTER

Plastics Training

Best Practices, Cost Saving Tips, Product Technology

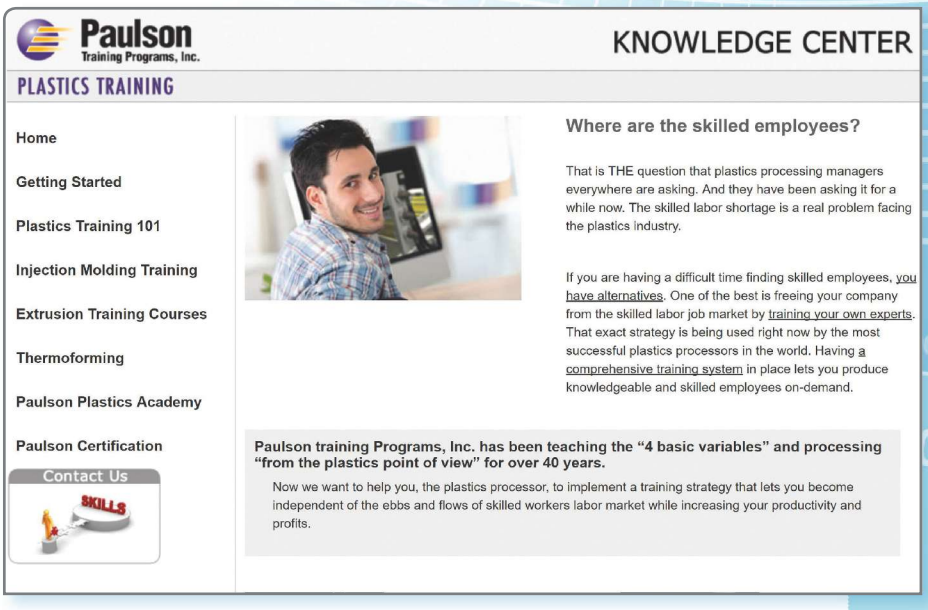
Comprehensive collection of technical content

On-Demand Videos & Webinars

The latest technology in action and explained by industry experts

Ask Experts

Connect with industry leaders for immediate answers



Find Plastics Training Solutions at:
short.ptonline.com/KC-train

Get more KNOWLEDGE

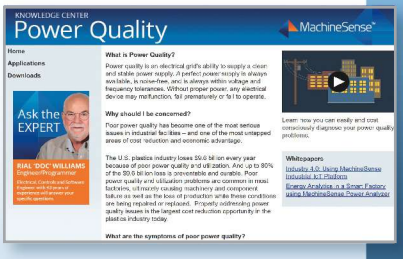
Purging Compound

- Purging Compond Basics
- Commercial Purging Compounds
- Injection Molding, Extrusion, Blow Molding, Hot Runners, Compounding

short.ptonline.com/purging

Power Quality

- What is Power Quality?
- Why Should I be Concerned?
- What are the Symptoms of Poor Power Quality?



short.ptonline.com/power

Why Drying Polyolefins Might Be Right for Your Process

From a technical standpoint, drying non-hygroscopic materials such as polyethylene and polypropylene may not be necessary. However, doing so may be advantageous to your process. Here are details.

By Pete Stoughton,
Polymer Drying Services

Polymers of all kinds can be classified into one of two groups: hygroscopic or non-hygroscopic. Hygroscopic materials such as nylon, ABS, PC, and polyesters—to name just a few—will attract and absorb water molecules into the plastic's interior structure. Non-hygroscopic plastics such as polyolefins (polyethylene and polypropylene), on the other hand, will not absorb water molecules into the polymer structure.

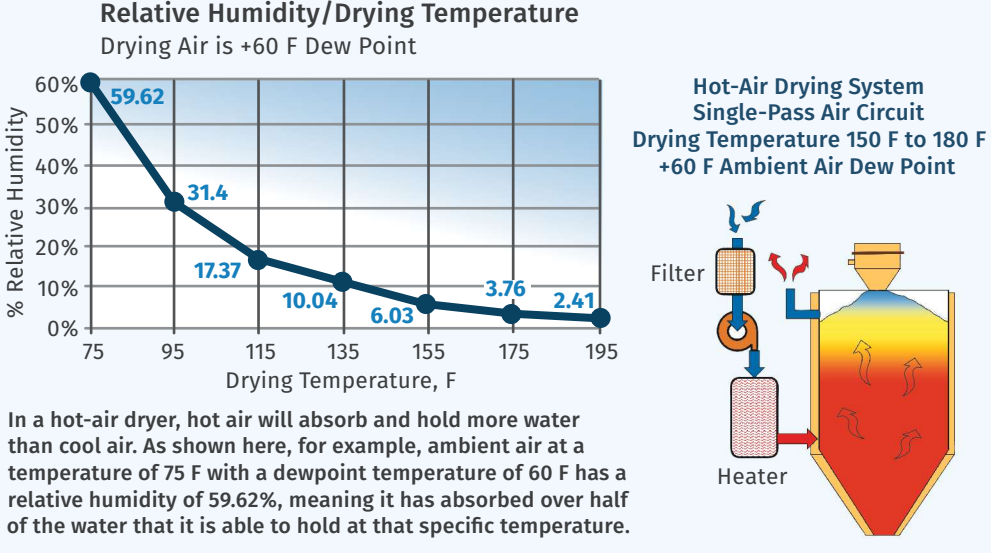
The fact is, processing polyolefins without predrying can lead to problems.

Because hygroscopic polymers attract and absorb water molecules from the atmosphere, they must be dried prior to processing to achieve consistent production results regardless of changes in the ambient temperature and humidity conditions that occur throughout the year.

But what about polyolefins? Polyolefin processors molding and extruding products for automotive, medical, and certain other markets sometimes predry materials to remove surface moisture and, in effect, "preheat" or soften the material to facilitate melting. But this is not a common practice. Still, the fact is that processing polyolefins without predrying can lead to problems:

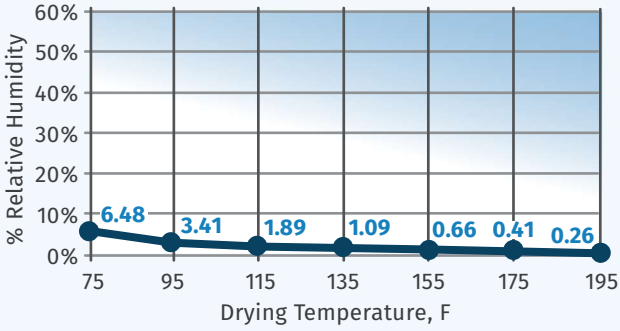
- Although polyolefins are non-hygroscopic and will not attract moisture from the surrounding air, they will certainly pick up some surface moisture when exposed to high ambient humidity. While a very small amount of surface moisture may not cause

FIG 1



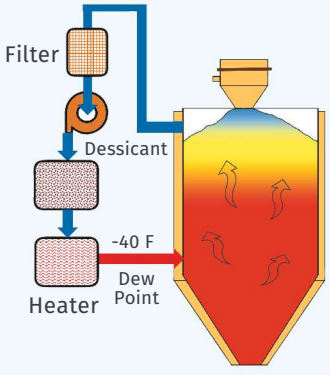
In a hot-air dryer, hot air will absorb and hold more water than cool air. As shown here, for example, ambient air at a temperature of 75 F with a dewpoint temperature of 60 F has a relative humidity of 59.62%, meaning it has absorbed over half of the water that it is able to hold at that specific temperature.

FIG 2 **Relative Humidity/Drying Temperature**
Drying Air is -40 F Dew Point



In a dehumidifying dryer, drying air is passed through a bed of molecular-sieve desiccant. The dehumidified air is then heated to a higher temperature, which lowers the air's relative humidity. We now have drying air that has a very low dewpoint and an extremely low relative humidity A dehumidifying dryer can easily reduce the surface moisture of polyolefin pellets to 0.005% or lower.

Dehumidifying Drying System
Closed-Loop Air Circuit
Drying Temperature 150 F to 180 F
+60 F Ambient Air Dew Point



any visible issues in most general-purpose molding and extrusion applications, increasing surface moisture levels will cause surface finish problems such as roughness, splay, or silver streaks.

• Moving containers of polyolefins from an unheated warehouse into a warm and more humid production area may cause moisture to condense onto the cold pellets when the containers are opened.

• Polyolefins that contain colorant such as carbon black, or are filled or reinforced, will attract and hold some surface moisture.

• A good, high-quality surface finish is a necessity when plating polyolefin products, and even a very small amount of surface moisture present on the incoming pellets will result in a poor finish.

DRYING BENEFITS AND TIPS

Processors that have made the commitment to dry polyolefins have seen several benefits. Maintaining a consistent temperature and moisture level in the incoming material throughout the year helps them achieve consistent performance of the extruder or injection molding machine. What's more, reducing surface moisture on the incoming material results in an improved surface finish. Plus, preheating the material will reduce the energy load required from the injection molding or extrusion machine to melt the polymer.

Preheating the material will reduce the energy load required from the injection molding or extrusion machine to melt the polymer.

QUESTIONS ABOUT DRYING?

Learn more at PTonline.com

Visit the Drying Zone.

So much for the why. What about the how? A hot-air dryer is recommended for drying polyolefins at temperatures in the range of 150 F to 180 F; a drying hopper should be sized for 2 hr of drying time. This type drying system will provide a stable incoming material temperature and lower the surface moisture of the pellets.

The principle of operation of a hot-air dryer is simple: Hot air will absorb and hold more water than cool air; for example, ambient air at 75 F with a dewpoint temperature of 60 F has a relative humidity of 59.62%, meaning it has absorbed over half of the water that it can absorb at that temperature. If that air is then heated to a temperature above 75 F, as shown in Fig.1, the relative humidity of the air will decrease, and the drying air then will be able to absorb more water.

A hot-air dryer will dry polyolefins down to 0.1% moisture, and often much lower, which will satisfy the vast majority of polyolefin processors. However, if your application requires an extraordinary low final moisture level, a dehumidifying dryer may be required.

A dehumidifying dryer is a hot-air dryer on steroids. It first passes the drying air through a bed of molecular-sieve desiccant, which removes water from the drying air and lowers the air's dewpoint. The dehumidified air is then heated, which lowers the air's relative humidity. We now have drying air that has a very low dewpoint and an extremely low relative humidity (Fig. 2). A dehumidifying dryer can easily reduce the surface moisture of polyolefin pellets to 0.005% or lower.

Note: Relative humidity is not a term used to describe the performance of dehumidifying dryers. It is used in this article to provide a reference when comparing the performance of a dehumidifying dryer to that of a hot-air dryer. PT

ABOUT THE AUTHOR: Pete Stoughton has more than 40 years' experience with dehumidifying dryers and PET crystalizing systems. He has held various technical positions with the Conair Group, including technical services manager, product manager, and business unit manager. He now has his own consulting firm, Polymer Drying Services. Contact: *(814) 516-3838; pstoughton@comcast.net; pstoughton.com.*

Molding 2018

28TH INTERNATIONAL CONFERENCE & EXHIBITS

Hilton Long Beach | Long Beach, CA

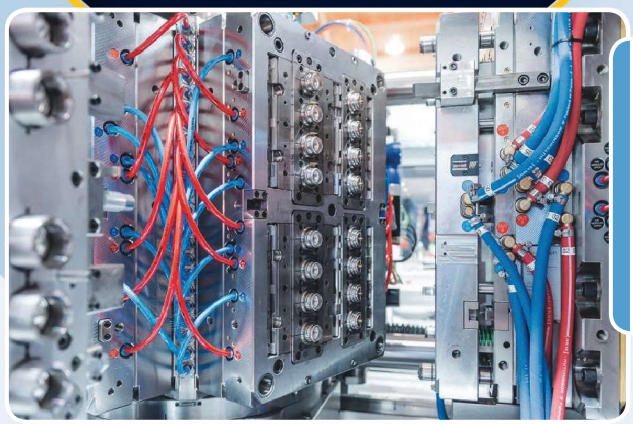
February 27-March 1, 2018

REGISTER TODAY & SAVE!

