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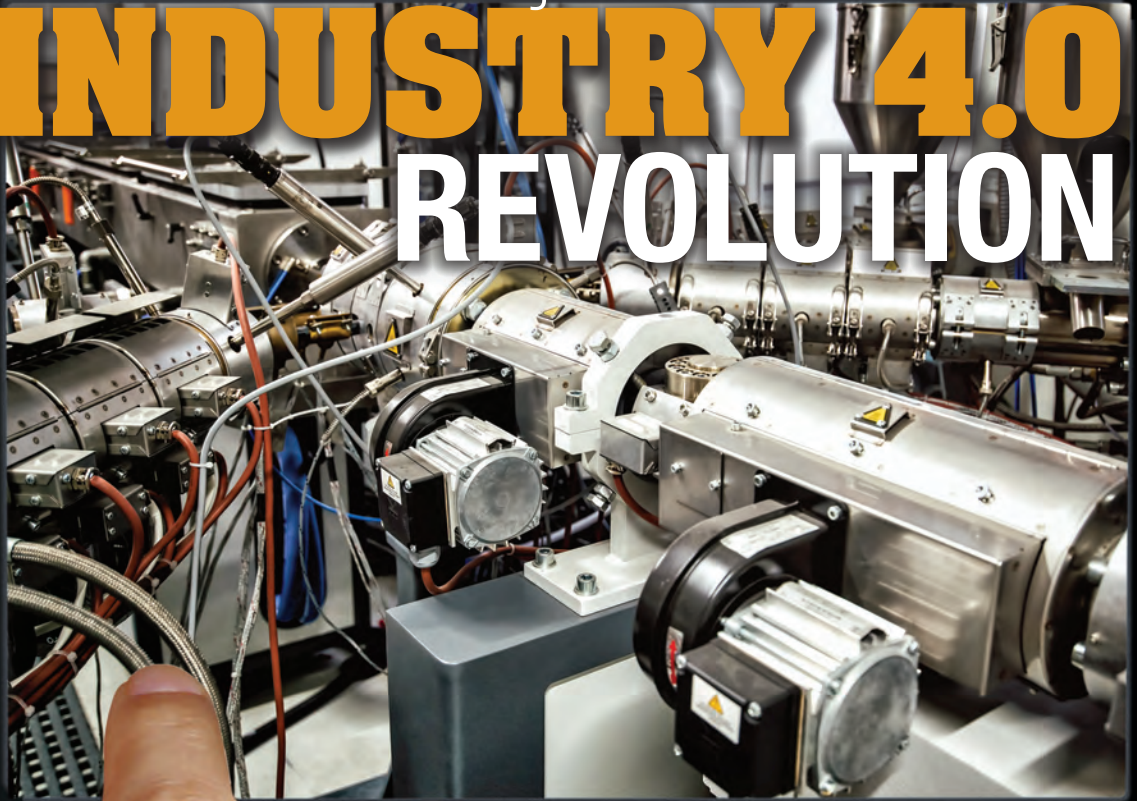
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## FROM THE ARCHIVES

The February 1962 issue of *Canadian Plastics* reported on the formation of a new association to represent Canadian chemical manufacturers. "A petition for incorporation will shortly be filed in Ottawa," our story said. "Eligibility will extend to any company, or division, primarily engaged in chemical manufacturing which sells to others a substantial portion of its output." And speaking of substantial, the nascent association's founding committee was made up of a who's who of industry heavyweights, including the presidents of DuPont Canada, Dow Chemical Canada, Union Carbide Canada, Shawinigan Chemicals, and Canadian Chemical Co.

**Number of the month:  
\*\$377 million**

\* The preliminary estimate of shipments value, in U.S. dollars, of primary plastics machinery in North America in fourth quarter 2018. (See pg. 7)



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# A bad plan that will hurt SMEs

When Canada signed onto greenhouse gas (GHG) reduction targets as part of the Paris Climate Accord in 2015, not everyone was happy, with some seeing it — rightly in



my view — as a job-killing cash grab. Four years later, four provinces still don't have either a provincial carbon tax or a provincial cap-and-trade policy: Ontario, Saskatchewan, Manitoba, and New Brunswick. Not to be thwarted, the Trudeau government is readying to implement its federal carbon backstop plan on these non-compliers, which will impose a federal levy on GHGs in any province that doesn't meet the federal standard.

As arguably the most significant assertion of federal authority in recent Canadian history, there are serious questions about whether the backstop is actually within the federal jurisdiction under Canada's Constitution — which is why both the Ontario and Saskatchewan provincial governments are currently challenging the legislation in their respective courts of appeal. The consensus among legal scholars is that the federal government would likely need to establish the regulation of GHGs as a national concern under the peace, order, and good government power for the backstop to be deemed constitutional.

Small- and mid-size enterprises (SMEs) should hope the challenges *do* succeed, however, since the backstop plan will be a significant burden to them if implemented. The federal government has promised revenue neutrality in its plan, but it won't deliver on this. Different segments of the economy will see very different net results, with households being the net beneficiaries on average because the incentives they get back each year at tax time will be more than the extra fuel charges they pay, and businesses the net losers. Large businesses will pay a little more under a complex, separately adminis-

tered output-based pricing system (OBPS), but only after receiving exemptions on about 80 per cent on the fuels they currently use.

But as noted in a recent article by Ted Mallett, the chief economist of the Canadian Federation of Independent Business (CFIB), SMEs in general — and SMEs in energy-intensive manufacturing sectors like plastics processing in particular — aren't covered by the OBPS, and will be left with what he calls “the pointy end of the adjustment,” facing higher costs with little in the way of benefits or incentives returned. “[SMEs] will be charged on every litre or cubic metre of fuel used and be expected to contribute to the incentive payments to households, all while having to compete with larger enterprises or sell their products in export markets,” Mallett wrote. “Even though the government casually assumes that all businesses will pass on all these extra costs through higher prices, many of these businesses will not be able to do so because of the nature of their products or competition from outside the country.” In fact, more than half of CFIB's members in those four provinces told the organization they will not be able to pass on any of the additional costs in the short to medium term. “It's a problem the government acknowledged for large businesses — one the OBPS was expressly designed to minimize — but which small firms are expected to handle unaided,” Mallett noted.

Which is why I hope the backstop plan goes down in flames. Canada's SMEs have had to endure enough bad policy decisions recently from both the federal and provincial governments, from aggressive small business taxation to — in Ontario at least — skyrocketing hydro rates. They don't need to get whacked yet again by another Ottawa policy that's demonstrably unfair to small business.

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

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# Montreal researchers create plastic from lobster shells



Thomas Di Nardo, a master's degree student at McGill University, shows chitinous shells. The process could turn waste lobster shells into biodegradable plastic.

For most of us, lobster shells are just scaly-looking things that pile up on the side of our plates while we pick apart and devour an overpriced crustacean at the local seafood restaurant.

Researchers at McGill University in Montreal have found a more noble end for discarded lobster shells, however, by developing a new chemical process that could turn them into biodegradable plastic.

The plastic is derived from chitin, a material from the exoskeleton of arthropods such as lobsters, as well as shrimp, crabs, and insects. Recent research at the University of Georgia used chitin — and also a derived substance, chitosan — in flexible food packaging. Chitosan has also been used in disposable medical products such as bandages, thread, and stitches by scientists at Harvard University.

The McGill research builds on these successful uses of chitin and chitosan as plastics, but differs in that the researchers have found a way to make chitosan more durable. “A polymer is a really long chain of molecules, like a necklace,” said Audrey Moores, an assistant professor of chemistry at McGill, who developed the new technique along with graduate student Thomas DiNardo. “When chitin is transformed into chitosan, that chain gets chopped apart, so the bonds are weaker and the material breaks down more rapidly. That’s a good quality for some medical products that you want to degrade, like stitches, but not for other products. Now we can make a new material that’s super-durable and that could be used for food wraps, storage, and surgical implants. It’s also very resilient and non-toxic, so it has a lot of potential in biomedical applications.”

An added benefit is that the McGill process is simple — researchers mix chitosan powder with sodium hydroxide, then let the mixture age. “There’s no big machine required and no specific skills needed,” Moores said. “This is making

it very appealing for large-scale application.”

Another plus is that producing a chitosan polymer could take a significant bite out of the millions of tons of waste produced by the seafood industry every year. On the downside, lobster-based shopping bags, drinking straws, and disposable cutlery are probably not feasible, Moores said, since the process won’t be able to scale up enough to compete against cheap plastics produced by the massive international petrochemical industry. “This is why our team is focusing on niche biomedical products,” she said.

Sourcing also might be difficult, since petrochemical plastics benefit from centralized refineries while the seafood industry is spread among many small producers up and down the North American shoreline. “What you would need is a place to concentrate that waste and process it,” Moores said. “The East Coast of Canada or Maine is an opportunity, because you have a concentration of the industries.” For that reason, Moores said, it will still be a few years before the McGill researchers come up with blends that will be commercially viable.

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## En-Plas moves into new headquarters



Top and middle: The outside and inside of En-Plas's new Toronto headquarters.  
Bottom: Al Lemieux (left) and En-Plas sales manager Brad Lemieux on the shop floor.

A change is as good as a rest, the saying goes. After 31 years in the same plant in Toronto, En-Plas Inc. moved into a new, more efficient headquarters just a few miles away, at 55 Nashdene Road, at the end of 2018, and the firm is more than rested — it's re-energized.

En-Plas Inc. has been a turnkey supplier of new and used plastic injection molding machinery, automation, and auxiliary equipment since 1978, the last three decades having been spent at its previous location. "Our old plant was showing its age, so it was time for us to move," said En-Plas president Al Lemieux. "Our new plant is more streamlined and gives us the layout we need to serve our customers better."

