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in size reduction

**INJECTION
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FROM THE ARCHIVES

The October 1993 issue of *Canadian Plastics* reported on a major plant expansion underway at the headquarters of Engel Canada Inc. — the Canadian subsidiary of Austrian injection molding machine maker Engel GmbH — in Guelph, Ont. Scheduled for completion by mid-1994, the expansion would increase the plant's manufacturing space by nearly 50 per cent, our story noted, and the office area would also be enlarged. "The new facilities will include a state-of-the-art CAD-driven machining and assembly area, comprehensive engineering and equipment test facilities, software development and automation labs, and a training centre," we wrote. "The expansion is in response to the wide acceptance of Engel's tiebarless machines."

**Number of the month:
\$62.5 million ***

* Selling price of the assets of Mississauga, Ont.-based PE pipe producer Uponor Infra Ltd. (See pg. 9)



Cover Getty Images/Fotolia



cover story

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If you think the injection molding machinery makers all shot their bolts at NPE, think again. Germany's Fakuma trade show is all about injection molding, and the industry's heavy hitters have enough new technology left over to keep the 2018 edition more than a little interesting. Here's a look at some of what will be unleashed in Friedrichshafen.

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Unless consumer product makers want their sales to flatline faster than Venezuela's economy, they have to offer things the marketplace actually wants. Making products in the right colours is a good start. Here's what some colourant makers say will be the hot palettes in 2019.

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Quebec's only plastics trade show is also Canada's only plastics trade show this year, and it's part of the larger ADM Expo. Here's what you need to know at a glance.

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Accentuate the positives

Keeping abreast of the plastics industry these days can feel a bit like watching the proverbial slow-motion car wreck — or rather several car wrecks, as straw bans, bag bans, ocean litter, trade wars, and tariffs T-bone our sector, one after the other, with tire-screaming force.



If it seems as if plastic as a whole is becoming stigmatized, well...it is, at least to the extent that environmental campaigners can stigmatize it.

But let's pivot from all the doom and gloom and focus on the positives. Here's a big one, to start: Globally, the plastics industry is expected to see broad-based growth in the coming years. There are a number of reasons why. First, trends in end-markets are well anchored on technological innovations that require more utilization of plastic and plastic composites; second, the explosive growth in e-commerce will generate higher use of plastics in packaging; and third, the continuing trend to lightweighting of automobiles will mean a greater percentage of plastics in automobiles. Also, the aging baby boomer population in advanced economies is fueling higher demand for medical care — and by extension the use of supplies and equipment that make extensive use of polymers as the medical industry moves away from metals like titanium.

But don't take my word on this. From 2006 to 2016, global plastic output rose from 245 million to 348 million tonnes, according to the Plastics-Europe trade association. Production rose by 3.9 per cent in 2017, which is up from a rise of only 3.5 per cent in 2015. And after posting anemic growth of 0.5 per cent in 2016, total demand for plastic products is on track to expand by 3.5 per cent in 2018. Demand for thermo-plastics alone — which includes the most common kinds of plastic, such as

PET used in water bottles, PP, PE, PVC — has soared by 4.7 per cent yearly from 1990 to 2017, PlasticsEurope says.

The continued growth of the plastics industry sounds counterintuitive given the tsunami of negative publicity it receives, I know; and it certainly defies concerted efforts from activists around the world, as well as an increasingly hostile regulatory environment. But it's a fact, and not a difficult one to understand. Simply put, plastic goes hand-in-hand with economic development. The more an economy grows, the more plastic is used in construction, infrastructure development, the electrical and electronic industries, and transport. Even single-use plastic packaging — the ultimate nemesis of environmental activists — remains in strong demand in developing countries.

Make no mistake: Single-use plastic packaging has become a piñata, and North American, European, and Japanese plastic manufacturers have all seen their market share shrink. But even in Europe, where the anti-plastics movement is well-established and particularly vigorous, packaging still accounts for 40 per cent of consumption. And Western producers are doing especially well in the development of so-called specialty plastics used in the construction, automobile, medical, and other industries. Nor is there any evidence of overheating in any of these major sectors — indeed, the demand for polymers in the medical industry, for one, will continue to skyrocket as the number of older persons more than doubles by 2050.

The bottom line? Despite the bans, plastic remains miraculously ubiquitous, seen in all three consumption categories: durable and nondurable goods, and in services.

So let's not let the wall-to-wall negativity get us down.