Make plans to attend Molding 2018. You'll come away with valuable tips and insights that you can't find anywhere else.

Molding 2018 is where leaders in injection molding connect!

Now in its 28th year, the Molding 2018 conference brings global leaders and innovators in injection molding together in the world's premier technical conference on this processing sector.



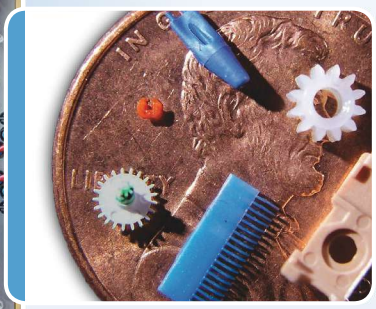


Photo Sources: (above, left to right) Foboha; Makuta Technics, (background) Stock Image

REGISTER BY JANUARY 29, 2018 & SAVE $100!

NEW in 2018!

Are *you* a HOT SHOT?

The "Hot Shots" Injection Molded Parts Competition at Molding 2018 will recognize and reward outstanding achievements in injection molding of plastics parts.

Parts submitted by a molder, moldmaker, OEM customer, and/or material supplier will be judged by conference attendees on specific aspects and winners will be announced at the conference and in *Plastics Technology* magazine in print and online.

See MoldingConference.com for contest details.

Register today at: MoldingConference.com

PRESENTED BY: Plastics Technology | MoldMaking TECHNOLOGY | GARDNER Business Media, Inc.

Join the global leaders and innovators in injection molding for information sharing, networking and exhibits at the premier technical conference on this processing sector—Molding 2018!

Molding 2018 offers you the opportunity to attend general sessions and concurrent breakout sessions on the hottest topics in injection molding and beyond, including additive manufacturing and Industry 4.0.

FEATURED PRESENTATIONS

Applying OEE: Using Data to Improve Efficiency in Molding Operations
- Adam Moran, VP Sales, Vorne Industries

Workforce Development—A Critical Issue for the Plastics Industry
- Beaumont Technologies Inc.

3D PRINTING: MOLDER'S FRIEND OR FOE?
Forecast 3D
HTS International Corp.
Phoenix Deventures
Proto Labs
Slant 3D
Stratasys
VooDoo Manufacturing

EMERGING TECHNOLOGIES
Engel
iMFLUX
MachineSense / Prophecy Sensorlytics
Milacron / Mold-Masters
Mobile Specs
Riverdale Global

ESTABLISHING & MAINTAINING A ROBUST PROCESS
AMA Plastics
Arburg
Fimmtech
KraussMaffei
Proto Labs
RJG, Inc.
SIGMASOFT Virtual Molding

LSR (LIQUID SILICONE RUBBER) MOLDING
Alba Enterprises / Babyplast
Elmet
Engel
Extreme Molding
Kipe Molds Inc.
Momentive

MATERIALS & ADDITIVES
Asaclean
Chem-Pak Inc.
Eastman Chemical Company
ELIX Polymers
iD Additives
Kenrich Petrochemicals Inc.
Techmer PM

PRACTICAL APPLICATION OF INDUSTRY 4.0
Arburg
Engel
KraussMaffei
Oden Technologies
Piovan
Smart Attend
Wittmann Battenfeld

ROBOTS & AUTOMATION
Absolute Haitian
Hirate America / Universal Robots
Laser-View Technologies
PTI Engineered Plastics
Sepro America
Staubli
Yushin

TECHNOLOGY FOR TODAY'S MOLDER
Athena Automation
Delta T Systems
IRONJAW LDA
MD Plastics
Moretto
Novatec
Wittmann Battenfeld
Zeiger Industries

TOOLING
Burger & Brown
Cold Jet
Haidlmair
HASCO
HRSflow
Milacron / Mold-Masters
PFA Inc.

WORKFORCE DEVELOPMENT: EDUCATION & TRAINING
Beaumont Technologies Inc.
Panel Discussion with Industry Leaders

Schedule and presentations subject to change.

PLATINUM SPONSOR

Riverdale GLOBAL®

GOLD SPONSOR

HASCO®

SILVER SPONSORS

chem-pak, INC.

EPS FloTek Moldex3D

iD Additives™

Laser-View Technologies
Smart non-contact measurement solutions

MILACRON Mold Masters

SPECIAL DISCOUNTED ROOM RATE FOR MOLDING 2018 ATTENDEES!

Reserve your room at the conference venue, the Hilton Long Beach, for only $199 USD per night plus taxes.

DEADLINE: February 5, 2018.

Reserve your room NOW! Visit MoldingConference.com and select HOTEL.

REGISTER by January 29, 2018 & SAVE $100!
MoldingConference.com

Molding 2018

PT Keeping Up With Technology

PRODUCT FOCUS **Auxiliary Equipment**

MATERIALS HANDLING

Screw Conveyor Goes Mobile, Adds Trough Hopper

Two new models of flexible screw conveyors are available from Flexicon, Bethlehem, Pa. First, a mobile, sanitary version can be tilted down and rolled to serve multiple functions. Using a manual jack screw, the support boom and conveyor can be raised for discharging into vessels or other process equipment. Fully lowered, it can be rolled through doorways as low as 7 ft and aisles as narrow as 42 in.

Sanitary features include a caster-mounted frame, support boom, and hopper grate of 316 stainless steel; sanitary quick-release cleanout cap; quick-disconnect discharge-box access cover; stainless control panel with stainless conduit and liquid-tight compression fittings, allowing washdown during changeovers and/or conveying of corrosive materials.

Second is a screw conveyor with a trough hopper. It can receive materials from multiple outlets of feeders, grinders, blenders, and other process equipment. The hopper has an extended charging adapter that exposes 45 in. of the flexible screw rotating within an inclined, U-shaped trough to charge material entering the hopper at any point.The hopper has a stainless-steel grate for worker safety, and to prevent oversized particles from entering the conveyor. Smooth, crevice-free surfaces of the screw and tube interior allow in-place flushing with water, steam, or cleaning solutions through a lower cleanout cap and/or upper discharge housing. The flexible screw can also be removed for separate sanitizing and inspection of the polymer conveyor tube and stainless-steel hopper, as well as the screw.

888-353-9426 • flexicon.com

DECORATING/PRINTING

Versatile Corona Treatment System

A new versatile, high-performance corona-treatment system from 3DT, Germantown, Wis., has multiple feedback devices for precise performance monitoring. Called the PolyDyne Pro, it is suited to prepping surfaces for marking and printing applications, such as medical parts, syringes, bottles, vials, surgical instruments, and tubing. Additionally, labware such as Petri dishes and multicell wells with corona treatment "wet out" for improved cell-culture growth.

Features include:

- Remote interface to enable the generator and set and monitor output power level.
- Color touchscreen for users to monitor all system parameters, data log, alarm history, and troubleshooting help.
- Programmable treatment modes: product sensing, timed, or continuous operation.
- Data log that records operation history to ensure maximum efficiency
- Compact design for easy integration into production lines.

262-253-6700 • 3DTLLC.com

MATERIALS HANDLING

Gravimetric Feeder for Compounding; Remote Monitoring for Predictive Maintenance

At the recent Fakuma show in Germany, Schenck Process (U.S. office in Kansas City, Mo.) presented a new feeder series for compounding and masterbatch production, as well as new remote monitoring capability for the company's weighing, feeding, and conveying equipment.

New ProFlex C loss-in-weight feeders for powders and pellets have flexible hopper walls with external agitation, easy-to-clean extension hoppers, and a compact, off-center design that allows space-saving installation of up to eight feeders in pairs with close-fitting discharge helixes and nozzles. Orientation of the discharge side can be changed easily. Three basic feeder sizes (500, 3000, and 6000 liters/hr) are offered with a variety of extension hoppers, spirals, and screws.

Meanwhile, Schenck feeders and other equipment can now be connected to the internet via the new Proxiq remote maintenance-monitoring system. This allows access by the customer's own service group or Schenck Process staff worldwide for early detection and diagnosis of conditions that require maintenance. The system is said to be highly secure.

800-821-2476 • schenckprocess.com

Plastics Technology

WEBINAR:
JAN 24, 2018 | 2PM

How to Remotely Monitor Vacuum Pressure, Performance, Oil Level, and Filters on Your Conveying Pumps

Presenters:

James Zinski
President & COO,
MachineSense

Fred Eichhorn
Electrical Controls Consultant,
MachineSense

The First Wearable, Retrofit Sensor and Analytics Package for Your Vacuum Conveying Pumps

- **Understand** how this technology measures key vitals including:
  - *Sensor Installation*
  - *Filter Condition*
  - *Low Oil & Viscosity*
  - *Blower Health*
  - *Pump Utilization*
  - *Operating Vacuum & Usage*
- **Learn** how to improve factory productivity by avoiding unplanned downtime

REGISTER NOW @ ptonline.com/pumpswebinar

MATERIALS HANDLING

New Volumetric & Gravimetric Feeders

Acrison, inc., Moonachie, N.J., has expanded two lines of dry-solids feeders with new models and added features. First, the 170 Series volumetric feeders (below) have a new dual-auger model with independently driven augers, providing an extremely wide feed range without the need to change augers. The 170 Series have a special discharge port that provides both self-emptying and quick-discharging capabilities. For easy cleaning, two new features are swing-out and tilt-back hopper options. These volumetric models can be incorporated into weight-loss metering systems.

Second, Acrison weigh feeders include a new model 408 (right), described as an extremely compact unit with a footprint of 18 × 28 in., suiting it, for example, to extrusion and compounding systems where multiple feeders are mounted over the machine hopper. Along with the 402 and 404 Series and models 405 and 406, the new unit can be supplied with several different types of metering mechanisms, depending on the material characteristics. Also, their weighing system is an advanced "platform"-type lever network, robustly constructed for exceptionally long life and near-zero maintenance requirements, Acrison says. The entire weighing system of the feeder is guaranteed for five years, including the associated electronics. Cost of ownership is said to be the lowest in the industry.

201-440-8300 • acrison.com

PREPARE FOR WHAT LIES AHEAD.

PLASTICS
LEADERSHIP
SUMMIT

INSIGHT
IDEATION
INSPIRATION

May 8-10, 2018
Orlando, Florida USA
Orange County Convention Center

The future of plastics unfolds at the inaugural **Plastics Leadership Summit** at NPE2018: The Plastics Show, an exclusive forum for C-level executive and senior managers in the world of plastics. Join your fellow leaders for three days of collaborative insight, ideation and inspiration and set the stage for a successful future for the industry. **Join the conversation.**

PLASTICS
INDUSTRY ASSOCIATION

NPE2018
THE PLASTICS SHOW

Learn more at **NPE.org/Summit**

SIZE REDUCTION

Central Granulator Boasts Energy Efficiency & Ease of Maintenance

T50 Series Granulators from Cumberland, New Berlin, Wis., have an offset design that promotes energy efficiency in a heavy-duty system said to offer ease of maintenance. Two cutting-chamber configurations are offered: The tangential geometry can process many types of scrap with improved ingestion at a lower power requirement. It can process larger parts, including thicker-walled and higher-density applications, like automotive parts, PVC fittings, film/sheet rolls, and appliance components. Alternatively, the offset design allows for higher throughput of lower-density parts. Both cutting-chamber configurations are available with either a three- or five-blade rotor. The T50's cutting chamber creates high-consistency regrind via a twin-shear design that also reduces energy consumption.