The new plant has dedicated areas for refurbishment, enabling machinery to be stripped down to the bare bones, and an in-house machine shop which designs and builds downstream automation, end-of-arm tooling, guarding cells, and any form of custom steel work including welding. It also accommodates a substantial showroom that enables En-Plas to inventory a large number of machines in varying tonnage, robots in all sizes, auxiliary equipment, and a spare parts cage that facilitates quick delivery of equipment and parts to customers.

En-Plas represents Nissei Injection Molding Machines, Yushin Automation, Mokon, Thoreson McCosh, Tecnomagnete, and Zerma Granulators in the new equipment category, and also sells used equipment from these same companies, as well as miscellaneous items like heavy-duty industrial shelving, tiebars, ultrasonic welders, and more. "We customize what each customer needs, right down to nozzles," Lemieux said. "We take care of these small details."

Unlike companies that relocate dozens of miles or more, En-Plas has basically moved around the corner in Scarborough, which means it kept its staff — a big benefit in this era of skilled workforce shortages. "Our staff is made up of people of varied cultural backgrounds and all ages, and people with unconventional work experience," Lemieux said. "These values became an integral part of our company culture."

After four decades in business, En-Plas has seen more than a few machinery sales firms come and go in the Toronto area, and Lemieux credits the company's continued survival to its dependability. "We offer good equipment that stands the test of time," he said. "Automotive customers who are required to ship 'Just-in-Time' to Tier 1 manufacturers have counted heavily on the reliability of Nissei machines and Yushin robots, and also on our service."

One of En-Plas's strengths, Lemieux said, is its eagerness to take on projects that push the boundaries of what's possible in plastics manufacturing. "We don't turn away anyone who needs support for a new project," he said. "There are lots of ambitious processors out there trying to take plastics applications into new areas, and we want to help them. Our new plant makes it easier for us to do this, as well as serve our more established customers." **CPL**



## Plastics machinery shipments finished strong in 2018

Shipments of primary plastics machinery (injection molding and extrusion) in North America increased in the fourth quarter of 2018, according to the statistics compiled and reported by the Plastics Industry Association's Committee on Equipment Statistics (CES).

The preliminary estimate of shipments value from reporting companies totalled US\$377 million, which represents an 8.0 per cent increase from the third quarter 2018. "Injection molding shipments rose 8.8 per cent and single- and twin-extrusion equipment shipments increased 4.6 per cent and 1.5 per cent, respectively," CES said.

Comparing the fourth quarter 2018 shipments to the fourth quarter 2017, the value of single- and twin-extrusion equipment shipments rose by 33.7 per cent and 52.0 per cent, respectively. However, injection molding shipments value was 4.9 per cent lower over the same period.

"We projected higher shipments for the fourth quarter and that's exactly what transpired," said Perc Pineda, PhD, chief economist with the Washington, D.C.-based Plastics Industry Association. "The increase is not due to inflationary pressures of the economy, which one tends to think about when dollar value increases, but purely an increase in the quantity of shipments."

CPL

## Management change at Wittmann Battenfeld

Georg Tinschert, the long-standing managing director and CEO of Austria-based processing and auxiliary equipment maker Wittmann Battenfeld, retired at the end of March.

Tinschert was succeeded by industry veteran Rainer Weingraber, who once held a management position with Canada's Magna International Inc. In addition to Magna, Weingraber, an industrial engineer, has worked for DaimlerChrysler, Siemens and, most recently, the Haas Group, where he was a managing director for several years in Austria as well as in other countries.

"With Rainer Weingraber, the Wittmann Group will have a top executive who will give the company new impulses from his knowledge and management experience," Dr. Werner Wittmann, managing partner of the Wittmann Group, said.

Tinschert was appointed CEO of Wittmann Battenfeld, which is headquartered in Kottlingbrunn, Austria, in 2007. Wittmann Battenfeld is a division of the Vienna-based Wittmann Group.

CPL



Photo Credit: Wittmann Battenfeld

From left: Rainer Weingraber, Dr. Werner Wittmann, and Georg Tinschert.

## Quebec's IPL Plastics buys Belgian molder Loomans



Photo Credit: IPL Plastics Inc.

Quebec-based injection molder IPL Plastics Inc. will acquire Belgian plastic packaging supplier Loomans Group NV for a total consideration of \$85.5 million.

The transaction is due to close by the end of March 2019.

Headquartered in the Belgian town of Lommel, Loomans will be integrated into IPL's consumer packaging solutions business in Europe.

"Loomans has a well-established, blue chip customer base in continental Europe, and provides IPL with a strong platform for growth in this region," IPL said in a statement. "Loomans is an impressive, single-site tooling and plastics manufacturing business with significant in-mold labeling expertise, operating for over 50 years."

The deal will also help lessen the group's dependence on the North American market, IPL said.

IPL, formerly One51, recently relocated its headquarters from Dublin, Ireland to Montreal. The company injection molds products for the food and bulk packaging, environment, and material handling sectors. It has about 1,900 employees and operations in the U.K. and China, as well as in Canada and the U.S. IPL's Canadian facilities are located in Edmundston, N.B. and Saint-Damien-de-Buckland, Que.

CPL

## Kistler opens Canadian office



Photo Credit: Kistler Group

Mississauga Mayor Bonnie Crombie (fifth from right) joined the Kistler Canada staff in a ribbon-cutting ceremony on Feb. 19.

Kistler Group, a Swiss-based supplier of measurement technology, has opened its first Canadian location, a new sales centre in Mississauga, Ont.

“The Kistler Canada office represents a significant expansion of our global presence... and serves to advise and support customers as well as man-

age sales in Canada,” Kistler Group said in a statement.

Kistler Canada was incorporated into the Kistler Group in September 2018.

Located at 5700 Explorer Dr., the new office was officially opened on Feb. 19, with Mississauga Mayor Bonnie Crombie helping to officiate. **CPL**

### SUPPLIER NEWS

– Chemical and resin supplier **Sabic** has appointed Orlando, Fla.-based **Amco Polymers LLC** as an authorized North American distributor of its complete portfolio of specialty materials, including Noryl resins (polyphenylene ether-based materials), Ultem resins (polyetherimide materials), LNP compounds, and the full range of PC-based high-performance copolymers. Nexeo Solutions Inc. and Chase Plastic Services Inc. are also distributors of these materials in North America.

– The telephone number for **Control Solutions Inc.**, a Brampton, Ont.-based supplier of process control systems, has been changed to 416-419-4926. The company is headed by Peter Fenrich, who can be reached directly at that number. Control Solutions represents Bauer PTG, Gammaflux L.P., Priamus Systems, Solvtech Inc., and Vector Injection.

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## PEOPLE



Kevin Barker



David Bradley



Linda Campbell



John Hafferty



Michael Hilton



Michael Jones



Sumit Mukherjee

- Beckhoff Automation has named **Kevin Barker** as the new president of **Beckhoff Automation LLC** to manage Beckhoff business operations across the U.S. Beckhoff Automation LLC is headquartered in Savage, Minn.
- **SI Group**, a Schenectady, N.Y.-based developer and manufacturer of performance additives, process solutions, and pharmaceuticals and chemical intermediates, has appointed **David Bradley** as its president and CEO.
- Lebanon, Ore.-based extrusion machinery maker **Entek Extruders** has named **Linda Campbell** as its vice president of sales.
- Bolton, Ont.-based machinery maker **Husky Injection Molding Systems Ltd.** has named John Hafferty as its new chief financial officer.
- **Michael Hilton**, president and CEO of **Nordson Corp.**, a Westlake, Ohio-based maker of dispensing equipment for consumer and industrial adhesives, sealants, and coatings, has announced his plans to retire by the end of the year. A successor has not yet been named.
- Cincinnati, Ohio-based machinery maker **Milacron Holdings Corp.** has named **Michael Jones** as president of its plastics processing unit, formally named Advanced Plastics Processing Technologies, for the Americas and Europe.
- Packaging supplier **PTI**, headquartered in Holland, Ohio, has named **Sumit Mukherjee** as its chief technology officer.

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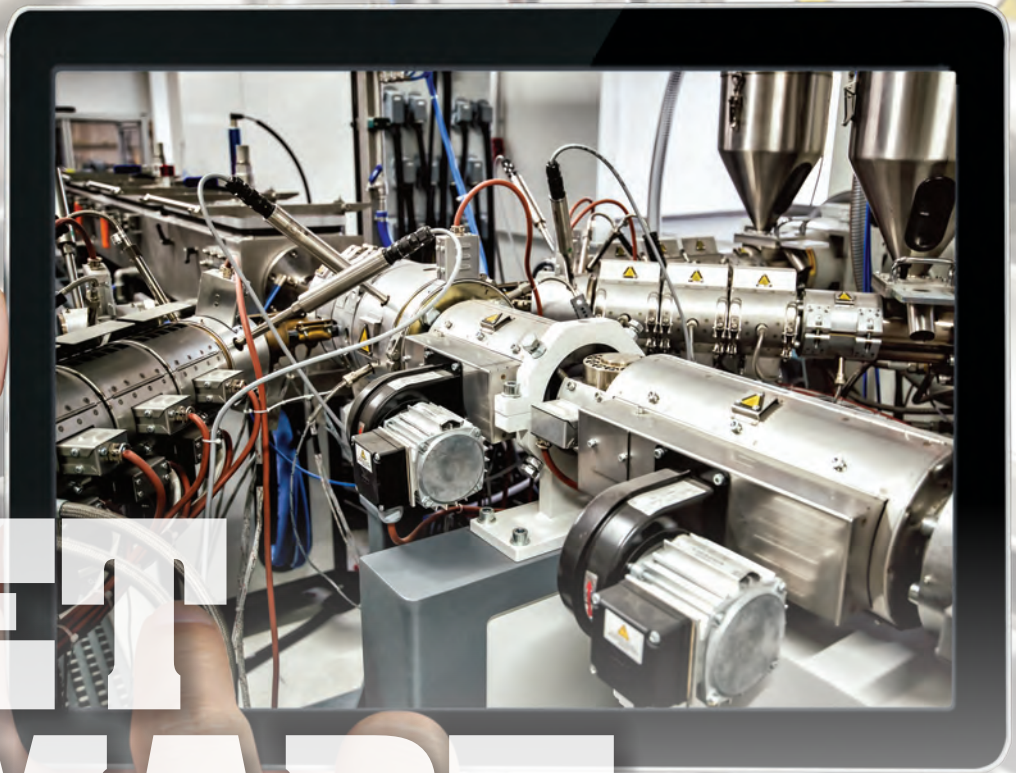
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# GET SMART

By Mark Stephen, editor

Industry 4.0 can provide manufacturers with almost as many benefits as Trump has Twitter followers, including managing production line equipment through the Internet, predicting maintenance, increasing production efficiency, and enhancing process reliability. Now it's extrusion's turn to get with the program.