Mark Stephen, editor
mstephen@canplastics.com

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

www.canplastics.com

EDITOR

Mark Stephen

416-510-5110 Fax: 416-442-2230
mstephen@canplastics.com

NATIONAL ACCOUNT MANAGER

Catherine Connolly

289-921-6520
cconnolly@annexweb.com

ART DIRECTOR

Andrea M. Smith

ACCOUNT COORDINATOR

Tracey Hanson

416-510-6762
thanson@annexbusinessmedia.com

CIRCULATION MANAGER

Aashish Sharma

416-442-5600 ext. 5206
asharma@annexbusinessmedia.com

VP PRODUCTION / GROUP PUBLISHER

Diane Kleer

dkleer@annexbusinessmedia.com

PRESIDENT & CEO

Mike Fredericks

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CIRCULATION

mchana@annexbusinessmedia.com

Tel: 416-442-5600 ext. 3539

Fax: 416-510-6875 or 416-442-2191

Mail: 111 Gordon Baker Road, Suite 400,
Toronto, ON M2H 3R1

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• Tel: 800-668-2374

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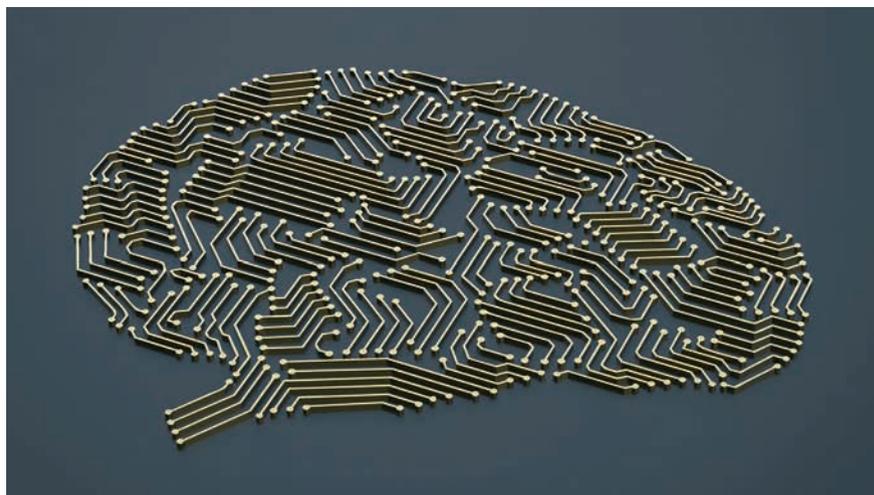


New technology lets the plastics industry act smarter through artificial intelligence

The manufacturing world has probably seen more new technologies in the past few years than Wile E. Coyote unleashed on the Road Runner in total, but none are bigger than the advances in artificial intelligence (AI). Defined as human intelligence exhibited by machines, the general idea behind AI in an industrial setting is the ability for machines to think for us, whether they're projecting sales forecasts or directing a factory assembly line.

And a new machine learning solution developed by Montreal-based AxiPolymer Inc. is designed to make it easier for large-sized plastics processors to embrace AI. Founded last year by polymer scientist Dr. Ata Zad, AxiPolymer provides product development services for the plastics sector. And no product deserves development more than AI, Zad said. "Every plastics manufacturer has the potential to integrate machine learning into their operations and become more competitive by gaining predictive insights into production," he said. "Machine learning's core technologies align well with the complex problems manufacturers face daily, especially large manufacturers that have the largest amount of raw data."

But adaptation of AI by the plastics sector has been slow. "In many manufacturing companies, IT systems aren't well developed and aren't aligned together to act as a total decision aid system, which makes it difficult to bring all of the different parts of a company onto the same path to accomplish shared goals," Zad said. And without AI, the problem is only going to get worse. "When a company expands, the amount of new data it has to deal with grows exponentially — data relating to new clients, new formulations and products, new suppliers, new employees, and more — and it's almost impossible to interpret these huge loads of data and get actionable intelligence



from it with a traditional IT system," Zad said. "The only way to do this is with AI, which uses algorithms to find hidden patterns in data. These algorithms are iterative, and will learn continually and seek optimized outcomes; they also iterate in milliseconds, which lets manufacturers find optimized outcomes in minutes instead of months."

Now available from AxiPolymer after more than six months in development, the machine learning system is both modular and highly customized. The first step towards implementation, Zad said, is for AxiPolymer to meet with a company's executives and find out what their business priorities are, and where exactly they need help from AI. Determining a company's so-called "deep features" is key. "Deep features are features that can only be obtained with the help of field experts, as opposed to shallow features that can be obtained directly from observations," Zad said. "Once we understand the deep features, we start gathering the data from the company that needs to be analyzed. We then feed that data into an algorithm that will begin to get trained and start predicting patterns, some of which will be right and some wrong — the system will teach itself and learn enough to become operational after a short period

of time. At that point, the customer can run the AI system on their own."

And since each plastics processor is unique, each machine learning solution will also be unique. "AI isn't a one-size-fits-all technology," Zad said. "It's company-specific and policy-specific, which means every company needs its own customized deep features and customized AI algorithms, and we deliver that. We also introduce the AI solution in a modular format — to the supply chain first, for example, and then to production, and then to sales and marketing. We finish by connecting them all together."