Overall maintenance, including knife adjustments, is eased by the T50's "wide-open" design, according to Cumberland. Screens are reversible for longer use, and a new rear hopper door is equipped with a zero-speed locking mechanism and improved seal design. Locking the rotor is now accomplished by pushing a button, and cleaning access is possible only when the rotor stops spinning. A new linear-actuated rear cutting-chamber door further eases access for bed-knife maintenance.

800-423-3183 • cumberland-plastics.com

WELDING

Compact Linear Actuators For Automotive

Two new compact linear ultrasonic actuators—the CLA-50 and CLA 100, designed specifically for automotive applications—were introduced by Rinco Ultrasonics, Danbury, Conn., at the recent 2017 Assembly Show. The units were developed to meet demand for robust and compact actuators that meet today's stringent requirements and provide long component life. A key feature is distance feedback, which will reduce over-welds. The unit has a footprint of 55.5-mm diam. allowing a 56-mm center-to-center mounting configuration.

In this small footprint, the 35-kHz rigid-mount converter (and booster if applicable) is mounted with high rigidity, using no O-rings, thereby allowing the least amount of deflection from the stack components and ensuring optimum weld consistency. Another feature is integrated air cooling, which has multiple mounting locations for tight layout patterns.

Rinco offers these CLA units in conjunction with anti-rotating, 40-mm diam. air cylinders in stroke lengths of 50 and 100 mm and various mounting configurations.

203-744-4500 • rinco-usa.com

machined.
melted.
extruded.
welded.
compounded.
blow molded.
injection molded.

We've got it covered.

casted.
fabricated.
foamed.
thermoformed.
rotation molded.
vacuum formed.
cooled.
heated.
sealed.
thermoset.
packaged.
transported.
consumed.
recycled.

NPE2018

THE PLASTICS SHOW

Innovation. Technology. Sustainability.

From equipment and trends to the people advancing plastics manufacturing, **NPE2018: The Plastics Show** has it covered. Be there to discover new ways to maximize efficiency, advance your operations and achieve success.

REGISTER TODAY AT **NPE.ORG**

MAY 7–11, 2018 | ORLANDO, FL, USA

TESTING

Vision Extensometer Tests Structural Materials

Startup company Point Semantics Corp. (PSC), Silver Springs, Md., is commercializing a technology licensed from the U.S. Naval Research Laboratory to make its entry into the materials-testing arena. PSC's new MVE-100 high-performance machine-vision extensometer is designed to measure elongation, strain, and crack-opening displacement during testing of plastics, composites, elastomers, and other materials.

This non-contacting instrument is priced competitively with conventional contact extensometers, but boasts distinct advantages. Most crucially, the MVE-100 measures with high accuracy, precision, and efficiency at a wide range of strain rates. It provides six analog inputs and four outputs, strobing for controlling external devices, and internal and external triggering capabilities. Also, it measures the total as well as the horizontal and vertical components of elongation between two arbitrary points.

Said PSC's CTO and co-inventor and engineer Athanasios Iliopoulos, "Our extensometer can measure strain in a deforming specimen or structure while it is being stretched more than 20 times its initial length. And, it can perform measurements with precision of ±30 µm strain when the proprietary tMarch technology is enabled."

The instrument comes equipped with everything needed to capture data and export the results, including an integrated computer processor and control unit, digital camera and lens, LED lighting, support fixtures, tripod, and shock-absorbing storage case. Testing setup is reportedly quick, requiring the user only to mark two dots on the surface of the specimen or other deforming component and point the camera and a lighting source at it. PSC's Ariston-EX software is used to capture and display extension or strain or crack-opening displacement histories as a function of loading, as well as stress-strain curves (when load-cell data are acquired through the analog input interface) in real time. The instrument is evaluated under the ASTM E83 and ISO 9513 standards.

708-862-5307 • pointsemantics.com

TESTING

Laser Scanner for Complex Parts

A hand-held scanner that incorporates blue laser technology, ultra-fast frame rate, specially developed Nikon optics, and the ability to measure dimensions of the most challenging materials has been introduced by Nikon Metrology Inc., Brighton, Mich. The ModelMaker H120 is recommended for prototyping and designing parts and reverse engineering to check the details of complex shapes.

The unit has a field of view of up to 120 mm and a point resolution down to 35 µm. Extremely fast frame rate of over 450 Hz is available even when measuring difficult materials such as carbon fiber or glossy black, reflective, or multicolored parts. With 2000 points per scan line and no reliance on point-to-point interpolation to artificially boost data density, it is possible to measure very small details on large surfaces, even when cycle time is critical.

810-494-5616 • nikon.com

THE PLASTICS RACE

Join the race for plastics knowledge at NPE 2017

NPE / ANTEC 2018 ORLANDO

MONDAY, MAY 7, 2018 | 12:00 PM - 2:00 PM

Limited Sponsorships Available

More than 2,000 exhibitors will be competing for attention at the 2018 NPE / ANTEC, but only 200 will have teams of plastics engineers racing to their booths.

Make your booth a prime destination in The Plastics Race and engage the minds of the industry's brightest young professionals.

RESERVE YOUR SPONSORSHIP TODAY

Register at *https:/www.4spe.org/tpr*

Contact Jackie Dalzell on behalf of SPE to discuss your sponsorship and learn how you can become a race participant too.

(w) 513 - 338 - 2185 | (c) 216- 233 - 6794 | JDalzell@ptonline.com

Proceeds go to SPE's Next Generation Advisory Board

Brought to you by:

Plastics Technology

Plastics Engineering

DRYING

Compressed-Air Dryer Recovers Heat from Compressor

The CARD L and CARD M compressed-air dryer series from Austria's FarragTech GmbH (U.S. office in Glendale, Ill.) can save 70% of compressed air compared with other compressed-air dryers, according to the company. The new CARD R system uses the CARD L and CARD M units as a base and then can save even more energy by recycling the heat produced by the compressor. It was introduced at the Fakuma show in Germany in October.

FarragTech says the CARD R system is customized based on process needs, with customers providing FarragTech their material throughput requirements and resin drying time. With this information, FarragTech can supply a properly sized dryer and compressor. The heat produced by the compressor is recycled via a heat exchanger and used to preheat the air used for drying.

With this design, the resin to be dried is preheated in the upper part of the hopper via heated ambient air, while the actual drying process takes place in parallel to the lower part, using only about 30% of the compressed air required by "pure" compressed-air dryers at the same material throughput, according to FarragTech.

Waste heat from the compressor at up to 80-90 C (176-194 F) is recovered via oil or air heat exchangers, which are integrated directly into the compressor's housing. FarragTech points outs that if drying takes place at 80 C (176 F), which is the drying temperature for nylon and ABS, then no additional heat input is required.

630-547-4447 • farragtech.com

DRYING

Vertical Centrifugal Dryer Gently Removes Moisture

A vertical rotor shaft in a new series of centrifugal dryers reportedly ensures longer dwell time in the drying chamber with a significantly smaller footprint than horizontal systems. The HVT series from Herbold USA, N. Smithfield, R.I., offers gentle, energy-saving drying of scrap and regrind, especially hollow bodies, PET bottles, polyolefins, and other plastics. Herbold notes that the HVT's distinguishing feature is its vertical rotor shaft. The dryer's rotor and housing design has been refined to minimize fines and increase yield.

Material is accelerated against a screened stator surface and is simultaneously transported from bottom to top by rotor paddles. Feeding is via a horizontal drainage screw, reportedly eliminating most of the surface moisture before material enters the dryer.

Herbold says energy savings are achieved through a reduced motor size. It says a typical one- or two-stage drying system for PET flakes with a 150-hp motor would yield a throughput of 2.5-3 tons/hr, whereas an HVT system can equal that performance with a drive motor of only 75 hp.

401-597-5500 • herboldusa.com

DRYING

Energy Saver Software Minimizes Power Usage

Maguire Products, Inc., Aston, Pa., has developed new software for its VBD vacuum dryers that constantly monitors the dryer operation and automatically adjusts to ensure that power consumption is reduced to only what is needed. Standard on new Maguire VBD dryers, the new software can be retrofitted to existing units.

Maguire notes that vacuum dryers' energy efficiency is greatest when they are operated at or near their throughput capacity. In actual processing, however, throughput varies, reacting to the demands of a molding machine or extrusion line. Without the new energy-saver software, Maguire says a vacuum dryer uses increasing amounts of energy as throughput decreases, unless the unit has been set up for the lower throughput. At throughputs that are 10% of capacity, for example, energy consumption could be 10 times greater than at full capacity if the dryer was not set up correctly.

The company says the new software eliminates the penalty for low-throughput operation by using data acquired from previous heating cycles to make adjustments to the current cycle. In addition, all controllers for VBD dryers now include a standard onboard energy-consumption display and logging capability, showing both real-time and time-averaged values in the industry standard of watts/kg/hr.

888-459-2412 • maguire.com

amerimold

The Event for Mold Manufacturing 2018

SAVE THE DATE

Novi, MI | June 13-14, 2018

AMERIMOLDEXPO.COM

EXHIBIT HALL
featuring machine tools, mold components, tooling, materials, software, more

BUSINESS DEVELOPMENT OPPORTUNITIES
for mold builders and mold buyers

AMERIMOLD TECH TALKS
on designing, machining, maintaining molds

BOOTH SALES ARE OPEN
Reserve Early and Save!
Sales@amerimold.com

CO-LOCATED WITH:
CW 2018 COMPOSITES OVERMOLDING

PRESENTED BY:

MoldMaking Technology | PT Plastics Technology | AD&P Automotive Design&Production | Modern Machine Shop | AM Additive Manufacturing | Gardner Business Media, Inc.

INJECTION MOLDING

Production Monitoring System Built for Simplicity, Affordability

Production monitoring systems are increasingly popular in molding and extrusion plants. And for good reason: If evidence from metalworking machine shops is any indicator of conditions in plastics processing, then more than 80% of current manufacturing data is often lost or under-utilized, and this can cost manufacturers thousands of dollars a month per machine due to inefficiencies not perceived or not promptly diagnosed for lack of data. And manual production-data reporting systems are time-consuming and prone to errors.

One experienced injection molder wanted an automated system, but considered the available options too costly and too complex, requiring weeks of personnel training and expensive installation. So he built a team of experienced manufacturing professionals and created his own. Called Smart Attend, the system was in development for two years and was launched commercially last June by a company of the same name, based in Aurora, Ont.

Smart Attend collects data (such as 24V I/O signals) produced by injection machines, extruders, or other machinery and connects to the plant's WiFi network to send data to PCs via web browser login or to mobile devices via the Smart Attend app for iOS or Android. Data is collected by a small, WiFi-enabled box called a Smart Device, which sends encrypted data to a secure "cloud" server. A backup 2 GB memory card ensures that data is never lost and can be collected in the event of a network disconnect. Also included is a special "tower light" with 150 LEDs capable of flashing a wide variety of colors to signal the state of the machine and production.

Initial registration and setup of the system can be done on a PC through a micro USB cable. Further Smart Attend settings can be configured directly over the network via the app. Utilizing "plug-and-play" functionality, initial configuration can be completed in as little as 20 min without requiring IT or specially trained personnel. Overall installation time averages 2-4 hr, says Max Preston, Smart Attend dir. of sales and marketing. He says the Smart Attend system can work with any brand and any age of machine—"It helps bring old machines up to the modern age."

Preston adds that "Big data does not equal smart data. A production-monitoring system does not need to provide a lot of data, but just crucially important data, *usable* data, *actionable data*." One factor is immediate availability. "With Smart Attend, data goes instantly from machines to managers."