The Luddites were a secret oath-based organization of English textile workers in the nineteenth century who tried to hold back the effects of the Industrial Revolution by destroying new textile machinery. They failed, and inadvertently handed down an iron-clad lesson for posterity: You can't defeat an idea whose time has come.

So think of Industry 4.0 as the modern equivalent of new textile machinery, or the "fourth industrial revolution." Entering the world of Industry 4.0 enables companies to manage and monitor production line equipment and operations through the Internet, with benefits that include improved productivity through better management of information and resources, increased

profitability through reduction of production costs, and the reduction or avoidance of wasted materials and downtime through effective preventive maintenance.

Except that this time around, no one is fighting it. Just the opposite, in fact: The trend towards the smart factory in plastics processing has been embraced eagerly, led in general by the injection molding machine makers, who have been introducing smart machines that use the Internet of things, or IoT, to integrate peripherals with ease, analyzing and regulating process parameters, centralizing data management, and providing far-reaching assistance and support functions.

Extrusion lagged somewhat at the

beginning, but no longer. And even though the needs and conditions of pipe and profile extrusion companies differ from other forms of molding, they have just as much incentive to get with the Industry 4.0 program. Which is why, with extrusion machinery and technology makers now stepping up, it's finally extrusion's turn to get smart.

## MAKING CONNECTIONS

Unplanned downtime can result in the triple threat of idle employees, halted production, and missed deadlines, which is why it's hard to overstate the importance of preventative maintenance. Connected equipment allows for easier analysis of a worn or likely-to-fail part and indicates that preventive maintenance should take place. With this in mind, Battenfeld-Cincinnati recently unveiled its BCtouch UX, a new extrusion control platform that supports preventive maintenance intervals, as well as efficient production planning and connectivity with servers and mobile appliances. The "UX" in the name stands for "user experience" and refers to the intuitive operation of



the user interface. “All process parameters are monitored centrally, enabling line operators to carry out energy monitoring, and also calculate energy diagrams over time and on the basis of freely selectable production parameters,” Battenfeld-Cincinnati president and CEO Paul Godwin said. “This makes it possible to find an operating point where the line can be run with optimal resource efficiency. Since maintenance intervals for all line components are recorded in the control system, it supports the necessary preventive maintenance actions, which increases line uptime and consequently the overall efficiency.” In addition to the central operating terminal, additional terminals can be integrated without any problems along the line. “Thanks to a new type of cockpit view, the process status of the entire line can be viewed at a glance,” Godwin continued. “The design of the overview page and the navigation through the menu are derived directly from the line configuration.” Additional features of the new operating terminal are the RFID access control system that enables easy identification by chip card, and a context-sensitive help system. Also, a modern user interface recalls familiar operating concepts of tablets or cell phones and offers multi-touch zoom as well as move and slide functions.

Davis-Standard LLC recently introduced its new DS Activ-Check system, a continuous extruder monitoring plat-

form used for predictive and preventative maintenance. “The DS Activ-Check is another step in smart factory development, and is all about the ability to collect data that will help reduce waste, increase uptime, and improve productivity,” said John Clemens, the company’s director of extrusion controls. “The system works by placing sensors on extruder components such as the gearbox and motor to monitor factors such as temperature, pressure, and vibration. After that, DS Activ-Check allows processors to monitor and record key mechanical and electrical components of the extruder and gearbox — including all equipment process data — providing information to the user in the forms of event logging, customized reports, and historical trending.” DS Activ-Check also pushes the envelope in predictive maintenance, Clemens said. “Users will receive early notifications of potential component failure to prevent unscheduled downtime via email and text, and can remotely monitor conditions via smart devices or remote PCs, allowing them to plan production around scheduled maintenance,” he said.

Entek Extruders has also taken steps to make its machines compatible with Industry 4.0. “All of our major components — PLCs, HMIs, and VFDs — communicate with each via the Ethernet, and our HMI has the ability to store data via SQL database, making it accessible by other applications,” said Al Bailey,



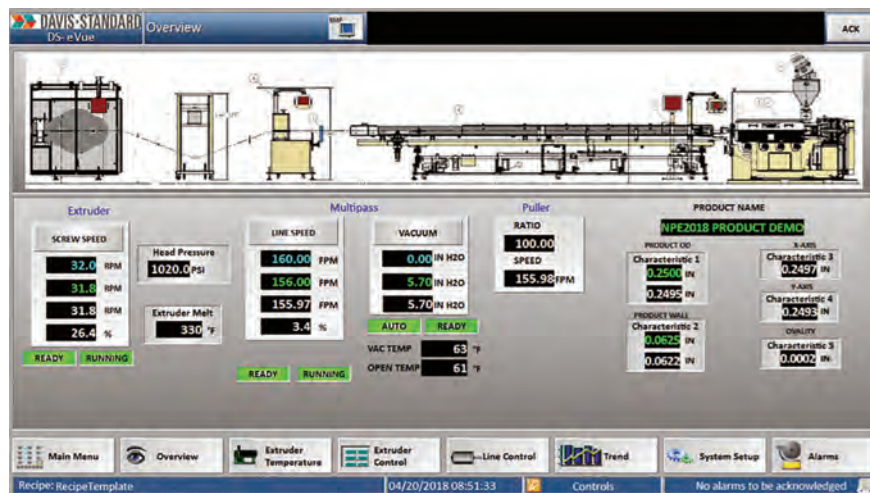
Photo Credit: Battenfeld-Cincinnati

Battenfeld-Cincinnati’s BCTouch UX is an extrusion control platform that supports preventive maintenance intervals, as well as efficient production planning and connectivity with servers and mobile appliances.

Entek’s East Coast controls manager. The company also uses Ethernet communications to allow access of all major components and systems for diagnostics and troubleshooting, Bailey continued. “And we’ve also integrated the material handling, extruder, pelletizer, classifier, and finished goods equipment to work together as one unit on one control platform instead of as a collection of independent machines,” he said. “This allows for increased interlocking, automation, optimization, and decreased waste.”

## MONITOR MANIA

Pipe extruder maker DRTS America Inc. is also developing connected extruder machines that give the operator the ability to utilize remote maintenance capabilities. “This enables immediate connection of the extruder manufacturer and specialized maintenance experts directly to the machine, allowing intervention and problem solving in case of fault,” the company said. “In addition, it gives the ability to receive



Davis-Standard’s new DS Activ-Check system is a continuous extruder monitoring platform used for predictive and preventative maintenance.

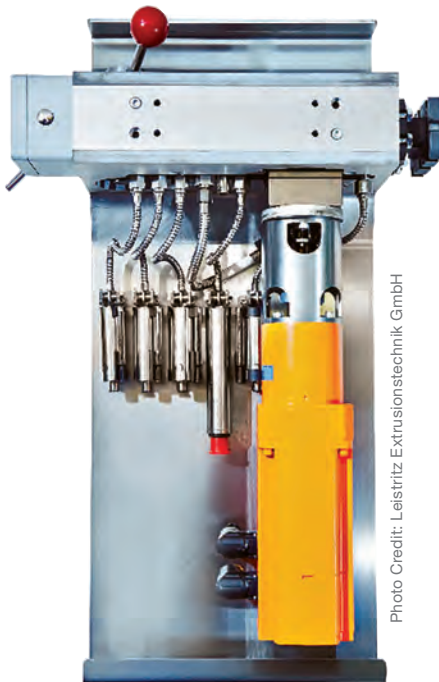
Photo Credit: Davis-Standard LLC

DRTS online live support without requiring an actual technician to visit.” And with security a major concern in the era of the smart factory — when critical equipment is connected to an outside network such as the Internet — the key to remote maintenance is having secure connection protocols that can’t be hacked. According to DRTS, its connected extruders feature robust security technologies such as firewall connection architecture, login credentials, and OPC Unified Architecture security protocols.

A recent innovation from American Kuhne Inc. is also firmly on the path towards Industry 4.0. The company has extended its XC200 Navigator controls system to its Ultra R/S series of extruders to provide control for one or more machines in simultaneous operation. “The HMI is via a panel or optional swing-arm mounted screen map with integrated hard-wired Estop, Start, Stop, and Reset pushbuttons,” the company said. “It offers intuitive, visual navigation by touchscreen with easy to understand graphical displays of controls, status, and alarms along with integrated machine documentation.” The system enables operators to monitor and control functionality, the company said, including closed-loop barrel PID heat/cool control; clamp and die zone control; heater burnout detection/alarm; high-temperature alarm; melt pressure monitor with dual alarms; high-pressure shutdown; soak timer/cold start interlock; hour meter; seven-day timer; extruder screw speed control (start/stop, speed display, amp display); security access manager; recipe manager; and trending of any parameters that are monitored and controlled. “These and other features are readily accessible even when remote via smartphone using the optional TeamViewer application,” the company said.