When it comes to the benefits of using AI, Zad said, the sky's the limit. "AI can bring new levels of insight, intelligence, and predictive accuracy to every phase of plastics production," he said. "It can increase production capacity, optimize production workflows, help achieve a more accurate cash flow, improve preventative maintenance, create more accurate sales forecasts, improve supplier selection to make sure you source from the right suppliers, power analytics for more effective advertising, and more," he said.

AI might even have allowed Wile E. Coyote to finally bag that pesky Road Runner.

CPL

GN Thermoforming is on a roll with its new GN800 unit

On the heels of what it calls a “highly successful” NPE2018 trade show in May, Chester, N.S.-based GN Thermoforming Equipment has received multiple orders from Canadian and American processors for its new GN800 Thermoformer.

According to Jerome Romkey, GN’s vice president of sales and foreign operations, the company has received orders for six GN800 units so far and expects further increased business activity over the next several months in the U.S, Mexico, and the Caribbean.

Targeted for food, medical, and industrial packaging, the GN800 offers many standard features including forming capability of five inches above and below the sheet line, in-mold-cut capability, auto-grease, heavy-duty bearings in the toggle system, and high-efficiency SOLAR



The GN800 Thermoformer.

Photo Credit: GN Thermoforming Equipment

heaters.

Additionally, the GN800 has a forming area of 830 mm by 570 mm (31.5 inches by 22.4 inches). The cutting force of the forming and cutting stations is 75 tons. The GN800 also has additional space between the forming and cutting stations, providing extra cooling time when running heavier gauge materials or PP. The GN800 features a standard oven that is four times the index length of the forming area, Romkey said, and also comes with independent top and bot-

tom servo-plug drives for better material distribution. The GN800 handles sheet widths up to 880 mm (34.6 inches), and can run sheet thicknesses ranging from 0.25 mm (0.010 inches) to 1.5 mm (0.060 inches). The unit comes fully equipped and handles all thermoformable grades of PET, OPS, HIPS, PLA, PP, and PVC.

“Overall, traffic was down at our booth at NPE2018 but we were pleased to see that the quality of attendees was superior to previous shows,” Romkey said. “It was a great show because we had a targeted group of visitors — they were at NPE for a reason and interested in buying.”

GN manufactures roll-fed thermoformers for the production of high-quality plastic packaging. The company’s operation also includes a technical service and sales centre in Jihlava, Czech Republic. **CPL**

Nova investing \$2 million to reduce plastic ocean debris

Calgary-based chemical maker Nova Chemicals Corp. will make a three-year investment of nearly \$2 million to prevent plastic debris from reaching the ocean.

The investment supports Project Stop, a new global initiative to design and implement solutions to reduce marine plastic pollution, especially in countries with high leakage of plastics into our oceans.

Southeast Asia has been identified as a major source of marine plastic debris, as economic development and plastics consumption have outpaced the expansion of waste management systems in the region. Project Stop has chosen Indonesia as a primary focus region.

“We understand the growing concern about marine plastic pollution and agree we must take meaningful action to address this challenge,” said John Thayer, Nova’s senior vice president, PE business. “Plastics are too valu-

able to be thrown away or left as litter. We’re working with Project Stop to find high-impact solutions to prevent plastic pollution in critical locations around the world.”

Nova’s investment will support the first city partnership in Muncar, a coastal fishing community located in Banyuwangi, Indonesia. “With minimal waste services in place, many citizens are forced to dump their waste directly into the environment,” Thayer said. “Muncar was chosen as the first Stop location due to the seriousness of the challenge, coupled with strong leadership and environmental commitment at national, regency, and local levels.”

Project Stop was co-created in 2017 by Borealis and SystemIQ. Borealis, a sister company of Nova, provides polyolefins and other base chemicals; SystemIQ is a firm that develops solutions for sustainable land-use.

Project Stop has three objectives: Zero leakage of waste into the environment by ensuring waste collection services are available to all households and businesses, through increasing pick-up points and sorting facilities; increased recycling of plastics by strengthening the supply chain from waste collection to waste management companies; and providing benefits for the local community by creating new jobs in the waste management system and reducing the impacts of mismanaged waste on public health, tourism, and fisheries. **CPL**



Plastic washed up on a beach in Muncar, a coastal fishing community located in Banyuwangi, Indonesia.

Photo Credit: Nova Chemicals Corp.

Beckhoff Automation opens office in Laval, Que.

In a move to increase its direct sales and support presence in Canada, automation software provider Beckhoff Automation Ltd. has opened a new office in Laval, Que.

“As the second Beckhoff office in Canada, the 2,223-square-foot facility establishes an automation solution centre for Beckhoff customers in Quebec, located conveniently within driving distance from downtown Montreal and Montreal–Pierre Elliott Trudeau International Airport,” the company said in a statement. “The facility boasts collaborative space for Beckhoff customers and employees to develop innovative automation and control projects. A dedicated training room is available for customers to increase their engineering knowledge of Beckhoff PC-based control solutions and to enhance programming expertise in areas such as PLC, motion control, safety technology, IoT connectivity, and more.”