Smart Attend provides information in three ways:

1. Visually, through the tower light, which responds to machine alarms in custom-configurable ways, with several flash, strobe, and solid-color settings. Alarms can be customized in almost any color. The light provides 360° visibility.
2. Audibly, through a powerful speaker housed at the top of the tower light, which accepts custom sound files to represent specific alarms.
3. Digitally, through the native mobile-device app and web portal. That portal not only allows remote access to all machine-based production data, but also allows export of the data to ERP or MRP systems. The Smart Attend user "dashboard" provides a quick overview of plantwide production data and the ability to home in on any individual machine. The dashboard provides data on cycle times, current machine status, part counts, alarm description and Pareto analysis, hourly incident reporting, job scheduling and tracking, and machine OEE (Overall Equipment Effectiveness, which is a single percentage number that combines ratings of machine availability, productivity performance, and good/bad part production).

Custom reports are also available for production from the last minute up to the last three years. Such reports can include alarm response times, uptime/downtime tracking, actual vs. expected productivity, and real-time benchmarking from shift to shift, week to week, or month to month.

According to Preston, beta users of Smart Attend have experienced a productivity boost of 10% to 15% or even 20% in the first two weeks of using the system:

- One customer with 26 injection machines experienced 46% average productivity improvement over the first 12 months with the system.
- An injection molder of auto parts with a global customer base, reported saving $10,000 in the first week by not having to expedite customer shipments through better production data.
- A moldmaking firm used production data to help diagnose and solve job setup and lag time problems, resulting in 12% greater uptime and quicker job completion.
- A CNC machining customer uses the sytsem to monitor machines in different buildings, resulting in 35% greater productivity and uptime on specific machines.

866-210-9630 • smartattend.com

Plastics Technology

WEBINAR:
January 17, 2018 | 2PM

Sick & Tired of Burning Up Motors, Capacitors, Drives and Controls???

Transformers Failing and Downtime

Motor Burnout and Downtime

Controls/Displays, Memory Loss and Downtime

VFD Drives and Downtime

80% of These are Caused By Poor Internal Power Quality Which Can Be Identified and Corrected:

WEBINAR: January 17, 2018 | 2PM

How to Identify the Problems and Causes of Plant Downtime Caused by Poor Power Quality

LEARN why this happens

LEARN how to diagnose with low cost electrical equipment

LEARN how to improve plant productivity by avoiding unplanned motor & drive outages

Presenters:

James Zinski
President & COO,
MachineSense

Fred Eichhorn
Electrical Controls Consultant,
MachineSense

REGISTER NOW @ ptonline.com/powerwebinar

INJECTION MOLDING

MES System Adds Mobile Reporting & Maintenance Apps

Arburg's November user group meeting focused on the company's ALS host-computer system at Arburg's Lossburg, Germany, headquarters. The meeting presented new functions to make data from this MES (manufacturing execution system) accessible on mobile devices. These included the new ALS Mobile front end with a responsive design, as well as the Mobile Reporting report client and the new Mobile Maintenance module, which makes it possible to execute, acknowledge, and comment on maintenance orders via mobile devices. Arburg's U.S. office is in Rocky Hill, Conn.

860-667-6500 • arburg.com

INJECTION MOLDING

Fine-Tuned Control for Hot-Runner Valve-Gates

Synventive Molding Solutions, Peabody, Mass., has introduced synflow3 technology, which allows molders to slow the opening of the hot-runner valve pin for a set distance and hold at that position until closing, or alternate different moves within a cycle. The updated pin control can stop the pin and hold it at any position mid-stroke. Used to help eliminate cosmetic defects on sequentially filled parts that are caused by sudden flow-front accelerations and hesitations when the delayed pins open, synflow3 allows for individual flow-rate control of each nozzle to balance family molds or fill complex multi-gated geometries. In addition, alternating opening profiles can be programmed for ability to pre-fill cold runners or create differential packing within complex multi-gated parts. No connection to the injection machine is necessary.

Synventive reports that the most significant difference between synflow and other pin control technologies is the ability to apply it to existing tools. For example, if during mold sampling, it's determined that synflow could improve the process, Synventive says the technology could be installed and running in minutes. Synventive notes that its valve-gated hot runners come standard with SVG+, which includes position sensors. Synflow can be added to any activeGate-enabled system through external hookups. This means that molders no longer need to commit to these flow-control technologies for the life of the tool, not knowing if they will ever actually be needed.

800-367-5662 • synventive.com

INJECTION MOLDING

News in Sensors, Quality Monitoring, And Quick Mold Change

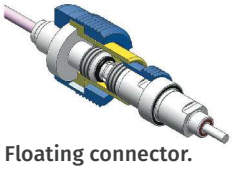
At the recent Fakuma show in Germany, Priamus System Technologies (U.S. office in Sterling, Va.) introduced several new products:

• The new Quality Monitor is an inexpensive alternative to the company's FillControl process monitor. It's based on the new BlueLine QDaq digital data-acquisition unit (below) mounted on the injection machine. This compact unit measures only 160 × 100 × 61 mm. It incorporates an OPC-UA interface, becoming the standard for Industry 4.0 connectivity or "the Internet of Things." The device sends data from cavity pressure or temperature sensors and from the process to a server,

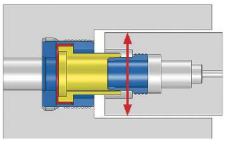
the cloud, tablet, and/or smartphone. No special software is needed. A PC or tablet is connected to the QDaq only for setup, after which it operates as a stand-alone data collector and transmitter. Accessories for this system include a QScreen tablet for data display and color-coded LED lights to indicate process status relative to standards.

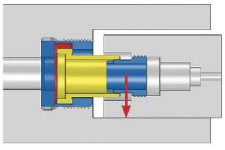
Angled connector.

• Priamus also showed two new developments in sensors. One is cavity-pressure sensors with angled connectors. This minimizes the mounting space and height required by replacing the standard axial connection with a right-angled connection (see image). The side-outlet connecting cable is available for all standard sensors with automatic sensitivity detection and requires no modification of the sensors. The second development is floating sensor disconnects for floating mold inserts. Priamus says floating mold inserts with generous tolerances are an increasingly popular option because they require less precise machining. The new disconnect system for cavity pressure and temperature sensors automatically compensates for lateral displacement of the inserts.



Floating connector.





• For quick mold changes, Priamus' new Mold Dock is the result of a collaboration with Staubli, which specializes in connectors for mold utilities in quick-mold-change (QMC) systems. Up to eight connector inserts for temperature or pressure signals are secured by a simple locking system and encoding pins. A manual dock is shown here; the inserts are also available separately for fully automated QMC systems.

Mold Dock.

877-774-2687 • priamus.com

INJECTION MOLDING

New Small 6-Axis Robot

Sepro Group of France (U.S. office in Warrendale, Pa.) is expanding its line of six-axis robots from Yaskawa-Motoman with three smaller models sized for injection machines of up to 500 tons clamp capacity. Four larger models were introduced in 2016 for presses up to 5000 tons. The new models in Sepro's 6X Visual family are:

- 6X-70/70L (long reach) for presses of 20 to 200 tons. Payload capacity, 5 kg (11 lb); reach, 706 mm or 895 mm (70L).
- 6X-140 (pictured) for presses of 80 to 200 tons. Payload capacity, 5 kg (11 lb); reach, 1440 mm.
- 6X-170/170L for presses of 150 to 500 tons. Payload capacity, 24 kg (52.8 lb) or 10 kg (22 lb) for 170L; reach, 1730 mm or 2010 mm (170L).

412-459-0450 • sepro-america.com

MATERIALS

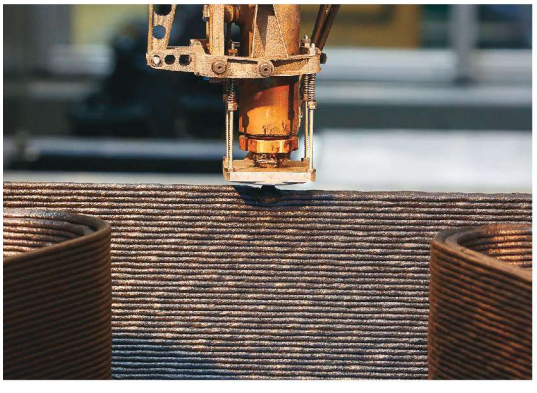
More Filaments for FDM and Large-Area Additive Manufacturing Debut

Continuing its thrust into the additive manufacturing/3D printing arena, SABIC, Houston, has launched new filaments and is working on others.

Lexan EL AMHI240F is a based on SABIC's Lexan EXL PC/silicone copolymer technology, which delivers high impact strength and low-temperature ductility. The filament is said to address the need for higher-performing industrial materials and is designed for use in Stratasys Fortus Classic FDM industrial printers, as well as other printers with sufficient temperature capability and an open-format architecture. It is the first of several new materials with distinctive performance characteristics that the company aims to launch in 2018. The filament features a high level of toughness and improved ductility down to -30 C/-22 F. Compared with standard PC, this material delivers up to four times better notched Izod impact at room temperature and up to three times better at -30 C, depending on print orientation. It has a HDT of 140 C/284 F, which is higher than that of general-purpose ABS filaments. It is initially offered in black, with white and other colors underway. It meets UL 94V-0 at 3.0 mm in flat (XY) and on-edge (XZ) orientations.

Competitive Filament | Lexan PC Filament

New Thermocomp AM compounds address the special requirements of large-format additive manufacturing (LFAM). Print parameters and mechanical properties for the materials—developed by SABIC using test specimens printed on the company's in-house big-area additive manufacturing (BAAM) machine—can aid users in expediting material selection and optimizing processing conditions. Reinforced with carbon or glass fibers, the new compounds can be used for applications in tooling, aerospace, automotive, and defense industries. The first eight Thermocomp AM compounds are based on four of the company's amorphous resins: ABS, PPE, PC, and PEI, which exhibit good creep resistance. Greater dimensional stability of these maerials means lower shrinkage during cooling and less thermal expansion during part use. SABIC plans to expand the Thermocomp AM portfolio.



Thermocomp filament for LFAM.

Currently in development are compounds based on semi-crystalline resins such as PBT, nylon, PPS, and PEEK to address the need for LFAM materials with improved chemical resistance and stiffness.

713-532-4999 • sabic.com

MATERIALS

Medical TPEs For Face Masks And Cushions

Two new families of medical-grade TPEs launched by Teknor Apex Co., Pawtucket, R.I., are designed for injection molded face masks. They include a deformation-resistant series for flexible masks and a series of gels that provide a gas-tight cushion for rigid masks molded from PP. The new materials comply with FDA requirements for food-grade ingredients, ISO 10993-5 standards for biocompatibility, and REACH SVHC directives.

Medalist 50100 Series TPEs for flexible masks are more deformation-resistant than PVC and more economical than silicones. In respiratory-therapy oxygen masks, the Medalist TPEs are flexible enough to provide a comfortable fit on the face yet retain their shape during packaging and storage, without need for inserts. Their PVC-like transparency facilitates patient monitoring. These compounds come in Shore A hardness of 58, 68, and 73.

Medalist 10100 Series TPE gels for rigid-mask cushions bond to PP in insert or two-shot molding, providing a less costly alternative to air-filled PVC "balloon" cushions that must be glued onto the rigid component. The super-soft gel cushion conforms to the patient's face to ensure a gas-tight fit that is more secure than the PVC cushion and has a lower profile on the face. Grades in the series include a clear 8 Shore A compound and a translucent 18 A grade. Precolored compounds are available.