### MEASURED DEVELOPMENTS

Robust data acquisition processes are another hallmark of Industry 4.0 functionality. Along this line, KraussMaffei Berstorff has developed two new sys-



Leistritz’s new intelligent measuring system provides solid data to prove even the slightest variations in the compounding process.

tems, now available as options for ZE BluePower extruders, that synchronously collect all production data of a compounding line. The first is a modular system that can be adapted to a wide range of different applications, scaled in size, and is suited for interface-independent operation. All interfaces can be integrated into an overall system that collects and visualizes the desired process data. Pressure, temperature, speed, and volume flow values of all upstream and downstream components — for example, metering systems, melt filters, and melt pumps and pelletizing systems — as well as the extruder parameters are combined in this single system. The second development is an in-line measuring system designed to detect any metering errors in order to reduce production scrap and enhance line efficiency, and is based on colour measurement — light is projected into the melt, reflected, and then detected by a high-resolution glass fibre sensor. “When compared with the previously defined setpoint, any deviation of brightness or colour is instantly recognized and indicated,” KraussMaffei said. “The colour measuring system can be integrated

into the overall line control.”

Leistritz Extrusionstechnik GmbH also has a new intelligent measuring system that provides solid data to prove even the slightest variations in the compounding process. Developed in partnership with the Austrian Johannes Kepler University in Linz, the technology uses an online elongational rheometer with patented die geometry. “During the extrusion process, a small amount of the melt flow is channeled off via a bypass system, pushed through the rheometer’s slot die, measured, and then transferred back into the process without losing any material,” said Thomas Unger, head of the Leistritz lab in Nuremberg, Germany. “The rheometer facilitates online measuring of the shear viscosity with shear rates in the range of 10 to 10,000 s<sup>-1</sup> and the elongational viscosity with elongation rates in the range of 5 to 75 s<sup>-1</sup>, which has not been possible with online measurement devices until now.” An intelligent automation in the online rheometer’s control unit allows the operator to obtain viscosity curves of the material being processed in near-real-time, Unger continued. “The online elongational rheometer can be mechanically integrated onto any given extrusion process without having to undergo major retrofits,” he said.

With these smart factory extrusion technologies enabling greater connectivity and productivity, even the Luddites might have got with the program. **CPL**

### RESOURCE LIST

- American Kuhne Inc.** (Ashaway, R.I.); [www.americankuhne.com](http://www.americankuhne.com); 401-326-6200
- Battenfeld-Cincinnati USA** (McPherson, Kan.); [www.battenfeld-cincinnati.com](http://www.battenfeld-cincinnati.com); 620-241-6843
- Davis-Standard LLC** (Pawcatuck, Conn.); [www.davis-standard.com](http://www.davis-standard.com); 860-599-1010
- Auxiplast Inc.** (Sainte-Julie, Que.); [www.auxiplast.com](http://www.auxiplast.com); 866-922-2894
- DRTS America Inc.** (San Diego, Calif.); [www.drts.com](http://www.drts.com); 858-587-4833
- Entek Extruders/Entek Manufacturing Inc.** (Lebanon, Ore.); [www.entek-mfg.com](http://www.entek-mfg.com); 541-259-1068
- KraussMaffei Corp.** (Florence, Ky.); [www.kraussmaffei.com](http://www.kraussmaffei.com); 859-283-0200





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Photo Credit: Conair Group

Conair's PR series of powder receivers use up to three high-capacity, pleated polyester cartridge filters that separate air from particulate.

## For plastics processors, conveying powders involves a completely different set of challenges compared to pellets. Here's how to handle them.

By Mark Stephen, editor

**F**or companies that manufacture or — supply products, a lot hinges on delivery. Which is why Amazon, for example, is spending millions to develop drones that can get packages to customers in 30 minutes or less. For plastics processors, meanwhile, the importance of good delivery begins earlier, before the product is even made — conveying material from a central point to the processing machine efficiently can jump-start the molding process.

Unlike plastic pellets, however, moving powders can be especially demanding for processors since no two powder conveying systems are exactly alike. With powders, the checklist of considerations is particularly long, and includes factors such as conveying rates

and distances, material characteristics, flow aids, pick-up and discharge, filtration, and safety concerns about combustible materials.

### **MATERIAL DECISIONS**

To recommend the right solution, it's critical for the conveying system supplier to first understand the powder in question, beginning with its bulk density. "We want to see and touch a sample of the powder that's going to be conveyed," said Brian Davis, general manager of Maguire Products Canada Inc. "Understanding the powder's bulk density is key to calculating the size of the conveying system. The bulk density also factors into calculating the system parameters and conveying velocity,

since higher bulk density materials require higher pick-up velocities."

The flow characteristics of powders are affected by the bulk density of the material and the size, shape, and cohesiveness of individual particles. Blends of multiple powders may include particles having various origins, sizes, shapes, and bulk densities. In general, powders used in the plastics industry can be either free flowing, sluggish or non-free flowing, and this distinction can impact conveying needs. Making it tougher, one product might consist of several grades, with each behaving differently than the other. Additional characteristics include being abrasive or combustible; whether the powder absorbs moisture; whether there potentially could be chemical compatibility issues with conveying hoses, gaskets, filters, or process equipment; and materials that are "smoky" like talcum powder, which has a high fines content, requiring more filter area.

Powders that are combustible should



obviously be treated with extreme caution. “Even powders that aren’t normally combustible can explode if the particles are a certain size and in a certain concentration, for example PVC dust,” said Janice Xiong, lead systems engineer with Hamilton Plastic Systems Ltd. “Since these materials, and more traditionally combustible powders, can catch fire and explode when mixed with air, the conveying system needs to be a closed system.” Some equipment suppliers avoid jobs that involve conveying combustible powders period, and for a simple reason. “I’d say that any equipment maker that makes pellet conveyors is by definition not making powder conveying equipment that’s explosion-proof,” Brian Davis said.

For non-free flowing powders, meanwhile, the key is to move the material at a constant rate from the pick-up point to the material line and at a constant rate from the discharge point to the material receiver. These materials often require the most equipment modifications, and there are a variety of discharge and feeder methods to handle these powders. Maguire Products’s MPF powder feeder, for example, is designed to handle non-free flowing powders; the hopper features an integral bridge breaker bar that sweeps the bottom of the hopper once every two turns of the auger to keep the flights of the auger full and to provide accurate metering. And Metro P powder hopper loaders from Motan Inc. have been developed for reliable, service-free continuous operation for conveying both free flowing and non-free flowing materials.

Carbon black and titanium dioxide powders are difficult to handle as they pack or smear, bridging or “rat-holing” in the process stream, greatly reducing efficiency; both are also notorious for potentially binding or jamming moving components, causing time-consuming cleanup efforts. They also tend to be abrasive — almost like sand — as does PVC powder. Knowing in advance that abrasive materials are going to be conveyed allows the system supplier to make adjustments. “Materials of construction are a very important consideration in the design and functionality of

a powder conveying system, especially with abrasive material that can damage the bends and the receiver itself, where the velocity is highest,” said Jan Rickenbach, Motan’s extrusion sales manager. “You can convey at a slower rate to avoid damaging the system, but only to a certain extent. A better option is to have the conveying system made with stainless steel pipes, deflector plates, and ceramic or glass elbows and bends.”

At the other end of the spectrum, some powders flow almost *too* easily. “Polyethylene, especially as used in rotational molding, is a very soft powder and flows like water,” said Rob Miller, president of Wittmann Battenfeld Canada Inc. “With a material like that, velocity becomes a potential problem because conveying the powder too quickly can generate angel hair or streamers, just as with pellets.”

### KEEP IT MOVING

Once they have a handle on the compound being conveyed, knowing the conveying distance — which can comprise both horizontal and vertical factors — is a second important factor the system supplier will consider. “A typical up-and-in system offers a vertical lift from floor-level, conveying up to a receiver over an extruder or loss-in-weight feeder,” said David Kennedy, sales manager with Vac-U-Max. “It’s important to know the number of 45° or 90° sweep elbows, keeping in mind that one sweep elbow is equivalent to 20 feet of linear tubing.” The end goal is to reduce the number of elbows in the system, since powders don’t always flow as cleanly as pellets. “If vertical vacuum conveying runs exceed 12 to 15 feet in batch mode, the material in that line will stop conveying and fall back down,” Kennedy said. “For this scenario, it’s important to design a line-clearing valve to make sure the vertical leg is clear before the batch process stops.”

Third, a properly designed powder conveying system will take into account how the materials are received and introduced to the process. Material can be received in paper bags, fibre drums, barrels, bulk bags, super sacks, rigid intermediate containers, silos, day bins, railcars, bulk trucks, or upstream

process equipment. The process of silo selection, to cite one example, is different for powders than for pellets. “Silos designed for powders should have a minimum cone angle of between 60° to 70° for better flowability, compared to 45° and 60° cone designs typically used in pellet silos; and if the powder is non-free flowing, the cone should have provisions like air cannons to prevent build-up,” Brian Davis said. “These design features should be specified before the silo is ordered, because trying to retrofit a silo involves cutting into the lining, which disrupts its effectiveness.” Also, as opposed to an atmospheric vent for a pellet silo, a silo designed for powders typically requires a bin vent filter, which is a dust filtration unit on top of the silo. “The bin vent filter prevents powder from being discharged into the outside air when the silo is being filled,” said Rob Miller.