Ted Sarazin, the company’s regional sales manager for Quebec and Eastern Canada, will run the day-to-day activities at the Laval facility. “We are excited about all the new opportunities that the Laval office now makes possible,” Sarazin said. “Customers across Canada, and regionally here in Quebec, have recognized the benefits of



The new office in Laval.

Photo Credit: Beckhoff Automation Ltd.

control systems that feature PC-based hardware, Ether-CAT networking, and TwinCAT software technology. This office location makes direct interactions with customers more efficient as we provide local product support and application engineering to help their business operations grow.”

The Canadian headquarters of Beckhoff is located in Mississauga, Ont.

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Canadian Bill Spenceley inducted into Rotational Molding Hall of Fame

The U.S.-based Association of Rotational Molders (ARM) has named Canadian rotomolding industry veteran Bill Spenceley into the Rotational Molding Hall of Fame.

Spenceley is the owner and president of Lethbridge, Alta.-based rotomolder Flexahopper Plastics Ltd. Spenceley joined Flexahopper as its director of design engineering in 1981, seven years after the company was founded. In five short years, he was the general manager/director of design engineering, and by 1995 he was president of the company and then principal owner three years later. During that time, Spenceley helped grow Flexahopper into one of the largest processors of rotomolded products in the Pacific Northwest, exporting products worldwide from its headquarters in the Lethbridge Industrial Park. Spenceley played a key role in Flexahopper's decision to install more



Bill Spenceley was instrumental in Flexahopper installing more than 500 solar panels on its factory roof to generate power for the plant.

than 500 power-generating solar panels on its factory roof in 2017, and he has also supported industry research and development activities at the Flexahopper plant.

He also served as president of ARM from 2012-13, and as chairman of the International Affiliation of Rotational Molding Organizations from 2010-12. In 2014, he earned ARM's Charles D. Frederick Distinguished Service Award in 2014.

Spenceley will be inducted into the Rotational Molding Hall of Fame on Oct. 23 at ARM's annual meeting in Montreal.

It's turning out to be a big year for Spenceley, who graduated from the University of Lethbridge with a degree in chemistry and biochemistry before starting at Flexahopper: The University of Lethbridge Alumni Association recently named him as its 2018 Alumnus of the Year.

CPL

Photo Credit: Association of Rotational Molders

Lorenz Conveying Products buys Flow Valves International

In a bid to increase its presence in North America, Cobourg, Ont.-based Lorenz Conveying Products has acquired Flow Valves International, a flow control valve manufacturer headquartered in Evanston, Ill., for an



Syntron and SMS Iris flow control valves.

Photo Credit: Lorenz Conveying Products

undisclosed price.

Flow Valves makes the Syntron and SMS Iris flow control valves, which are used for applications ranging from packaging and bagging, and for free-flowing powders and granular materials.

The acquisition includes Flow Valves' manufacturing plant in Normal, Ill., which will be renamed Lorenz Conveying Products U.S.A. Inc. The plant will retain all of its employees and resources.

"This addition of the Iris flow valves to our product line is the perfect fit with our other products," Lorenz Conveying president Peter Lorenz said. "It gives us a new customer base that blends seamlessly with our existing clients. And the U.S. base is in the perfect location for providing service and extending our offerings to our existing clients in both America and Canada."

Founded in 1979, Lorenz Conveying manufactures couplings, elbows, fittings, diverter valves, slide gates, cyclones, and custom fabricated accessories for pneumatic conveying, and vacuum and bulk handling systems.

CPL

L.V. Lomas' Canadian operation renamed IMCD Canada Ltd.

One year after being acquired by a new owner, specialty chemical distributor L.V. Lomas Ltd. (Canada) has changed its name.

The Brampton, Ont.-based division of L.V. Lomas has been renamed IMCD Canada Ltd.

L.V. Lomas' U.S. operations has been renamed IMCD US Food Inc.

L.V. Lomas was purchased by Netherlands-based IMCD N.V. in August 2017 for an undisclosed amount.

Established in 1960 and with activities at six locations in Canada and the U.S. — including offices in Montreal and Vancouver — L.V. Lomas distributes specialty chemicals, ingredients, and raw materials throughout North America. In 2016, the acquired business of L.V. Lomas generated revenue of \$383 million. The company has approximately 280 employees.

CPL

Assets of Ontario extruder Uponor bought by U.S. investment firm Wynnchurch Capital

The assets of PE pipe producer Uponor Infra Ltd., which is headquartered in Mississauga, Ont., have been acquired by U.S.-based investment firm Wynnchurch Capital LLC for \$62.5 million and renamed as Infra Pipe Solutions Ltd. (IPS).