401-725-8000 • teknorapex.com

ufi Approved Event

Chinaplas® 国际橡塑展 2018

New Venue
New Breakthroughs

The 32nd International Exhibition on Plastics and Rubber Industries

Smart Manufacturing • Innovative Materials • Green Solutions

@Asia's No.1 Plastics & Rubber Trade Fair

2018 • 4 • 24 - 27

National Exhibition and Convention Center,
Hongqiao, Shanghai, PR China

- Exhibition area 320,000+sqm
- 4,000 exhibitors
- 4,200+ sets of machinery on display
- 13 country / region pavilions

www.ChinaplasOnline.com

CHINAPLAS

Pre-register to
enjoy admission discount

CHINAPLAS

ORGANIZER

ADSALE 雅式

CO-ORGANIZER

Messe Düsseldorf China

SPONSOR

EUROMAP European Plastics and Rubber Machinery

OFFICIAL PUBLICATIONS & ONLINE MEDIA

CPRJ 中国塑料橡胶 China Plastic & Rubber Journal AdsaleCPRJ.com

CPRJ International 国际 China Plastic & Rubber Journal AdsaleCPRJ.co

Tel: (852) 2811 8897 (Hong Kong) | E-mail: Chinaplas.PR@adsale.com.hk | Adsale Plastics Website: www.AdsaleCPRJ.com | Adsale Group: www.adsale.com.hk

THERMOFORMING

All-Servo Single-Station Former

CannonSpA of Italy (U.S. office in Cranberry Twp., Pa.) has introduced the T-System, a single-station thermoformer designed to be faster, more flexible, and more energy efficient than previous equipment. Available in 12 sizes from 1000 × 700 mm to 3000 × 2000 mm forming area and 400 to 800 mm max. draw depth, the units boast the following:

- Up to 40% lower energy consumption for the machine movements, thanks to all-servo actuation with self-lubricating linear guides;
- Up to 20% less energy used for cooling;
- Up to 40% faster movements in the forming area, while maintaining positioning precision of up to 0.05 mm;
- Up to 20% savings in machine weight, making it easier to move and service and reducing wear and tear on individual components;
- Up to 15% smaller footprint and overall machine height.
- Mold changes as fast as 10 min;
- Up to 20% greater flexibility in adjusting the forming aperture plate, thanks to the patented TRIPLO automatic adjustment system, which has been further improved in terms of lower weight.

This new-generation machine has an icon-based touchscreen operator panel; choice of ceramic, quartz, or halogen heaters; and standardized tool-mounting system that takes into account most of the types of tools used by custom formers and those of major brands in the industry.

724-772-5600 • cannonusa.com

MATERIALS

Carbon-Fiber Nylon 6 & 66 Compounds

Nylon 6 and 66 compounds reinforced by 15% to 30% virgin carbon fibers have been introduced by A.Schulman, Fairlawn, Ohio. They are aimed at aerospace, automotive, civil engineering, sporting goods and other consumer and technical applications.

Schulamid 6 is a general-purpose nylon while Shulamid 66 is recommended for applications with higher peak temperatures. Besides increased stiffness and strength, these compounds offer electrical conductivity and low thermal expansion.

330-666-3751 • aschulman.com

MATERIALS

Low-Emission Acetal for Gears

A new low-emission acetal for automotive and non-automotive gears is said to outperform high-viscosity acetals. Launched by DuPont Performance Materials (now a unit of DowDuPont Materials Science), Wilmington, Del., Delrin 100CPE NC010 is an alternative to Delrin 100, which for 60 years has been a standard choice for high-performance gears—particularly in automotive actuators such as window lifters, steering supports, safety restraint systems, and wipers.

Thermal properties and high-temperature tensile creep of this grade are comparable to state-of-the-art grades. Its level of formaldehyde emissions is below 2 ppm according to the VDA 275 testing method—which allows compliance with current and future industry standards. It also boasts strong molding productivity, enabling continuous molding for several thousand shots. It is said to leave a very clean tool surface with a step-change reduction in mold deposits vs. the incumbent materials.

800-441-0575 • dupont.com

AUTOMATION

New Source & Capabilities For Collaborative Robots

One of two recent announcements in collaborative robots ("cobots") is the entry of a new supplier in the field. Motoman Robotics Div. of Yaskawa America Inc., Dayton, Ohio (***motoman.com***), is now offering commercially its first "human collaborative" robot, the six-axis model HC10. Featuring power- and force-limiting technology, it's said to work safely with, or in close proximity to, humans by stopping if it contacts an operator. Dual torque sensors in all joints constantly monitor force to react quickly to contact, something usually found only in more expensive systems. It also is designed to eliminate operator pinch points, and through-arm utilities hide cabling and increase safety by reducing the risks of snagging or interference with other equipment.

In addition to standard robot programming through the teach pendant, the user can hand-guide the HC10 when teaching new program paths. The robot can operate at full speed or reduced, "collaborative" speed. Payload capacity is 10 kg (22 lb) and horizontal reach is 1200 mm.

Second, Rethink Robotics, Cambridge, Mass. (***rethinkrobotics.com***), has introduced Intera 5.2, an expanded software program for its Sawyer cobot. This software is said to be a first for a cobot in providing data on cycle time, part count, speed, force, etc. on a customizeable "dashboard." Called Intera Insights, this feature for the first time gives users real-time information on how the cobot is operating.

The new software release also includes extensive additions to Sawyer's vision capabilities. In addition to the embedded cameras that are standard with Sawyer, users now have the option to seamlessly integrate external cameras in minutes. This will improve the cobot's vision capabilities and can allow integration of existing in-house vision systems on Sawyer.

Intera 5.2 is available for download on existing Sawyer cobots and will come standard on all new units.

COMPOUNDING

Custom Designed Process Vessels

The newest process vessel from Charles R. Ross & Son, Hauppauge, N.Y., is a 300-gal version designed for 5-psi internal pressure at 300 F. Product wetted surfaces are polished stainless steel. A special disperser blade is driven to 1150 rpm by a 75-hp, explosion-proof motor. The agitator shaft utilizes a mechanical seal in an oil bath. A 50-psig, baffled jacket surrounds the sides and vessel bottom for heating/cooling.

800-243-7677 • mixers.com

MATERIALS

High-Heat-Stabilized Nylon 66 Goes Under the Hood

A new iron-free heat-stabilization system from Lanxess, Pittsburgh, is designed to increase the continuous operating temperatures of nylon 66 to over 230 C/446 F. Previous "Xtreme Temperature Stabilization (XTS)" systems protected nylon up to 200 C/392 F. The first entry in this new product line is a 35% glass-reinforced grade, Durethan AKV35XTS2. Lanxess is responding to the trend toward more efficient combustion engines that subject plastic components under the hood to higher thermal loads. According to the company, the new nylons provide an alternative to costly, heat-stabilized specialty thermoplastics such as fully and semi-aromatic nylons and PPS. Possible applications include air-intake modules with an integrated intercooler or air ducts near the turbocharger.

After 3000 hr at 230 C, reduction in tensile strength at break and elastic modulus is "barely measurable," according to Lanxess. Compared with Durethan nylon 66 compounds having the same glass-fiber content and previous heat-stabilization systems, the new grade boasts improved flow and surface quality.

Lanxess is working on additional grades with higher and lower glass contents, as well as a blow moldable version for turbocharger components.

800-526-9377 • lanxess.com

MATERIALS

Flame-Retardant Nylon 66 for Unattended Appliance Connectors

An unreinforced, flame-retardant nylon 66 designed to bring extra safety to electrical connectors for unattended appliances is new from Houston-based Ascend Performance Materials. Vydyne FR350J reportedly sports a "best-in-class" glow-wire ignition temperature (GWIT) of 960 C at all thicknesses up to 3 mm. Molded parts have achieved glow-wire end-product test values of 750 C at all thicknesses. The material also achieves PLC 0 ratings in hot-wire ignition (HWI) and high-amp arc-ignition (HAI) tests according to UL 746A. In addition, the compound carries an RTI electrical rating of 130 C and UL 94V-0 rating down to 0.4 mm.

Vydyne FR350J also boasts superior melt flow and requires lower pressure to fill molds. The compound has a wide processing window and is color stable for natural and colorable applications. The FR additive package is said to exhibit low corrosion for improved electrical contact performance.

713-315-5826 • ascendmaterials.com

TOOLING

New Standard Mold Components

Among a wide-ranging miscellany of new standard mold components at the recent Fakuma show in Germany, a couple stood out. One was stack-mold actuator systems. Hasco (U.S. office in Fletcher, N.C.; ***hasco.com***) introduced the Module 2.5, a smaller version of the Module 4 introduced at K 2016. There's now also a larger Module 5. They have DLC-coated slideways and low height to accommodate smaller tiebar distances.

Another new product of this type is the E 8630 from Meusburger (U.S. office in Charlotte, N.C.; ***meusburger.com***). It comes with DLC-coated slideways, through-hardened gear teeth, a choice of gear racks from 800 to 1200 mm, and a software "wizard" to help users calculate the length needed.

Among new standard mold components at Fakuma were stack-mold actuators from Hasco (left) and Meusburger (right).

Another category of new products are mold monitors. Hasco has a new *round* cycle counter, which simplifies installation, since the mold maker can use a round cutter to make a pocket, rather than having to mill a square pocket.

Progressive Components, Wauconda, Ill. (***procomps.com***), continues to improve its CVe Live remote mold monitor. An enhanced online dashboard provides a snapshot of a company's entire fleet of tools. A customizeable tool tab displays mold information and performance metrics, such as efficiency and cycle-time averages for the trailing hour, 24 hr, and week. Presses can now be assigned to a tablet, providing a portable and simplified interface to enter rejects and downtime codes. There's also a new Exceptions Dashboard for manufacturing cells (intended for display on a large screen), which keeps track of any exceptions that occur on the machines assigned to the dashboard. And a Data Transfer option allows any data collected by the CVe Live to be manually or automatically outputted to an Excel or JSON file, simplifying data transfer to existing systems.

A new player in the mold-monitor market is moldmaker Haidlmair of Austria and Concord, Ont. (***haidlmair.us***) Its Mold Monitoring 4.0 system uses a box on each mold half to collect and upload to the cloud data on parts produced, cycle time, water temperature and flow rate, cavity pressure, and more. The mold can also send out warnings when critical parameters deviate from permissible limits and send notifications when the tool needs maintenance or service. Haidlmair has four molds in testing since the end of 2016.

In other components, Hasco offers a new Z1790/1791 round latch lock, which is compact and mounted not on the side of the mold, but inside the tool, out of the way where it is not easily damaged. Stroke is adjusted by means of a screw at the back, not by machining.

For plugging cooling channels, moldmakers normally use threaded plugs. A more compact solution is Hasco's new Z9430 copper sealing disc, which has no threads and is quickly and inexpensively driven into the channel by a Z9431 fitting mandrel.

Other new Hasco components were reported in an October Keeping Up, but the company has also launched an update of its customer portal, which now allows ordering of products from the company's 100,000-item catalog and provides an online check of whether the item is in stock and also provides individual customer prices, not list prices. The portal provides CAD data and drawings in many formats. There's also a new mold-base assistant configurator that provides not only standard configurations but allows the user to configure a customized mold base in as little as 2 min—said to be unique in the world. With drag-and-drop, users can configure bases for stack molds, stripper-plate molds, and double-ejection tools. Configurations can be saved for repeat use. Also configurable in the portal are ejector pins, cut to length in a choice of two tolerances.

Meusburger also brought out several new standard components:

- E 3064 guide for an angled pin requires only conventional machining for a rectangular pocket, with no angling of the cavity plate.

New guide for inclined pin from Meusburger simplifies machining, allows for stroke adjustment, and absorbs high force through maximum contact between guide and pin.