Pick-up points might also require



Wittmann Battenfeld’s PMX series powder loaders have a blowback system designed to extend the operational life of the filter media.

Photo Credit: Wittmann Battenfeld

The Series E Slide Gate from Lorenz Conveying Products is used to convey powders in vacuum applications, and can be air-purged to eliminate the chance of powder passing into the body cavity.



attention. “The pick-up point can be configured with a wand for a simple up-and-in system, bag dump station, bulk bag unloader, and in some cases silo or railcar, all dependent on the container holding the material at the beginning of the process,” David Kennedy said. The pick-up point also poses a challenge for powder when it comes to efficient material transfer. “There must be a means to aerate the powder so that it flows freely into the tubing from start to finish,” said Doug Brewster, conveying product manager with Conair Group. “Non-free flowing powders in particular require aeration at the pick-up point or agitation to keep them moving properly.”

Gates, which open and close a path of material flow, play a role in powder conveying too, but can cause problems when material leaks from the gate orifice to the body along the blade. The Series E Slide Gate from Lorenz Conveying Products Corp. is used to convey powders in vacuum applications, and can be air-purged to eliminate the chance of powder passing into the body cavity, thereby avoiding gate failure.

And at the end of the conveying process, there are a variety of discharge methods to handle difficult non-free flowing powders, such as over-sized receiver discharge openings as well as 70° and other cone-less, jam-proof vacuum receivers. “For difficult-to-move powders, the key is to move the material at a constant rate from the pick-up point to the material line and at a constant rate

from the discharge point to the material receiver,” David Kennedy said. A tip: Lighter weight powders need larger receivers in order for the material to fall out of the air stream, the experts say.

Powder systems handle particles measured in microns, some of which are invisible to the human eye at less than 10 microns and capable of staying suspended in the air for days. This is why filters, which separate air from particulate, are another key consideration when designing a powder conveying system. “Filtration is one of the biggest challenges in powder conveying, and is largely dictated by the type of powder being conveyed and its characteristics,” Rob Miller said. Filtration is based on the air-to-cloth ratio, which is the volumetric flow rate of air flowing through a dust collector’s inlet duct divided by the total cloth area in the filters. The air-to-cloth ratio for pellets is usually 5:1 or 6:1, the experts say, whereas for powders it can be 2:1 or 3:1. “Knowing the air-to-cloth ratio is critical to sizing the filter area to do the job,” Miller continued. “Factors such as the type of powder, particle size, conveying rate and distance, conveying pressure, and air volume used in the conveying circuit all contribute to calculating the air-to-cloth ratio.” Other filtering factors to consider include the number of filters, filter placement, the cleaning cycle, and the material of the filter. Wittmann Battendorf’s PDR central powder conveyors, for example, have a spun woven polyes-

ter dacron blend pleated filter media; and Conair’s PR series of powder receivers — which have a 3:1 air-to-cloth ratio — use up to three high-capacity, pleated polyester cartridge filters, with an optional filter vent available that holds in pressurized air and dust.

### PUTTING IT ALL TOGETHER

The considerations listed above should determine which of the two primary methods for transferring bulk materials — vacuum and mechanical — is the better choice for a particular powder conveying application. And the equipment suppliers lean towards using vacuum in most cases. “Vacuum conveying is the best method for handling powders because it requires less maintenance, has less spillage and dust leakage, minimizes dust exposure, and gives enhanced flexibility,” said Janice Xiong. “And because it’s a closed process that protects against ambient air, it’s the preferred technology for transporting powders that are combustible.”

As a subset of that question, there are two main categories of vacuum conveying technologies to select from: dilute phase, which uses constant vacuum pressure to lift the material to get it flowing through the system; and dense phase, where the vacuum pressure is higher but is modulated on and off to move the material through the lines in small batches. Again, the final choice will come down to the specifics of each powder conveying situation. “Dilute phase is less expensive and is the industry standard with powders,” said Jan Rickenbach. Typical conveying rates in dilute phase may go up to 2,500 lbs per hour, with typical conveying distances of less than 300 feet. “But dense phase can be the better choice when higher conveying rates, longer conveying distances, or fragile or abrasive materials are involved,” Rickenbach continued.

Some technologies are essentially hybrids of the two. “Conair’s Wave system is a dilute phase system that can also operate in a dense phase mode,” Doug Brewster said. “Wave conveying technology lets the powder flow like a wave on the ocean, and can increase through-



put nearly two-fold, allows conveying over longer distances, eliminates clogging, and reduces the build-up of powder residue near destination receivers.”

And speaking of clogging and build-up, cleaning a powder conveying line of residual material is vital to process efficiency and quality control for applications requiring change-over, and — depending on the powder — might have to be done more frequently than with a pellet conveying system. “A PVC powder system will wear much faster than most pellet systems, and if you don’t maintain the filters and the filter blowback systems you’ll develop material problems,” Rob Miller said. “And even with a blowback system, powders can accumulate in the filters, signalled by slowdown of material.”

The good news is that maintenance is getting easier. Hamilton Plastics Systems’s Vectra powder loader has quick-release latches for no-tools disassem-

bly, and a unique, removable filter plate module designed to make filter changes faster and cleaner; Wittmann Battenfeld’s PMX series powder loaders have a blowback system designed to extend the operational life of the filter media; and the VLP series powder vacuum loaders from Novatec Inc. use spun bond polyester filter elements that are washable for years of use with only simple cleaning and an occasional washing and air dry.

In the end, not all powders require complicated, custom-made equipment — some materials can be accommodated using standard “plug-and-play” components. But whatever the situation, working with your equipment supplier to achieve an understanding of material properties and operational needs is the best way to get the right powder conveying system for your needs.

Unfortunately, they can’t deliver it by Amazon drone — at least not yet. **CPL**

#### RESOURCE LIST

**Conair Group** (Cranberry Township, Pa.); [www.conairgroup.com](http://www.conairgroup.com); 724-584-5500

**Dier International Plastics Inc.** (Unionville, Ont.); [www.dierinternational.com](http://www.dierinternational.com); 416-219-0509

**Industries Laferriere** (Mascouche, Que.); [www.industrieslaferriere.ca](http://www.industrieslaferriere.ca); 450-477-8880

**Turner Group Inc.** (Seattle, Wash.); [www.turnergroup.net](http://www.turnergroup.net); 206-769-3707

**Hamilton Plastic Systems Ltd.** (Mississauga, Ont.); [www.hamiltonplasticsystems.com](http://www.hamiltonplasticsystems.com); 905-890-0055

**Lorenz Conveying Products Corp.** (Cobourg, Ont.); [www.lorenzproducts.com](http://www.lorenzproducts.com); 800-263-1942

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

**Motan Inc.** (Plainwell, Mich.); [www.motan.com](http://www.motan.com); 269-685-1050

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

**Vac-U-Max** (Belleville, N.J.); [www.vac-u-max.com](http://www.vac-u-max.com); 888-445-5606

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

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# MORE CHILL THAN EVER

Chiller technology is gaining ground with more energy efficiency, modularity, and sophistication in controls. Here are some new cases in point.

By Mark Stephen, editor

**M**ost of us don't think about it too much, but the heat transfer process is a bedrock factor in everyday life with both positive and negative ramifications, from ironing your shirts (good) to scalding your mouth with Tim Hortons coffee (bad).

Heat transfer in plastics processing is definitely good. Beyond good, in fact: Removing heat from a process load and transferring that heat to the environment is key to successfully molding a part. Which is where chillers come in. Used by plastics processors when they need a lower process

fluid temperature than a simpler system — such as a cooling tower — can provide, chiller systems range vastly in size and design and are available as small, localized or portable chiller units for smaller applications or large central chillers designed to provide cooling for entire processes. As an added bonus, they save on energy and prolong the machine life by preventing wear and tear of the machine itself, especially during the hotter summer months.

Here's some of the latest chiller technologies for removing the heat.

## SELF-ADJUSTING CENTRAL CHILLERS

Piovan SpA's Aquatech brand recently made its Easycool+ line of air- and water-cooled chillers available for the North



America market. Created specifically for the plastics industry, the Easycool+ line consists of 34 models with cooling capacities from 15 to 150 tons, and feature components and functions that provide self-diagnostics during start-up, flexibility during operation, and

energy savings compared with conventional "fixed" central chiller systems

According to Giorgio Santella, Piovan's chief marketing officer, the chillers are designed to deliver greater efficiency and automatic control at a cost that's competitive with conventional central cooling systems, and have a favourable energy efficiency ratio (EER) due to their ability to adjust cooling capacity, pressure, temperature, and more. "EER indicates how many kW of electricity are required to produce a kW of cooling capacity," Santella said. "With Easycool+, at 100 per cent heat load the unit will require 1 kW to produce 3.5 kW of cooling capacity, which is about 0.5 to 1 ton of cooling capacity; and the EER improves when the chiller is used with partial heat loads. In comparison, a conventional fixed cooling system at 100 per cent heat load has

an EER between 2 and 2.5."

Also, Easycool+ chillers have several features that allow them to automatically adjust when cooling requirements change, Santella said, including a unique configuration of two Copeland multi-scroll compressors of different sizes; and the units also feature Aquatech's new automated pressure control, which uses process water pumps driven by electronic inverters to automatically and precisely maintain the pressure in the water supply line at the highest pressure required.

**Piovan Canada Ltd. (Mississauga, Ont.);**  
**www.piovan.com; 905-629-8822**

## MODULAR, ENERGY-EFFICIENT CENTRAL UNITS

ACS Group recently introduced its High Efficiency (HE) central chillers, which can save processors as much as 60 per cent in energy costs compared with traditional chillers.

"The difference comes from three major, more efficient components," said Kyle Nelson, the company's senior product manager. "Newer controllers have higher computing capabilities, and there are more modern electronics and proprietary algorithms that allow more computations to take place within the machine."