The deal includes Uponor's manufacturing plants in Mississauga; Huntsville, Ont.; and Saskatoon, Sask.

IPS will manufacture large diameter HDPE pipe for use in water infrastructure, mining, industrial processes, oil and gas distribution, and other applications.

The IPS deal marks Wynnchurch's eleventh platform investment in Canada and the second Canadian investment in 2018.

Sandeep Dhillon, who served as president of Uponor Infra Ltd., is now IPS's CEO.

"With the opportunities we have before us, this is a very exciting time for the company," Dhillon said. "Wynnchurch has the resources and expertise to take our company into a new phase of expansion as we continue to help our customers grow."

CPL

PEOPLE



Eric
Biddiscombe



Alvaro
Mendoza



Warren
Nordquist



Joseph
Serell

- **Polymer Logistics**, a Tampa, Fla.-based plastic packaging manufacturer, has named **Eric Biddiscombe** as its sales manager for Canada. Biddiscombe is based out of Cambridge, Ont.
- Masterbatch and colourant producer **Ampacet Corp.**, headquartered in Tarrytown, N.Y., has named **Alvaro Mendoza** as president and CEO. He succeeds Yves Carette, who has retired after 32 years with the company.
- Elmira, Ont.-based tooling and automation supplier **Tri-Mach Group Inc.** has appointed **Warren Nordquist** to lead its new Western Division based out of the Winnipeg area.
- Parsippany, N.J.-based **Sun Plastech, Inc.**, the manufacturer and distributor of AsaClean purging compounds, has named **Joseph Serell** as its president.

SUPPLIER NEWS

- Mold technology supplier **DME**, a product brand of Milacron Holdings Corp., has signed a distribution agreement with **Hawk Mold and Die Supply Inc.** that transforms Pipersville, Pa.-based Hawk into a DME exclusive North American East Coast distributor and warehouse.
- Parsippany, N.J.-based **Conventus Polymers LLC**, a distributor of high-performance engineering thermoplastics, is now an exclusive distributor of **Kumho Polychem's** TPVs in North America. Kumho Polychem is headquartered in Seoul, South Korea. Its Innoprene TPV line includes 43 grades which are targeted for seal, gasket, cover, and hose applications for the automotive, industrial, electrical, sporting goods, and furniture markets. The grades range in hardness from 45 to 93 Shore A and up to 40 Shore D.
- Auburn Hills, Mich.-based resin distributor **General Polymers Thermoplastic Materials LLC** is now the exclusive distributor of **Mitsubishi Chemical Performance Polymers'** Trexprene TPV elastomer compounds in North America. Trexprene TPV is a heat-stabilized, vulcanized PP/EPDM product approved for a variety of automotive applications.

Relief for the directionally CHALLENGED

If you're not conveying your resins with deadly efficiency — not too fast, not too slow, and to the right destinations — you're no longer in the game. The latest raw materials handling technologies can help.

By Mark Stephen, editor

For years now, self-help books have been telling us that it's the journey, not the destination, that matters. When it comes to raw materials handling, however, they're only half right: both the journey and the destination are critical.

Raw materials handling is vital for the efficient operation and profitability of a compounding line or mixing process. And in theory, at least, it's easy: you simply move resin from point A to point B. But whoever said that reality bites must have had conveying in mind because in the real world things can get ugly, with common problems including material and system damage as plastic moves through a conveying line too fast, contamination due to operator error, issues involving dust control, and sending material to the wrong processing destination.

The good news? The latest resin conveying technologies can make it harder to get bit.



Discrete-wire conveying controller for growing processing plants

Designed with growing factories in mind, AEC's new VacTrac Plus is discrete-wire conveying controller that allows the number of pumps and receiver stations to be customized to fit processors' evolving needs.

The controller can control vacuum receivers, vacuum pumps, remote proportioning valves, purge valves, knife gates, and pump or hopper blowback in any resin conveying application across any process. The control is fully configurable from one to 12 pumps and one to 44 stations, and the system features a wide range of configurable functions, including blowback, RPV valves, knife gates, local alarms, purge valves, and low level alarms. Data logging capabilities allow users to review alarm history to help troubleshoot upstream system issues. The system is also equipped with an automatic e-mail alert capability that sends e-mail alarms when specific issues occur, providing immediate visibility when it's needed.

The VacTrac Plus has a seven-inch colour touchscreen powered by an Allen-Bradley PLC. The graphical user interface with a VNC server allows remote two-way communication on any PC, tablet or mobile device. The system offers Ethernet connectivity, and can be upgraded by adding the required I/O modules and new software. Installation is made easy with a simple control set-up that's swift and intuitive.

AEC Group (New Berlin, Wis.);
www.acscorporate.com; 262-641-8600
EquiPlas (Toronto); 416-407-5456
Auxiplast Inc. (Ste-Julie, Que.);
www.auxiplast.com 866-922-2894

Truck-fill line-proofing system prevents costly silo-filling errors

The Conair Group's new truck-fill line-proofing system is designed to prevent expensive mix-ups during the transferring of truckload-quantity material to silos by remotely locking access to silo-fill lines, thereby making it impossible to connect to any silo line until the correct line is



confirmed and remotely unlocked by an authorized user.