- E 1830 ejector-set push-back unit allows the ejector set to move only after a defined opening stroke of the mold. Adjustable components allow setting the stroke length.

- E 2752 combination cable for hot runners includes both thermocouple and heater-power lines. Shielded sensor lines provide reliable signal transmission.

- E 1307 flat mold-base centering unit with DLC coating is said to be very compact and to provide optimal compensation for thermal expansion between the insert and cavity plate with milled pocket, due to centering directly on the cavity.

- E 13045 compact top lock with DLC coating provides for easy installation through vertical machining, from the split-line face, in one operation.

MATERIALS

New Nylon, PPA & PPS Grades For Water Management

DSM Engineering Plastics (U.S. office in Troy, Mich.) has launched a variety of new grades aimed at water management, such as water heating systems, water meters, sanitary products, appliances, and hot-water connectors.

- New grades in DSM's EcoPaXX nylon 410 range are suited to long-term contact with water.
- ForTii Ace WX51-FC is a 30% glass-reinforced PPA based on nylon 4T chemistry with a high glass-transition temperature of 160 C/320 F. It was developed for drinking-water applications and long exposure to water at 100 C/212 F and above. Injection molded parts reportedly show superior weld-line strength retention after long-term exposure to hot water above 100 C.
- Also for drinking-water contact is Xytron G3020DW-FC, a 30% glass-filled PPS; Xytron G4020DW-FC, 40%-glass PPS; and Xytron G3020E, impact-modified PPS. What reportedly distinguishes these grades is lower flash than with other PPS brands, while retaining high flow. Xytron PPS has a continuous-use temperature of 240 C/464 F.

800-333-4237 • dsm.com

INJECTION MOLDING

'Value-Priced' Servo-Hydraulic Toggle Presses from Taiwan

Cincinnati Process Technologies (CPT), Cincinnati, has introduced to the U.S. the new Super Master EV2 Series of servo-hydraulic toggle presses from Asian Plastic Machinery, sub. of Chen Hsong Group of Taiwan. This "value-priced" line ranges from 88 to 1099 tons. According to CPT general manager Mike Green, these machines use up to 80% less energy and water than standard hydraulic presses and also reduce noise levels. The Smart Mold Controller with B&R 10.4-in. display allows operators to profile stages of injection speed, holding pressure, back-pressure, and screw rpm with closed-loop control.

Pricing starts in the "low $40,000 range," according to CPT, making the EV2 Series unusually affordable for its capabilities. CPT will exhibit at NPE 2018 in Orlando, Fla., in May. It will not have an EV2 model, but will operate one of its higher-end TSV Series servo-hydraulic toggles with an IML system.

513-619-7415 • cinprotech.com

Mixed Bag for Volume Resin Prices

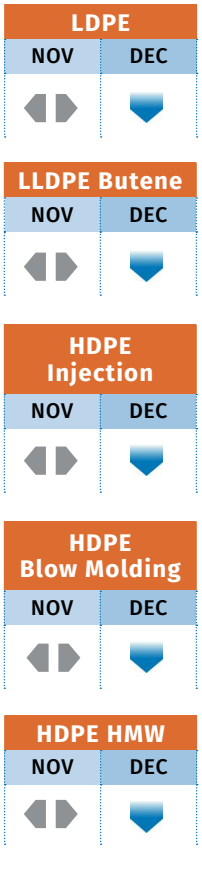
As hurricane aftermath recedes, PE, PS, PVC prices are retreating; engineering resins are rising; PP and PET are "iffy."

By Lilli Manolis Sherman
Senior Editor

As we head into the new year, the course of high-volume resin prices was up, down, and undecided. Supply/demand fundamentals are key to the projected downward trend for PE, PS, and PVC; while higher feedstock costs and, in some cases, strong demand, are key to the upward move for volume engineering resins. There's a more indeterminate scenario for PP and PET, owing to snug capacity for the former and overcapacity for the latter.

These are the views of purchasing consultants from Resin Technology, Inc. (RTi), Fort Worth, Texas (***rtiglobal.com***), CEO Michael Greenberg of the Plastics Exchange in Chicago (***theplasticsexchange.com***), and Houston-based *PetroChemWire* (*PCW*, ***petrochemwire.com***).

Polyethylene Price Trends



PE PRICES FLAT TO LOWER

Polyethylene prices remained flat in November, as there was still not enough inventory buildup, due to minor production issues at several suppliers, for post-hurricane prices to settle back to "normal" levels, according to Mike Burns, RTi's v.p. of client services for PE. Burns said last month there was potential for a supplier-driven decrease of up to 3¢ even before the end of the year. "Current price levels cannot be sustained as inventories recover," he explained. Burns expected further reductions this month and next, with decreases totaling 7-10¢/lb by March.

By early December, both The Plastics Exchange's Greenberg and *PCW* reported that spot PE prices continued to "unwind," a signal of what could be a course reversal in contract prices. Said Greenberg, "There was a series of price increases since August that varied by amount and implementation date. It seems that 10¢/lb on average took hold. Now, with the spot market falling sharply, we would not consider any further contract-price advancement and expect to see contract prices begin to decline, maybe as early as December." Secondary-market prices dropped by 7¢/lb from their peak gain of 15¢/lb in mid-October, according to all three sources.

PCW said spot PE prices were mostly lower as supplier inventories continued to recover from Hurricane Harvey disruptions. Burns added that new PE capacity continues to come on stream, with the majority of that added volume going to exports. "U.S. export PE prices will be 7-10¢/lb lower than global prices," he said. Burns noted some concerns in the industry that ethylene monomer availability will be a challenge in the second quarter, as new PE capacity could well outpace new monomer capacity coming on stream.

Market Prices Effective Mid-December 2017

Resin Grade	¢/lb
POLYETHYLENE (railcar)	
LDPE, LINER	100-102
LLDPE BUTENE, FILM	86-88
NYMEX 'FINANCIAL' FUTURES	48
JANUARY	48
HDPE, G-P INJECTION	102-104
HDPE, BLOW MOLDING	92-94
NYMEX 'FINANCIAL' FUTURES	50
JANUARY	50
HDPE, HMW FILM	109-111
POLYPROPYLENE (railcar)	
G-P HOMOPOLYMER, INJECTION	78-80
NYMEX 'FINANCIAL' FUTURES	57
JANUARY	57
IMPACT COPOLYMER	80-82
POLYSTYRENE (railcar)	
G-P CRYSTAL	104-106
HIPS	110-112
PVC RESIN (railcar)	
G-P HOMOPOLYMER	83-85
PIPE GRADE	82-85
PET (truckload)	
U.S. BOTTLE-GRADE	68-70

PP PRICES INCH UP

Polypropylene prices move up 1¢/lb in November, once again in step with propylene monomer contract settlements, though some industry sources reported that PP suppliers tacked on an additional

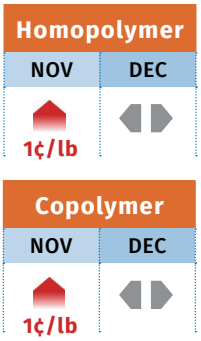
1¢ in margin expansion. However, Scott Newell, RTi's v.p. of PP markets, did not see evidence of margin expansion; he expected monomer prices to top out, possibly in December if the new Enterprise Product Partners propylene unit ramped up production. "In that case, December monomer contract prices could be flat to down—but if the new plant were not to ramp up enough, monomer could be flat to up," he said.

Though unconfirmed, some industry talk had it that as 2018 contract negotiations were underway, the market was becoming somewhat more competitive, and some suppliers were backing out of margin expansions and even offering some margin erosion.

The PP spot market was characterized as snug—with supplies of higher-flow impact copolymer and clarified random copolymer particularly tight—by both *PCW* and Greenberg. In early December, Greenberg said, "Despite the fact that PE prices are coming back down hard, PP market fundamentals are quite different; and, to buyers' frustration, prices remain firm to higher. Producers have responded to rising prices and good demand with added production, running reactors as close to capacity as practical. This has helped to keep a lid on PP prices."

Both Newell and *PCW* characterized the overall market at year's end as tightly balanced and demand as somewhat lackluster. Newell noted that for 2017, total sales (including exports—which dropped) will be up about 1%, though domestic sales were up by 3.5%. He expected to see some continued growth in demand in 2018. *PCW* reported that talk of planned maintenance at several units in the first quarter, combined with no new capacity, might tighten up the market further. Although some PP has come in from abroad, Newell did not expect a flood of imports, though a lot will depend on domestic PP pricing.

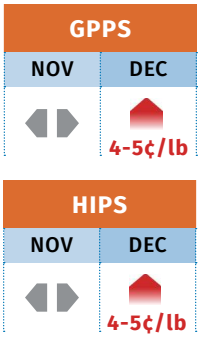
Polypropylene Price Trends



PS UP, BUT NOT FOR LONG

Polystyrene prices were flat in November, but suppliers were seeking increases on the order of 5-6 c/lb, effective Dec. 1, according to *PCW* and Mark Kallman, RTi's v.p. of client services for engineering resins, PS, and PVC. *PCW* noted that the move was supported by a 50¢/gal increase in December benzene contracts (each 10¢/gal increase is roughly equivalent to a 1¢/lb increase in PS cost), but also characterized December as a seasonally weaker demand month.

Polystyrene Price Trends



Kallman ventured that suppliers would more likely implement 4-5¢/lb, but he also expected that "a good part, if not all, of this increase will come off in January and February due to anticipated better benzene availability."

PVC FLAT TO DOWN

PVC pricing in November was a bit "muddled," according to RTi's Kallman, ranging from flat to 2¢/lb lower—after a 3¢ price hike in October. Kallman expected further price reduction in December from recognized discounts or incorporated into new 2018 contracts—for a total of 3¢/lb across the board. Not only were PVC inventories starting to build, but export business was off.

PCW reported that processors—other than pipe extruders, who were able to push pipe prices to the highest level of the year—were mollified by the prospect of PVC prices dropping by at least. 3¢/lb. *PCW* noted that the October hike brought the total increase in PVC prices to 9¢/lb, while ethylene contract prices through September were up only 1.75¢/lb since January 2017. Kallman predicted flat or lower PVC pricing in the first quarter, though the second quarter is expected to be strong domestically and globally.

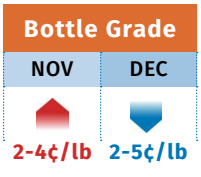
PVC Price Trends

PET PRICES UP

PCW reported that domestic bottle-grade PET spot resin started December at 68-70¢/lb for railcar/bulk-truck shipments for Midwest spot delivery—up 2-3¢/lb from November. However, December contract business tied to feedstock costs was 2-5¢/lb lower for railcar and bulk-truck quantities. Domestic PET feedstock prices settled moderately higher in November, with paraxylene up 1.5¢/lb and PTA up 1¢/lb, while MEG dropped by 1.4¢/lb.

Imported PET resin, with an IV of 78 or higher, on Dec. 6 was at 65¢/lb, delivered duty-paid (DDP) to the East Coast and 70¢/lb DDP West Coast, up 1-2¢/lb from November.

PET Price Trends



ABS FLAT TO HIGHER

ABS prices held flat from June through November, after increasing 15-20¢/lb through April and dropping 5¢/lb in May. But suppliers were seeking increases of 5¢/lb for mid-December, tied to higher benzene prices.

RTi's Kallman noted that while benzene contracts settled higher, they were generally expected to drop in the first quarter, and butadiene prices dropped. He expected ABS prices for ►

December and this month to range from flat to 2-3¢/lb higher. He noted that imported ABS continues to be competitive but not by much. Characterizing the domestic ABS market as fairly well balanced, he expected ABS demand to be steady in 2018.