The smart controls offer fast system diagnostics, including live graphing and data logging, as well as the ability to monitor as many as 10 HE chillers by way of a smartphone, tablet or PC.

The computations enable HE chillers to continuously monitor conditions and make adjustments to run in the most energy-efficient way. HE chillers also feature fans that use EC brushless motors, Nelson said, which are more energy-efficient than units with VFD compressors, regardless of the load.

AEC's HE chillers also are easy to maintain and service, Nelson said, and the units' strainers have a large surface area so that they need less frequent cleanings. In addition, the strainers are easy to access without using tools.

As many as 10 modules, with a maximum cooling capacity totalling 600 tons, can be controlled together. The modular design and the integrated communications enable the HE chillers to communicate with one another. "And if one chiller goes down, the others can automatically compensate to keep tank temperature at the optimum level," Nelson said. "The modular design also enables users to add or remove chillers as their needs change. To further protect against downtime, each HE chiller has a pair of compressors that cycle at different times, lessening the load on each."

**ACS Group (New Berlin, Wis.);**

[www.acscorporate.com](http://www.acscorporate.com); 262-641-8600

**Auxiplast (Sainte-Julie, Que.);**

[www.auxiplast.com](http://www.auxiplast.com); 450-922-0282

**Equiplas (Toronto); 416-407-5456**

**Shaw & Christler Equipment Technologies (Vancouver, Wash.);**

[www.shawequiptech.com](http://www.shawequiptech.com); 800-528-8011

## UPGRADED CONTROL SYSTEM FOR PORTABLE AIR- AND WATER-CHILLED UNITS



Advantage Engineering Inc. recently upgraded the MG series control system for its Maximum portable air- and water-cooled chillers to provide better temperature control, more user features, and a better user interface via an LCD that provides more information about performance for easier and quicker diagnostics.

The control replaces legacy M1 series and LE series chiller controls, said company president Jon Gunderson, for the goal of providing more features that customers are interested in and to improve overall performance of the chillers. The key feature upgrades include pressure transducers that monitor and report the refrigerant and water pressures, and which replace gauges. "This information can now be communicated to other primary equipment and systems that monitor the chiller performance," Gunderson said. "Removing the gauges also leaves fewer places that could experience refrigerant leaks, improving overall chiller reliability."

The MG control also can operate a wide range of chiller

configurations through its set-up menu, and is Industry 4.0-ready with a standard RS-485 port and Modbus RTU or SPI communication interface.

**Advantage Engineering Inc. (Greenwood, Ind.);**

[www.advantageengineering.com](http://www.advantageengineering.com); 317-887-0729

**Chillers Inc. (Newmarket, Ont.);**

[www.chillersinc.com](http://www.chillersinc.com); 905-895-9667

## HYBRID FILM EVAPORATOR TECHNOLOGY CUTS ENERGY USE

The new Accuchiller TCF model chiller from Thermal Care Inc. is a hybrid film evaporator technology designed to reduce energy use by up to 35 per cent and use less refrigerant than competitive flooded chillers.



The chiller uses a hybrid film evaporator which provides the energy efficiency of wet (flooded) systems in a compact footprint using less refrigerant, according to Bob Smith, Thermal Care's director of product management. "We developed the Accuchiller TCF in response to market demand for improved energy efficiency and reduced refrigerant charges," he said. "Unlike current flooded evaporative systems which immerse copper water tubes in liquid refrigerant, hybrid film evaporation systems use a thin film of refrigerant to achieve more energy efficiency with a reduced amount of refrigerant."

The hybrid technology boasts a compact modular design, Smith continued, providing a 25 per cent smaller footprint which maximizes floor space and helps to reduce production costs for molders.

The Accuchiller TCF also features Thermal Care's advanced PLC control system which controls, monitors, and maintains stable and reliable operation of the pumping system. A durable colour touchscreen displays a variety of operational screens for an uncomplicated view of the system, including time-stamped faults or alarms and compressor and pump hours. The Accuchiller TCF is also equipped with an Ethernet port, and is fully compatible with the company's Connex4.0 plant-wide equipment remote control and monitoring system.

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**Thermal Care Inc. (Niles, Ill.);**

[www.thermalcare.com](http://www.thermalcare.com); 847-966-2260

**D Cube (Montreal); [www.dcube.ca](http://www.dcube.ca); 514-831-6623**

**Tantus Corp. (Pickering, Ont.);**

[www.tantuscorp.com](http://www.tantuscorp.com); 647-258-9657

## NEW FAMILY OF MODULAR WATER-COOLED CHILLERS

Frigel's ModularChiller line of central chillers now includes a new family of modular and highly energy-efficient 3FX water-cooled chillers ranging from 25 to 139 tons each.

Designed for use with Frigel's Ecodry 3DK central adiabatic dry-cooler systems and offering engineered, automatic

## chillers

free-cooling capability, 3FX chillers are a key component of a digitally controlled, integrated closed-loop intelligent cooling system engineered to save energy and deliver reliable performance. “Each complete modular system offers a level of flexibility that gives industrial users the ability to easily expand and cost-effectively meet their evolving process cooling needs, or fulfill the need for system redundancy,” said Al Fosco, Frigel’s global marketing manager.

Available in 12 models to meet the demands of a wide range of process cooling applications, the 3FX units are designed to provide good EERs in all working conditions. Seven models are engineered with high-efficiency Bitzer screw compressors offering 41 to 139 tons of cooling per chiller and allowing for step-less capacity modulation from 25 to 100 per cent, Fosco said, and five models feature twin tandem



scroll compressors providing 25 to 65 tons of cooling capacity per unit.

“Each digitally controlled compact chiller has a minimal footprint and is engineered as a self-contained and complete package, consisting of a single-refrigeration circuit, rotary compressors, evaporator, and condenser,” Fosco said. “The chillers can be configured to provide up to 850 tons of cooling capacity.”

Frigel offers the 3FX chillers as part of an integrated system engineered to cost-effectively and reliably deliver process cooling based on each customer’s unique operation and process cooling needs. In addition to the 3FX chiller, an integrated system includes an Ecodry adiabatic cooler and Aquagel pumping, reservoir, and filtration package — all of which are modular units designed to minimize installation costs and provide for ease of expansion.

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

[www.frigel.com](http://www.frigel.com); 847-540-0160

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

[www.hamiltonplasticsystems.com](http://www.hamiltonplasticsystems.com); 905-890-0055

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Evonik has partnered with China-based Selective Laser Sintering Inc. to develop a new PA powder for applications in higher temperature ranges as part of its PA6 series.



New high-performance, high-purity, and high-quality filaments and powders are taking additive manufacturing to new heights.

# License to **PRINT**

By Mark Stephen, editor

To say that that 3D printing expands possibilities for plastic parts, short-run molds, and production mold tooling is to state a plain and simple fact, like noting that Prince Harry had a wild side in his bachelor days.

But while 3D printing is clearly gaining traction in the plastics industry, one of the biggest drawbacks has been the limitation of materials suitable for 3D printing. Take polycarbonate, for instance: While PC is one of the most widely used thermoplastics in the world, it's been slow out of the gate for use in 3D printing applications because of its high melting temperature.

But this situation is changing. Globally, the industrial filament market has grown by a whopping 217 per cent in the last two years according to a study by the Belgian company Filaments Discovery, and resin suppliers are a big part of the reason why. New lines of higher quality materials — PC-based and otherwise, in filaments and powders — designed specifically to enable higher quality 3D printing builds are starting to come thick and fast.

Here are some of the latest.

## FROM FORMNEXT

Some of the newest material offerings for 3D printing were unveiled at the recent Formnext additive manufacturing trade show in Frankfurt, Germany.

Arkema, for example, introduced new products in its N3xtDimension line of UV curable engineered resins. Presented through the company's Sartomer business unit, the materials have been developed for printing parts with high definition and performances that meet various industrial requirements. The specialized engineered resins, compatible with both digital light processing (DLP) and stereolithography (SLA), offer a range of beneficial properties, including impact resistance, elastomeric recovery, flexibility, and durability. The company also introduced Graphistrength C M17-20 at Formnext, a Kepstan PEKK-based multi-carbon nanotube masterbatch engineered to meet ESD properties in filament printing. Arkema also exhibited various parts printed from its Kepstan PEKK material, a high-performance thermoplastic which has been adapted for both powder bed fusion and filament-based additive manufacturing.

For a production run of hundreds of thousands of parts, 3D printing plastic components can't touch the speed and efficiency of an established process like injection molding, and probably never will. But at certain scales, 3D printing is indeed an option for production, and the scale is increasing. DuPont Transportation & Advanced Polymers, a global business unit of the DowDuPont's spe-

cialty products division, used the occasion of Formnext to introduce two new glass- and carbon-reinforced 3D printing filaments designed for easy printability that allows for reduced product development cycles and rapid prototyping. The first is Zytel 3D12G30FL BK309, a black heat-stabilized 30 per cent glass-reinforced PA with a modulus of 4-5GPA and a heat deflection temperature of >150°C or 300°F; the second is Zytel 3D10C20FL BK544, a black 20 per cent carbon fibre-reinforced PA for lightweight components with a modulus of 4-5GPA and a heat deflection temperature also of >150°C. "Both are resistant to most solvents, cleaning agents, automotive fluids and fuels at room temperature," said Ernst Poppe, the company's new business development manager. "These filaments are also a new step towards helping the industry move towards cost-efficient, automated, and larger scale production."