Available as either a stand-alone system or an easy-to-install connection for its FLX-128 Plus material handling control, the line-proofing system consists of a PLC module, wiring leads, and one electronically-controlled interlock device per silo line. "The plug-and-play system control, which connects directly to the FLX-128 Plus control panel, is pre-loaded with line-proofing software," said Doug Brewster, Conair's conveying systems manager. "From it, power/communications wiring extends to each of the remotely-mounted interlock devices at the end of each silo fill-line, and each provides a new four-inch quick-connect point that's protected by a hinged, electro-mechanical access gate." In normal operation, Brewster continued, the gate on each interlock device is locked by default to prevent unauthorized silo-line access. "When truck unloading is required, authorized plant personnel log into the control, complete a brief list of required information for each delivery, and then select and electromechanically unlock one silo-fill line," he said. "Outside at the silo location, a green indicator light indicates the open interlock. The trucker simply lifts the interlock gate to open it, connects to the silo-fill line, and fills the silo. When filling is complete, the trucker disconnects from the fill line and closes the interlock gate, which automatically re-locks the device."

The shipment data required by the line-proofing software is customizable, Brewster added. "Required data may include truck numbers, material numbers, order numbers, passcodes, barcode scans, and other information," he said. "Every transaction is time-stamped and logged for accountability."

Conair Group (Cranberry Township, Pa.);

www.conairgroup.com; 724-584-5500

Dier International Plastics Inc. (Unionville, Ont.);

www.dierinternational.com; 416-219-0509

Industries Laferriere (Mascouche, Que.);

www.industrieslaferriere.ca; 450-477-8880

Turner Group Inc. (Seattle, Wash.);

www.turnergroup.net; 206-769-3707



Feeder for continuous processing

Coperion K-Tron, part of Coperion's equipment and systems division, has added the new QT35 to its K3-PH brand of feeders. The design is suited for multi-feeder clustering in a variety of continuous processes,

including direct compression, continuous extrusion, wet and dry granulation, and continuous coating, as well as traditional batch processes.

The design features a modular concept with a reduced

overall footprint enabled by a smaller D4 platform scale, which uses the company's Smart Force Transducer (SFT) weighing technology. The modular concept also features a drive using a servo-motor, which helps reduce the overall footprint and offers a larger turndown range, including low feed rates. Electronic functions include linearization, temperature compensation, and a digital low-pass filter to reduce the effect of plant vibration. The digital design eliminates the need for calibration.

Depending on the application, the QT35 can be outfitted with a variety of ancillary options including the innovative ActiFlow bulk solids activator; a material flow aid for feeding difficult materials; and Electronic Pressure Compensation, a unique instrumentation package that can optimize feeder performance in continuous operations such as blending, extrusion, granulation, and coating.

Coperion K-Tron (Salina, Kan.);

www.coperion.com; 785-825-3884

Pneu-Tech Systems Ltd. (Woodstock, Ont.);

www.pneutechsystems.com; 519-537-7199

Auxiplast Inc. (Ste-Julie, Que.);

www.auxiplast.com 866-922-2894



Automated bulk solids drum dumping system

A new Tip-Tite drum dumping system from Flexicon Corp. is designed to automatically roll drums containing bulk material

into position, dump the material into downstream equipment, and roll the empty drums out of the dumping station to facilitate safe, high-capacity transfer from drums of all popular sizes weighing up to 750 lbs (340 kg).

Once full drums are rolled onto the dumping station platform, a hydraulic cylinder raises and seats the drum rim against a discharge hood; a second hydraulic cylinder then tips the drum to an angle of 45, 60, or 90° with a motion-dampening feature. At full rotation, the slide gate opens to allow controlled discharge of material into downstream process equipment. After the empty container is returned to its upright position, the rolling motion is reversed, and the container is halted in front of a pneumatically-actuated pusher, which transfers the empty drum to the return conveyor for removal. Meanwhile, another full drum rolls into position on the dumping platform.

Photoelectric sensors located along the powered roller conveyor relay the position of empty and full drums to the system controller, which actuates the conveyor to advance full and empty drums upon completion of each dumping cycle.

The Tip-Tite system is also offered in high-lift configura-

tions for dumping into elevated receiving equipment; and in open-chute and dust-free designs for dumping of boxes, bins, pails, and other containers.

Flexicon Corp. (Bethlehem, Pa.);
www.flexicon.com; 610-814-2400

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



Sanitary flange air conveyors for chemical, pharmaceutical applications

Designed to fit within existing sanitary flange piping systems and convert into a conveyor for waste, parts, and bulk materials, Exair

Corp.'s new Sanitary Flange Line Vac air-operated conveyor can be used to convey materials in systems that require frequent or mandatory cleaning.