PC MOVING UP

Polycarbonate prices remained flat through 2017's third and fourth quarters, after moving up 10-20¢/lb in the first two quarters. But bids of a 14¢/lb price increase for Jan. 1 were tied to the end-of-year spike in benzene prices. However, RTi's Kallman noted that the increase—which was not supported industrywide at press time—did not equate to the benzene increase but was an attempt at margin expansion.

"As suppliers' inventories build from improved plant production, I expect most buyers will be able to negotiate significantly lower reduction than the 14¢ sought," Kallman said. In addition, he noted that there were significant PC imports in 2017, which were expected to continue strongly into this year due to major capacity expansions in Asia, making for a more competitive environment. He predicted that PC demand growth would continue into this year, though perhaps not reaching 2017 levels, driven by automotive, electronics, and construction.

NYLON 6 & 66 UP

Nylon 6 prices gained 5¢/lb in November, after moving up 2-7¢/lb in the second quarter and holding flat from July through October. RTi's Kallman expected prices in December to rise another 5-8¢/lb. The swiftly implemented November increases were attributed to strong demand and some limitations in feedstocks availability following Hurricane Harvey. Moreover, there was further pressure from higher global prices of both benzene and caprolactum. Yet he expected prices to decline through the first quarter as benzene availability improves.

Nylon 66 prices in October and November were flat to higher. Some increases were pushed through distribution channels, although most held flat for 2018 contract negotiations, according to Kallman. Overall, he expected nylon 66 buyers to see increases of 5-10¢/lb, though one supplier was asking for 14¢. Kallman ventured that once increases were implemented this month, first-quarter pricing would likely be flat. Kallman sees continued demand growth for nylon 66 driven by key markets such as automotive, and characterized the market as balanced to a bit tight.

QUESTIONS ABOUT MATERIALS?

Learn more at PTonline.com

Visit the Materials Zone and the Materials Database.

Processing Index Nears Peak Historical Growth

Growth slowed in November, but index climbed 5% year to date.

By Michael Guckes
Chief Economist

Registering 51.9 for November, the Gardner Business Index (GBI): Plastics Processing indicated slowing growth among processors. The latest reading brings the index's 2017 year-to-date average to 53.7. November's reading was the lowest reading for the calendar year; however, in both April and July of this year the index fell sharply, only to rebound. In the year-to-date period, the index is up approximately 4.9%. The index is based on survey results from subscribers to *Plastics Technology* Magazine.

GBI's review of the underlying data for the month indicates that new orders, production, employment, and supplier deliveries lifted the business index while exports and backlogs pulled it down. The November readings showed a particularly abrupt change in supplier deliveries, which experienced a substantial slowdown in growth. The backlog reading also moved into deep contraction territory; however, past November backlog readings suggests that the fourth quarter of the year often experiences significant backlog contraction.

The GBI index for custom processors, in particular, increased in November after experiencing five consecutive months of slowing growth. The index was lifted largely by spikes in both new orders and employment, with the latter setting an all-time high. The employment index for the overall plastics industry was far more typical of recent levels.

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*.

GBI: Plastics Processing vs. Custom Processors

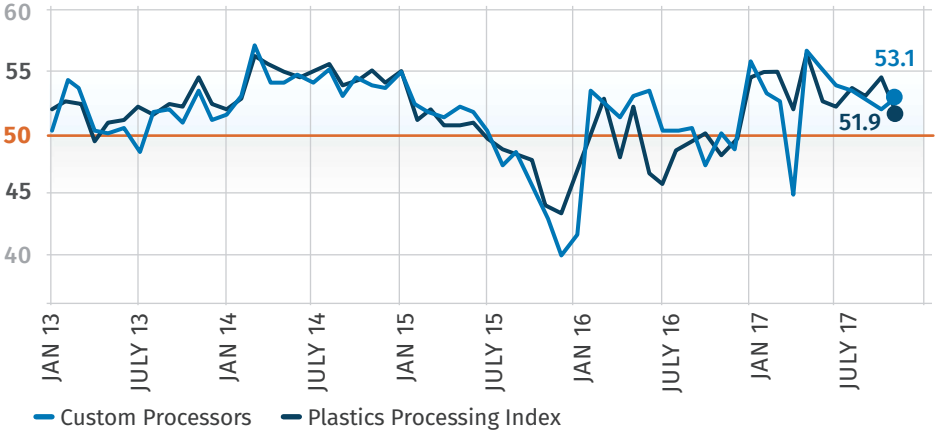


FIG 1

The GBI Plastics Processing Index ended November growing at its slowest rate for 2017. But the index for custom processors climbed, buoyed by increases in new orders and employment. (Index values above 50 indicate expansion, below 50 indicate contraction.)

GBI: Plastics Processing Backlog (3-month moving average)

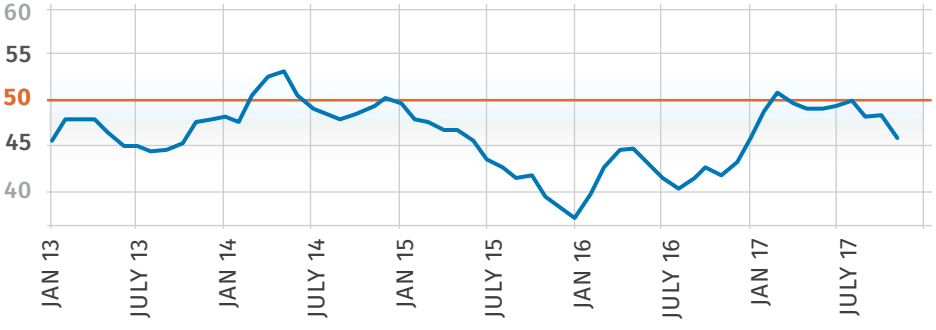


FIG 2

Backlogs contracted sharply in November, which is consistent with the seasonal pattern of weak fourth-quarter results in prior years, typically followed by improved readings by the end of the first quarter of the following year.

R&D Spending in Automotive Could Spur Demand

OEMs are investing more in R&D as they explore new technologies, a trend that bodes well for processors serving this market.

By Michael Guckes
Chief Economist

At Gardner Intelligence, we work diligently to provide our readers with information that connects economic data with current and expected business conditions. To accomplish this goal, we collect both economic data and equities data from Wall Street firms. By monitoring and reporting data from both domains, we create a more comprehensive view of what is and will happen in the specific manufacturing spaces covered by Gardner Business Media, parent company of *Plastics Technology* Magazine.

In recent months we have called attention to declining car sales and flattening truck sales. Yet this broad-brush picture misses critical dynamics of the industry, such as how the introduction and mass placement of new technologies and new drivetrains is creating significant demand for equipment in the automotive industry.

For this reason, Gardner Intelligence recently examined the financial statements of 14 major automotive OEMs to discern possible industry trends in capital expenditures, net property plant and equipment, and working capital. We selected these 14 OEMs because of the richness of the quarterly data they have provided during these years in their Security and Exchange filings, and then indexed this data to build a representative model of the industry.

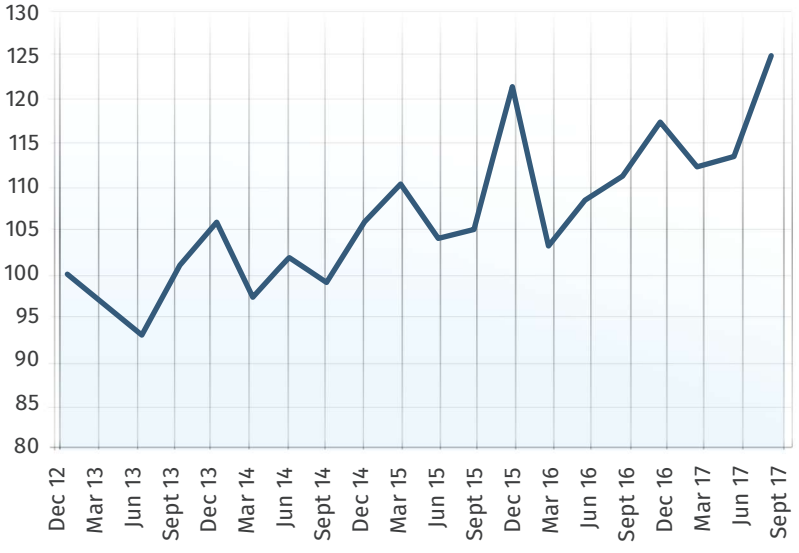
What we found was that between the fourth quarter of 2012 and the third quarter of 2017, capital expenditures grew at a nominal annualized rate of 4.7%. Unadjusted for inflation, the industry—as represented by our data—is spending 25% more on capital expenses than it did at the end of 2012. Additionally, net property, plant, and equipment data, which includes a broader range of purchases, including equipment but also depreciation of old equipment, has growth even faster during this time, with annualized growth of 17%. The result is that net PP&E today is nearly 70% higher than it was in 2012 .

The industry is spending 25% more on capital expenses than it did at the end of 2012.

Working capital between 2012 and 2015 was relatively stable until 2016, when it fell more than 20% from its level at the end of 2012. At present, the 14 firms for which we have data are holding 73% of the working capital they did at the end of 2012. Although working capital has diminished during these years, we see that major OEMs are spending more on R&D as a percentage of revenue than they have in the past. Honda and Daimler, respectively, spent over 5% and 3.7% of revenues on R&D in the third quarter of 2017. This is significantly more than was spent just two years prior, when Honda spent 4.25% and Daimler 3.25% of revenue on R&D in the third quarter of 2015.

While increasing sales in recent years has certainly bolstered some of these figures, it is important to realize that the new technologies coming to market in the next few years will require investments that will create sustained demand and industry growth for advanced automation, machinery, tooling, composites, and plastics. All OEMs understand that the significant changes their industries are and will be undergoing in the next few years will result in significant purchases of more technically capable and complex equipment.

Capital Expenditures of Major Auto OEMs
Indexed: 2012 = 100



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.SCREENCHANGER.COM

HITECH™

Leaders in continuous melt filtration since 1969

Manufacturers of fully automatic, continuous screen changers for every segment of plastics processing (blown & cast film; sheet, co-ex, foam, pipe & profile, blow molding, filaments & fibers, pelletizing, BIAX) for use with all families of thermoplastics.

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

D-S Davis-Standard®

The Global Advantage™

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.CWBRABENDER.COM

Brabender® CWB

C.W. Brabender Instruments, Inc. is the leading manufacturer of Polymer Processing Equipment. We offer an extensive product line of extrusion equipment.

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.DAKAMERICAS.COM

DAK Americas®

As one of the world's largest producers of PET Resins, DAK is committed to the global PET market with a capacity of over 4.1 billion lbs/yr. With sustainability initiatives, innovative Laser+® PET resin products, and trade leading technologies such as IntegRex® PTA and PET Technologies, DAK is setting new standards for the industry.

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

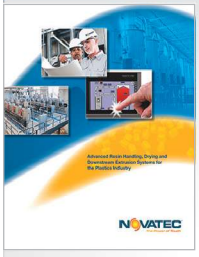
Macedonia, OH • sales@ppe.com

PET RESIN MARKET

With a PET Resin capacity that has grown thirteen fold (to over 4.3 billion lbs/yr), DAK Americas is committed to the global PET Resin Market. With sustainability, innovative new products, and state-of-the-art Melt-Tek® and IntegRex® PET technologies, DAK is setting new standards in the industry.