Also at Formnext, 3D printer maker Stratasys Ltd. unveiled new elastomer products for 3D printing. A thermoplastic polyurethane material, TPU 92A, has been developed for use in fused deposition molding (FDM) and PolyJet machines, enabling what the company calls new levels of elasticity, durability, and advanced colours in addition to hands-free soluble support. According to Stratasys, the material

## 3D printing

can significantly reduce both production time and labour costs compared to elastomer parts produced using traditional silicone or CNC molds, which are extremely costly and time-consuming. Further advancing realism for 3D printed prototypes, Stratasys also announced a range of new materials for its J750 and J735 PolyJet 3D printers. These include five new “highly realistic” materials with the ability to mimic rubber, leather or plastic.

### PUSHING THE BOUNDARIES

Outside of Formnext, what’s being described as the first high-purity PVDF filament for 3D printing of prototypes and small production runs is now available from Nile Polymers, which partnered with Arkema to develop the material. An addition to the company’s Fluorinar portfolio, Fluorinar-C copolymer filament is based on Arkema’s Kynar PVDF polyvinylidene fluoride



Photo Credit: BASF

BASF’s new Resin X004M is suitable for break-resistant parts such as post-coloured electric circuit connectors.

material and is designed for large parts, sales engineering Gene Alpin said, and stays secured to the build plate during printing and comes with all the certifications expected with Kynar PVDF, such as USP Class VI, NSF 51/61, and FDA certifications. “This is the first warp-resistant material to offer these certifications, and is a good fit for use in prototypes and small production runs of parts such as clamps, fittings, and vessel components used in several single-use biopharma applications,” Alpin said. Fluorinar-C is available in 1,000 gram spools with either 1.75 or

2.85 mm diameter with a +/- 0.05 mm tolerance, he added.

BASF recently unveiled two new materials for 3D printing. The first is Ultrasint PA6 LM X085, a PA6-based powder that melts at the low temperature of 190°C or 375°F, and is said to be easy to process on most commonly used selective laser sintering (SLS) machines. “These properties allow us to offer a PA6-based material to customers, especially those in the automotive and consumer goods industries, where today there is mainly only a choice between different PA11 and PA12 types,” said Alexander Cochrane, BASF’s marketing manager for powder bed fusion materials. Second, BASF 3D Printing Solutions has developed a new UV-reactive material called Resin X004M, which has been specially optimized for SLA, DLP, and LCD printers, in which the light source is placed beneath the printing material. “Resin X004M is



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especially suitable for break-resistant parts, for example post-coloured electric circuit connectors,” Cochrane said.

Specialty chemical maker Clariant AG, which established its own 3D printing division in 2017, has introduced a range of 3D printing materials since then, beginning with PAs for small lot production of parts used in applications such as transportation and electrical and electronics. Using flame retardants, glass fibres, and light stabilizers, Clariant’s glass fibre-filled flame retardant PA6 3D printer filaments using Exolit are designed to meet industrial requirements that include UL 94 V-0 levels. The company also offers high-impact strength materials that provide electrostatic discharge protection for manufacturing aids: PET-G, PC+ABS, and PC-based 3D printer filaments combined with conductive additives can provide OEMs with the ability to 3D-print jigs and fixtures that

are custom, durable, capable, and that won’t harm their manufactured parts due to electrostatic shock. Most recently, Clariant introduced 3D printer filaments in a variety of polymers that are colour-matched to the company’s ColorWorks ColorForward 2019 greenish-blue trend colour “άταραξία von has fidanken.”

Evonik Industries AG has partnered with China-based Selective Laser Sintering Inc. to develop a new PA powder for applications in higher temperature ranges as part of its PA6 series. Featuring high mechanical strength and superior chemical and temperature resistance, the powder’s heat deflection temperature is approximately 195°C or 380°F. “The powder material also stands out for its low water absorption — below three per cent — which has a positive effect on processability in 3D printing and the dimensional stability of 3D printed components,” said Selec-

tive Laser Sintering CEO Mark Zhao. “Also, the new polymer powder comes in a round grain shape, giving it excellent flowability and application properties, making it suitable for all powder-based 3D printing technologies.”

Prince Harry has finally slowed down; the drive to expand the range of materials for 3D printing is only going to accelerate. **CPL**

#### RESOURCE LIST

**Arkema Canada Inc.** (Burlington, Ont.); [www.arkema.ca](http://www.arkema.ca); 800-567-5726

**BASF Canada** (Mississauga, Ont.); [www.basf.ca](http://www.basf.ca); 289-360-1300

**Clariant Masterbatches Division** (Toronto); [www.clariant.masterbatches.com](http://www.clariant.masterbatches.com); 416-847-7000

**DuPont Canada** (Mississauga, Ont.); [www.dupont.ca](http://www.dupont.ca); 905-816-3300

**Evonik Canada Inc.** (Burlington, Ont.); [www.evonik.com](http://www.evonik.com); 905-319-4155

**Nile Polymers** (Centerville, Utah); [www.nilepolymers.com](http://www.nilepolymers.com); 801-203-3756

**Stratasys Ltd.** (Eden Prairie, Minn.); [www.stratasys.com](http://www.stratasys.com); 952-937-3000

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# PLAST-EX<sup>®</sup> 2019



<https://admtoronto.com/plastex>

## WHEN:

**Tuesday, June 4, 2019**

**10:00 a.m. – 5:00 p.m.**

Registration opens at 8:00 a.m.

**Wednesday, June 5, 2019**

**10:00 a.m. – 5:00 p.m.**

Registration opens at 8:00 a.m.

**Thursday, June 6, 2019**

**10:00 a.m. – 4:00 p.m.**

Registration opens at 8:30 a.m.

## WHERE:

**Toronto Congress Centre,  
650 Dixon Road,  
Toronto, Ontario**

**CO-LOCATED WITH:**

**ATX Canada, ADM Advanced Design  
& Manufacturing Expo, PackEx Toronto,  
and Toronto Powder & Bulk Solids**

The Plast-Ex show is like an extreme short-period comet, returning to Toronto every two years.

This year's edition, the upcoming Plast-Ex 2019, is Canada's only dedicated plastics trade show this year. Which makes it a big deal. Plast-Ex 2019 gives you a chance to discover the latest innovations, processes, and techniques in injection molding, extrusion, blow molding, auxiliary equipment, assembly, robots and automation, biocompatibility, materials, adhesives, 3D printing, and thermoforming.

Top companies and start-ups will be exhibiting state-of-the-art solutions, which makes this your chance to understand the technologies, processes, and services that can help you improve product quality and reduce your time, waste, and costs. Plast-Ex 2019 also offers plastics professionals and top suppliers from across the industry opportunities to meet and network, and to connect with leaders and visionaries at the forefront of the industry.

Top attendee titles include engineer, executive manager, owner, machine maintenance, mold design, production manager, manufacturer, purchaser, research and development, and quality control consul. Educational opportunities on the show floor will cover the latest breakthroughs in automation and robotics, design and manufacturing, packaging, plastics, and processing; and presentations, demonstrations, roundtables, meet-ups, and innovation tours can help you unlock the full potential of your projects.

This is your opportunity to discuss critical industry trends, learn best practices, and hear from top plastics thought leaders right on the show floor. If your company manufactures plastic materials, or uses them in the products you make, attending Plast-Ex 2019 should be a no-brainer. Sure the show will return again in 2021, but if you're not up on today's most innovative technology in this hyper-competitive market, there's no guarantee you'll still be in business by then.

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# PLAST-EX<sup>®</sup> EXHIBITORS

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## AUXILIARY EQUIPMENT

### Pumps featuring VFD system reduce noise pollution



New from **Advanced Blending Solutions LLC**, the *Tranquility* pumps for central material conveying systems come standard with a variable frequency drive (VFD) that controls the pick-up velocity of the material being conveyed.

There are five models available in the series, ranging from five to 25 hp, and all are compatible with competitors' central conveying systems.

The pumps feature a premium enclosure and silencer to reduce noise pollution. Compared to standard pumps during normal operation, *Tranquility* pumps have a decibel level reduction of between 13.5 to 28 per cent when the vacuum relief valve has been tripped.

Benefits of the new *Tranquility* pumps include employee comfort and safety; also, the use of a VFD helps prevent material degradation and the creation of angel hair and streamers.

**Advanced Blending Solutions LLC (Wallace, Mich.);**  
[www.adv-blend.com](http://www.adv-blend.com); 906-914-4180

## INJECTION MOLDING

### Remote diagnostics troubleshooting service

**Dr. Boy GmbH & Co. KG** has introduced its new *Boy Remote Service* (BRS), a smart remote diagnostics and interactive support program.

Using data glasses, via a smartphone and an Internet platform secured by the WebRTC protocol, live images of a customer's *Boy* machine can be shared online with *Boy's* service centre in Neustadt-Fernthal, Germany. The operator's verbal communication takes place locally with the service centre via a headset, while a *Boy* service technician virtually looks over the viewer's shoulder at the machine to provide guided customer support to troubleshoot problems and/or identify parts that require replacement.

The only prerequisite for this immediate assistance on-site is the purchase of the necessary data glasses and an annual license fee.

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



## EXTRUSION

### Rotary extrusion dies offer two-fold increase in speed

**Guill Tool & Engineering Co. Inc.** announces a new design for its high-production *rotary extrusion dies* — both inline and crosshead style — that offer cost savings due to the elimination of secondary processes, cosmetic enhancement of the end product with the elimination of weld or parting lines, plus reduction or complete elimination of ovality.



A two-fold increase in speed, with models running to 1,000 rpm depending on the application, are now available in the Guill line of patented rotating tip and die designs. By rotating the tooling in relation to the material flow, a rotary head increases the wall strength of an extrusion, which allows a thinner wall with less material and the corresponding cost savings for the user. Typical applications for rotary heads include medical and multi-lumen tubing plus various high-end extrusions with interlocking layer or multiple striping requirements.