Made from type 316 stainless steel to provide corrosion resistance and cleanliness, the clamp-style sanitary flanges are compatible with ISO 2852. Conveying rates are easy to control by regulating the compressed air supply pressure. No moving parts or electricity assures maintenance-free operation. The technology's large size makes it well-suited for conveying large volumes of material over long distances, Exair said. Sanitary Flange Line Vac conveyors eject a small amount of compressed air to produce a vacuum on one end with high output flows on the other; response is instantaneous, and regulating the compressed air pressure provides infinite control of the conveying rate.

In addition to raw material conveying, possible applications include part transfer, waste/trim removal, hopper loading, filling operations, chip removal, and fibre tensioning.

The Sanitary Flange Line Vac conveyors are offered in four common flange sizes: 38, 51, 64 and 76 mm.

Exair Corp. (Cincinnati, Ohio);
www.exair.com; 800-903-9247

Coupling system with RFID option for error-free connections

Motan's new MetroConnect U/C manually operated coupling system for pneumatic conveying lines has an RFID option designed to provide error-free connections.

Available as either an uncoded version (MetroConnect U) or a coded version (MetroConnect C), the coupling system is controlled, monitored, and configured with the MetroConnect controls, and can be connected via Ethernet with the MetroNet material loader control as well as with visualization.



Coupling station pipe work is usually made from robust and easy-to-clean stainless steel. As an alternative, Motan offers the MetroConnect with specially hardened, surface-nitrated distribution pipes specifically designed for conveying particularly abrasive materials such as glass fibre-reinforced granules; the conveying pipes are also suitable for problematic recycling materials.

Up to eight blower lines can be established with a maximum of 96 loaders and material sources, Motan said, and up to 125 coupling points can be connected to each blower line. If required, an extension of up to 250 coupling points is available. Also, the uncoded version can be retrofitted into a coded version at a later date if required. Which might just be necessary. "Not only do coded coupling stations protect against coupling mistakes, they're often necessary if material tracing, validation or certification is required," Motan said.

Motan Inc. (Plainwell, Mich.);
www.motan-colortronic.com; 269-685-1050
D Cube (Montreal); www.dcube.ca; 514-272-0500

Diverter valve prevents contamination

Schenck Process recently introduced its new PST30 diverter valve, which is designed to prevent contamination and provide line-switching for either dilute or dense phase conveying.

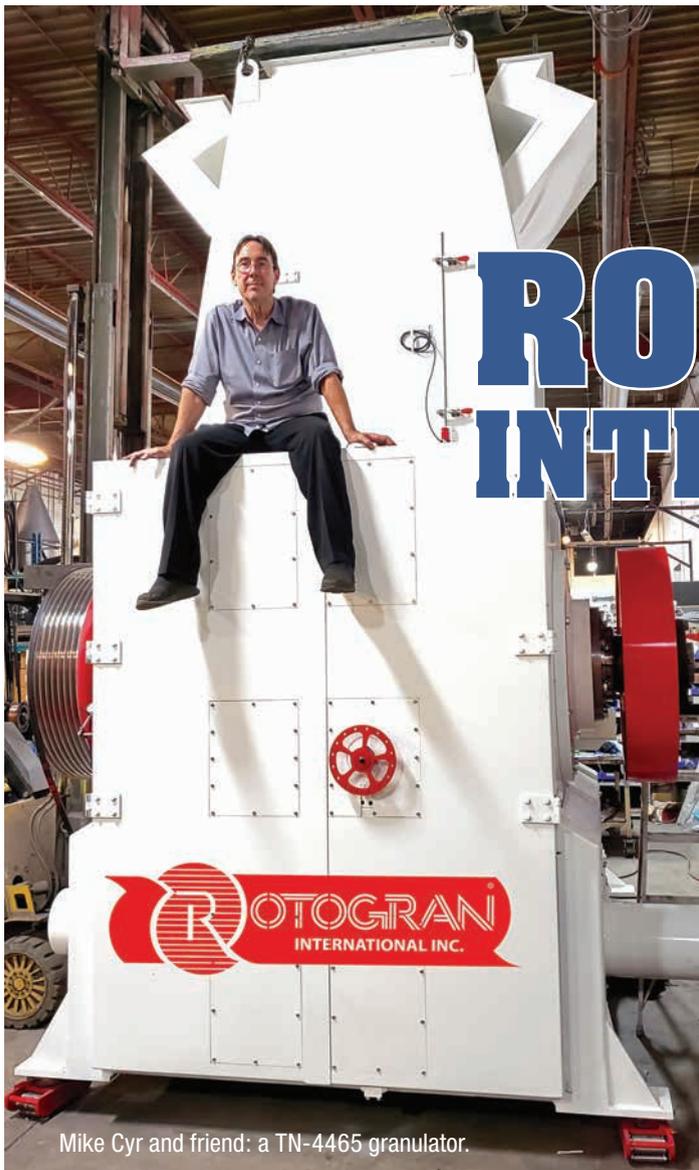
The PST30 comes standard with internally shim-able positive stops, inflatable pneumatic seals at each port, position indication from the tunnel itself, and external tunnel position indication.