DAK Americas, Charlotte, NC • info@dakamericas.com

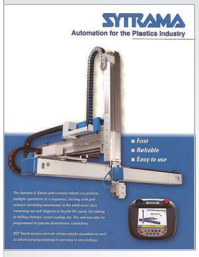
DRY-CONVEY-BLEND-EXTRUSION



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

STYRAMA AUTOMATION SOLUTIONS



Now a part of Negri Bossi (SACMI), Sytrama provides automation solutions for the plastics Industry. Sytrama G-Series part removal robots perform operations in sequence including movements in the mold area, and can be programmed to operate downstream automation processes.

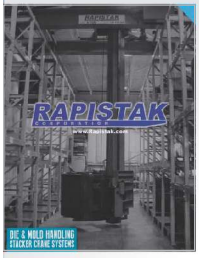
New Castle, DE • info@sytrama-usa.com

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

RAPISTAK-MOLD MANAGEMENT SYSTEMS



Mold storage a mess? Rapistak-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 today.

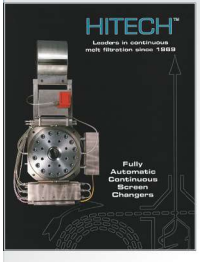
Blasdell, NY • ptsales@rapistak.com

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

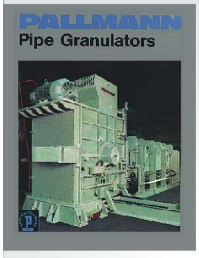
FULLY AUTOMATIC SCREEN CHANGERS



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

PLASTRAC AUTO-DISC

Plastrac Inc. manufactures Disc-based Blending and Dosing equipment for all plastics processing. Auto-Disc™ features gravimetric self-calibrating Dosing units and multi-ingredient blenders. Plastrac has recently added a Powder Additive Feeder option to the Auto-Disc™ Series.

Edgemont, PA • info@plastrac.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

HAMMERTEK CORPORATION

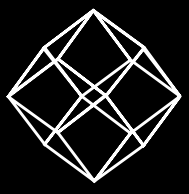
Built to endure.
Made to save you money.
Hammertek's Smart Elbow.

Landisville, PA • elbows@hammertek.com

SPECIAL SERVICES

TIME-CRITICAL CONFIDENTIAL PROBLEM SOLVING
Since 1973

- Chemical Analysis and Characterization
- Thermal Analysis and Rheology
- Mechanical Testing
- Organic Synthesis
- Lab Compounding, Pelletizing and Injection Molding
- Failure Analysis
- Quality Assurance
- Chemical Resistance
- Accelerated Weathering
- FDA Extractions
- R&D



- **PLASTICS**
- **POLYMERS**
- **RUBBER**
- **ASTM**

10626 KINGHURST
HOUSTON, TX 77099

281-879-8600
FAX 281-879-8666

POLYHEDRON
LABORATORIES, INC.
www.polyhedronlab.com

RIBBON BLENDERS PRICED 30% LESS

Scan to see units in stock for fast delivery.

Try our mobile app: mixers.com/web-app

1-800-243-ROSS
www.ribbonblenders.com

ROSS

Let Plastics Processors Know WHO You Are and WHERE You Are

To place a classified ad contact Chris Brock at 440-639-2311 or fax 513-527-8801.

PT Plastics Technology

GRINDING *Services*

- Granulation / Coarse Grinding
- Pulverizing / Fine Grinding
- Cryogenic Grinding
- Sifting / Classifying
- Blending / Mixing
- Destructive Grinding

Allgrind Plastics, Inc.
P.O. Box 363, Bloomsbury, NJ 08804
908-479-4400

www.allgrind.com • e-mail: info@allgrind.com

PRODUCT

Why should you filter your water?

Scale formation reduces the heat transfer rate and increases the water pressure drop through the heat exchanger and pipes. In fact, one study has shown that .002" fouling will increase pumping needs by 20%.

TEKLEEN® Automatic Filters Inc.

2672 S. La Cienega Blvd
Los Angeles, CA 90034 USA
(800) 336-1942 (310) 839-2828
www.tekleen.com info@tekleen.com

TRAINING

SYSTEMATIC EXTRUSION
TRANSFORMING EXTRUSION FROM ART TO SCIENCE

EXTRUSION MASTER I
CERTIFICATION COURSE

- Data driving extrusion processing
- Control process with only 2 parameters
- Live demo on extruder to prove theory
- Learn Scientific Extrusion method
- The only effective way to validate extrusion

26-30 MAR 2018
American Kuhne - York, PA

www.SystematicExtrusion.com
info@SystematicExtrusion.com

PURGING COMPOUNDS

MATERIALS WANTED/FOR SALE

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

PT 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.

DALLAS PLASTICS — MESQUITE, TEX.

Air-Ring Upgrade Pumps Up the Output

Film processor Dallas Plastics boosts throughput by as much as 40% by retrofitting a new air ring—without the need for IBC.

By Jim Callari,
Editorial Director

Output increases equal to that of adding internal bubble cooling without the "expense and headaches" associated with IBC. That's how Miguel Sanchez described his experience following the installation of a new air ring at Dallas Plastics Corp.'s blown-film plant in Wentzville, Mo.

Sanchez manages that plant, one of three facilities operated by Dallas Plastics, which was established in 1989. The company (***dallasplastics.com***) specializes in converter-grade films for printing, laminating, and automated packaging, and offers a wide range of specialty films such as narrow-width layflat tubing, critical-tolerance films, non-scratch LDPE, and high-tensile-draw tape for drawstring bags. Its films are used in a wide variety of markets that include food, medical, agricultural, retail, automotive, aircraft, and electronics.

Retrofitting Addex's new Intensive Cooling Air Ring has given Dallas Plastics output gains averaging 15-20%, but they can climb as high as 40%, says Miguel Sanchez, plant manager of the company's Missouri facility.

In Missouri, Dallas Plastics runs 24:7 on 12 monolayer lines that range in size from ¾-in. to 12-in. die diam. Film thickness ranges from ¾ mil to 7 mils. Companywide, Dallas Plastics runs layflat widths to 60 in., though Sanchez's plant focuses more on small-size tubing. Dallas Plastics runs a wide range of LDPEs and blends of LDPE/EVA or LLDPE/EVA, the latter based on both hexene and metallocene technologies.

Like most PE film processors, Dallas Plastics is regularly on the lookout for technologies to increase capacity. Last year, it considered retrofitting IBC on some lines, but ruled it out because of cost. "It's not just the IBC system itself, but you have to invest in a new die that can accommodate the IBC, along with new blowers and other components," says Sanchez. Instead, acting on a tip it received from a fellow film processor, Sanchez opted for a patent-pending air ring offered by Addex Inc., Newark, N.Y.

Dallas Plastics' $30,000 investment in a new air ring paid for itself in five months.

Addex introduced the Intensive Cooling Air Ring in 2016 (see June '16 Close-Up). It utilizes up to four stacked cooling elements with a surrounding enclosure, all topped by a conventional air ring. But Addex (***addexinc.com***) quickly realized that this technology was probably better suited for brand-new lines, so at K 2016 it showed a scaled-down version specifically targeting the retrofit business.

In the Intensive Cooling Air Ring, the standard lower lip on Addex's dual-lip air rings is replaced with a single intensive-cooling element. As Addex explains, this transforms the previous low-velocity lower lip into a high-velocity air stream, creating two primary locking points instead of just one, to significantly improve bubble stability. The Intensive Cooling air rings also include all the secondary air-collar locking points of the original air-ring design, says Addex. The units are reported to be simple and operator friendly, allowing a broad range of processes, blow-up ratios, thicknesses, and materials with minimal adjustments.

Dallas Plastics ordered two of the new air rings, one for the Missouri plant and the other for its facility in Longview, Tex. In Missouri, the new ring was installed last May on a 10-in. die. Installation was fast and easy—"like putting on your socks," Sanchez notes—and the $30,000 investment started paying off immediately. Addex guarantees a 10-15% output bump, but Sanchez reports output gains of 15-20% on average, and up to 40% in some cases, depending on the resin blend, with no negative impact on film properties. "The investment has already paid for itself," Sanchez said in late November, roughly five months after the air ring was installed.

Sanchez adds that Dallas Plastics has on order a third Intensive Cooling Air Ring, which will be installed early this year on a 12-in. line at its headquarters facility in Mesquite, Tex. PT

FIRST OR LAST... CALL PPE FOR ALL YOUR

PPE MOLDING ACCESSORIES

The World's Largest Variety of Accessories for the Plastics Industry!

SPRUE PICKING SWING-ARM ROBOTS

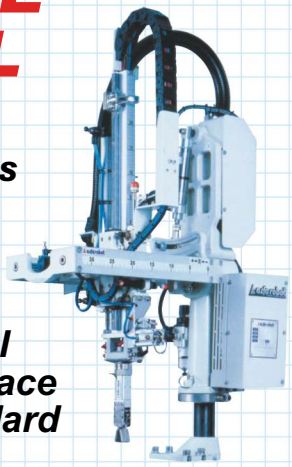
PHOENIX Series - Single Stage & Telescopic Arm

- **SPI & EUROMAP INTERFACE STANDARD ON ALL MODELS**
- VACUUM GENERATOR STANDARD ON ALL MODELS
- WRIST STANDARD ON ALL MODELS
- WIDE GRIPPER STANDARD
- SPARE OUTPUT PORTS FOR CONTROLLING AUXILARY EQUIPMENT (CONVEYOR)
- 2 HORIZONTAL ROLLER GUIDE-WAYS FOR STABILITY
- 8 STANDARD PROGRAMS
- 12 TEACH PROGRAMS
- RETAINS UP TO 50 MOLD SET-UPS
- HIGH SPEED
- HYDRAULIC SHOCK ABSORBERS
- HIGH EFFICIENCY (no smoke breaks)
- MINIMAL VIBRATION, EXTREMELY STABLE
- HAND-HELD CONTROLLER, USER FRIENDLY
- OPERATOR OR REAR SIDE PART DROP
- DESIGNED FOR LONG LIFE
- SELF-LUBRICATING
- MODULAR CONSTRUCTION
- AUDIBLE & VISIBLE ALARMS
- LOW NOISE LEVEL
- SAFETY LOCK, WON'T DESCEND AT AIR LOSS
- SWIVEL BASE FOR MOLD CHANGES
- ECONOMICAL (FULL AUTOMATION)

ONE TIME SPECIAL SALE

LIMIT ONE PER CUSTOMER

MORE FEATURES & FUNCTIONS INCLUDED IN THE PRICE!



SPI Interface Standard

Single Stage Model P350V

~~$2699.00~~ (13.7 in. stroke)

$2429.00

8 MODELS IN STOCK

SIZED FOR MACHINES FROM 30 TO 300 TONS

ISO-9001

MANUFACTURED IN A QUALITY SYSTEM CERTIFIED FACILITY.

WIDE GRIPPER

SWIVEL BASE RELEASE LEVER

Telescopic Arm Model P650WV

~~$4075.00~~ (25.6 in. stroke)

$3667.00

CE CERTIFIED

Single Stage Model P550V

~~$3075.00~~ (21.7 in. stroke) **$2767.00**

FAST — QUIET — EFFICIENT — LONG LASTING — AFFORDABLE PRICES

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

Wittmann 4.0

Your Solution to Industry

CMS Predictive Maintenance

Nobody can do it like we can!

- **Integration is seamless** - since we manufacture all the equipment, the challenge of combining miscellaneous and wide varying data protocols is not an issue!
- **One and Done!** Injection molding machine is the central interaction point for all connected auxiliaries
- **Windows based** for more flexible integration
- **Global exchange of information**

world of innovation
www.wittmann-group.com

Contact Us for More Details!

Booth W3742
NPE2018: THE PLASTICS SHOW
May 7-11, 2018 | Orlando, Florida USA
NPE.org
THE PLASTICS SHOW

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

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

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