Features offered on these new rotating extrusion dies include counter-rotating tip and die, co-rotating tip and die, rotating die with conventional tip, rotating tip with conventional die, crosshead or inline, multi-layer, striping, and optional quick-change cartridges that minimize cleaning downtime.

**Guill Tool & Engineering Co. Inc. (West Warwick, R.I.);**  
[www.guill.com](http://www.guill.com); 401-828-7600

### Flexible PVC compounds form strong bonds with rigid vinyl substrates

A new series of flexible PVC compounds for co-extruded profiles from **Teknor Apex Co.** are designed to form strong bonds with rigid vinyl substrates, yielding durable seal components for building and construction applications along with the possibility of eliminating the pre-drying step before extrusion.



*Apex 2310UV2* and *2316UV2* series compounds are available with a Shore A hardness range from 60 to 80 in both general purpose and "California Proposition 65-com-



pliant” grades, respectively. The complete series is formulated for UV resistance to ensure long-term retention of appearance and structural properties, and custom formulations are available with fungicide.

Uses for the compounds include window and door seals, and other indoor and outdoor applications requiring co-extrusion with rigid vinyl. To complement these flexible products, Teknor Apex also offers a broad range of rigid PVC compounds, making it possible to purchase a complete system from one supplier.

**Teknor Apex Co. (Pawtucket, R.I.);**  
**www.teknorapex.com; 800-556-3864**

## MOLD COMPONENTS

### Block cylinders in wide range of sizes and mounting styles

**Cumsa USA** has expanded its product offering with its own line of *hydraulic block cylinders* in multiple sizes and mounting styles.

Cumsa block cylinders are specifically designed for the high standards required in the moldmaking industry, and

can be used to move ejector plates, cores, and other components within a mold. They are available in different mounting styles, and can incorporate an end-of-stroke detection sensor and/or purge.



Two models are currently available. The Model A offers 12 different mounting styles, with a maximum working pressure 250 bar (3,600 psi), and eight different piston diameters (from 16 to 100 mm), with working temperatures up to 85°C or 185°F. The Model B offers five different mounting styles, and incorporates cooling to allow use in molds with higher working temperatures up to 150°C or 300°F.

**Cumsa USA (Troy, Mich.); www.cumsa.com; 248-850-8385**

## PACKAGING

### Thermoformer for low- to medium-volume production

**GN Thermoforming Equipment** has developed a new form-cut-stack thermoformer that targets low- to medium-

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volume packaging production for the food, medical, and industrial markets.

GN undertook an extensive research study and determined that there was strong demand from its customer base for a machine with similar capabilities to its successful GN800 unit, but within a mid-size production capability range. The result is the new GN580 thermoformer, a smaller version of the GN800 that offers many of the same features, and handles all thermoformable grades of PET, OPS, HIPS, PLA, PP, and PVC.

As with the GN800, standard features include in-mold-cut capability, auto-grease, heavy-duty bearings in the toggle system, and high-efficiency solar heaters.

The GN580 also uses common-edge-cut tooling technology, which offers the ability to form a series of square or rectangular trays in single or multiple rows while reducing web between the edges of the products.

**GN Thermoforming Equipment (Chester, N.S.);**  
[www.gnplastics.com](http://www.gnplastics.com); 902-275-3571



## MOLD CLEANING

Spray-on cleaner contains only EPA-exempt VOC compounds

**Slide Products Inc.** has unveiled its new X-Empty spray-on mold cleaner, designed to make it easier for plastics processors to comply with air quality regulations in the workplace.

Containing only EPA-exempt volatile organic compounds (VOCs) and free of any chlorinated solvents, X-Empty surpasses even California's tough CARB standards.

X-Empty is designed to clean molds that have cooled to temperatures ranging from 0° to 149°C or 32° to 200°F. It works fast to remove sticky, waxy, oily build-ups before quickly evaporating with no wiping needed. Molds can be cleaned and stored within minutes, ready for the next production run.



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X-EMPT is available in 16-ounce aerosol cans, as well as one-, five-, and 55-gallon containers.

**Slide Products Inc. (Wheeling, Ill.);**  
[www.slideproducts.com](http://www.slideproducts.com); 800-323-6433

**AceTronic Industrial Controls Inc. (Mississauga, Ont.);**  
[www.acetronic.com](http://www.acetronic.com); 905-564-7227

## MEASUREMENT

### Pressure transducers overcome thermal-zero-shift errors



New from **Nominal Controls Inc.**, *True-Melt* pressure transducers are designed to be virtually immune to thermal-zero-shift errors.

*True-Melt* transducers feature advanced temperature compensations that automatically correct for zero-shift errors; these

temperature-induced pressure drift errors could otherwise impede accuracy by as much as five to 25 per cent FSO.

Previously, pressure measurements at the extremes of low melt pressure (0 to 500 psi, for example) or high melt temperatures (>260°C or 500°F) had mostly been unfeasible because of pressure sensor thermal-zero-shift. *True-Melt* transducers reduce melt pressure sensor zero-shift from a typical 60 psi/37°C or 100°F, to less than 5 psi/37°C or 100°F.

*True-Melt* pressure transducers currently support pressure measurements as low as 0 to 100 psi at up to 400°C or 750°F. Available with 3.33 mV/V, 4-20 mA, or 0-10 V DC signal output, they can be further customized to meet spe-

cific user needs.

**Nominal Controls Inc. (Toronto);**  
[www.nominalcontrols.com](http://www.nominalcontrols.com); 844-741-2580

## MATERIALS

### Matting agent with high-transparency and soft-touch properties

The new *Acematt 3400* matting agent from **Evonik Industries AG** is designed for plastics applications for the auto sector that require high-transparency clear coatings and soft-touch coatings with smooth surfaces.



*Acematt 3400* is a surface-treated, thermal silica with medium-particle size of 7.5 µm. The improved grind performance results in a smooth surface finish with superior optical and haptic properties.

Suitable for high-solids and low-VOC formulations, the special after-treatment of *Acematt 3400* prevents the adsorption of associative thickeners in water-based systems. Likewise, when formulated with particular polyurethane binders, it can also improve the soft-touch feel.

The new matting agent can be easily incorporated into the formulation; no high shear forces are needed, which means that the bead mill can be skipped. *Acematt 3400* can also be added to the coating formulation at the end of the process, allowing for a post-adjustment of the gloss level.

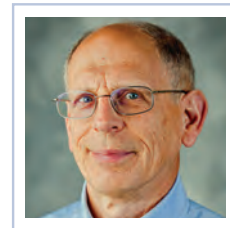
**Evonik Canada Inc. (Burlington, Ont.);**  
[www.evonik.com](http://www.evonik.com); 905-319-4155

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# Taking a second look at non-return valves

By John Bozzelli, Injection Molding Solutions



One of the most important details of the hundreds of details involved in injection molding is the non-return valve, or check ring. There are various versions of this: the three-piece, four-piece, full-flow, ball-check, et cetera. Leakage upon injection continues to be a problem, especially on small shot sizes. Most processors recognize the issue, but few do anything about it.

So, what's needed for a "good" non-return valve? The basic functions of a non-return valve are:

1. To allow plastic for flow through it — not over it — during screw rotation

to develop the required shot size for your part. There should be no dead spots for the plastic to accumulate or hang up. The flow path for the polymer should have minimum pressure drop and no shear stress due to sharp corners.

2. To provide a near-perfect seal so that upon injection this valve slides shut quickly and acts like the plunger in a syringe to push plastic forward into the sprue, runner, gate, and cavity, not allowing any plastic to slip back during injection, pack, or hold. We want it to seal under pressures up to 30,000 to 60,000 psi (2070 to 4140 bar).

3. To work properly on every shot.

4. To do the above without excessive wear on the barrel inside diameter. Note: It's possible that the non-return valve works properly but still doesn't hold a cushion due to wear on the inside diameter of the barrel. A better seal is made over a small area, not at mating or near mating angles.

5. To last at least six months to one year under normal use, understanding that some abrasive resins or fillers will influence functional life.

As I've written in previous columns and said in every one of my seminars, it's critical that the check valve seal doesn't leak. How do you make a good seal? Is it best to seal over a wide area or over a small area? Look at almost any container at home; take the cap off and analyze how the seal is made. You have to admit that these do a good job most of the time. Water bottles, sauce jars, you name it...they all have small contact angles and very few failures. Granted, these are low-pressure applications; but at 20,000 psi, a seal is best

made over a small or narrow area, not a wide area like 90 per cent of all check valves.

Take a good look at the non-return valve, even a ball-check, and you'll see that we're sealing over a relatively wide area. So wide, in fact, that if you have a glass fibre, piece of dirt, or even a partially melted granule, the injection pressure could lift the sliding ring or ball off its seat. This will result in a leak that will push molten polymer all the way to the feed throat after a few shots.

This isn't solved by locking the check valve, it's solved with a stepped — or better yet, radiused — seat. A recent study showed the radiused check valve outperformed the standard by 87 per cent.

We need a stepped angle or radiused seats to accomplish proper seal. The point being that a better seal is made over a small area, not at mating or near mating angles. A stepped or radius works and wears better. Some of my clients are seeing shot repeatability that they've never seen before, with three times the life of a standard valve. Questions remain as to what radius is best and where should it go: on the seat or the ring? Our industry is the third largest manufacturing base in North America, and yet the non-return valve still remains a problem in molding. We need more and better research to figure out how to correct this so we can make parts that are more consistent.

CPL

*John Bozzelli is the founder of Midland, Mich.-based Injection Molding Solutions, a provider of training and consulting services to injection molders, including LIMS and other specialties. He can be reached at john@scientificmolding.com, or visit www.scientificmolding.com.*

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