Additional features include 145° port-to-port rotation combined with the ability to switch between dilute or dense phase conveying. The housing, plug, and endplates on the aluminum valve are hard-anodized for wear resistance. A pneumatic actuator provides a four-second actuation time between ports. To complete the unit, a four-way double and three-way single solenoid air control valve with NEMA 4 enclosure, and two SPST proximity sensors, are included.

A version without inflatable seals is also offered.

Schenck Process LLC (Kansas, City, Mo.);
www.schenckprocess.com; 800-821-2476





Mike Cyr and friend: a TN-4465 granulator.

ROTOGRAN INTERNATIONAL

is getting very big in granulation

Booming sales, a recent move to a bigger plant, and a deep dive into making larger granulators all signal the start of a new era for this Southern Ontario-based size reduction equipment manufacturer.

By Mark Stephen, editor

Sir Isaac Newton's Third Law says that for every action there's an equal and opposite reaction. And it doesn't just hold true for physics. Take the plastics industry, for example, where the action of implementing bans on single-serve items such as bags and straws is creating a growing reaction towards using more post-consumer plastics.

Which is where another law — the one about unintended consequences — comes in: The use of more post-consumer plastics necessitates more comprehensive recycling, thereby boosting the fortunes of some companies that were founded to facilitate plastics production. Case in point? Rotogran International Inc., which has just moved from its original headquarters in Vaughan, Ont. into a much larger manufacturing plant in the nearby town of Bolton.

PLANNED PROGRESS

Rotogran is a North American manufacturer of size reduction equipment for the plastics and recycling industry, custom designing and building granulators, fines separators, evacuation systems, and feed conveyors with metal detectors. The company was founded in Vaughan in 1982 by entrepreneur Mike Mikellides and then acquired on Mikellides' retirement in 2013 by Mike Cyr, who was then Roto-

gran's vice president of sales.

Cyr's ambitions had been pent-up, and he made substantial changes to the company beginning on day one of his ownership. "As soon as I bought Rotogran I began expanding the product line to fill in what I saw as the gaps in our size reduction range," Cyr said. "We doubled the number of granulator models available, making the new models wider and also lower to go underneath shredders in stacked systems. We added new models to our WO-14 medium-duty granulator series, for example, including the WO-1424, WO-1430, WO-1442, and WO-1456 units. And where we only had two granulators in the 18-inch cutting circle range, we introduced three more. At the 26-inch cutting circle range we added two additional models, as well. We also expanded our Titan series granulators with 36-inch cutting circles in wider ranges of widths and higher production capacities."

Cyr had actually been planning these and other changes since before he even joined the company. "My relationship with Rotogran began in 1987, when I became a sales rep for their line while working as the national sales manager for a larger company," he said. "I was a machinist by trade, and worked with Mike Mikellides to bring Rotogran's early units up to my own standards." An example, Cyr continued,

size reduction



Rotogran's present and future: Mike Cyr (left) and Cole Cyr.

is when Rotogran developed its first granulator with quick and easy access. "I designed the system myself using CAD and had Rotogran build it," he said. "We introduced it at an NPE trade show, and then in 1992 I joined Rotogran as vice president of sales. I feel as though I was born to sell, and my passion for Rotogran products has always been so big that I purchased the company as soon as the opportunity arrived."

The investments in new machine sizes quickly paid off. "We've doubled our sales since 2013 and we outgrew our

original headquarters in Vaughan, which only had 14,000 square feet of space and only had machine capability for small machining, which meant that we had to outsource the balance," Cyr said. Which is why in November the firm moved into a 20,000-square-foot plant in Bolton. "We looked at many areas in Southern Ontario and finally picked Bolton, which is located in the Town of Caledon, for a number of reasons," Cyr said. "It has low taxes, good infrastructure, and close proximity to the airport and GTA. I was also very impressed with Allan Thompson, the mayor of Caledon, during my talks with him before we relocated, and with his vision for the Bolton area. Bolton is becoming a business and manufacturing hub: Amazon Canada, Canadian Tire, and Mars Canada are all setting up facilities here, and we want to be part of that."

And the company has taken to Bolton like Sidney Crosby did to his first pair of skates. "We work closely with Humberview Secondary School in Caledon as a proud sponsor of their 'Alpha Dogs' robotics program," Cyr said. "We recently hired an electrical and millwright apprentice from Humberview who is learning valuable job skills while developing his career."

RECYCLING REALIGNMENT

If you're wondering why Rotogran grew so fast that it needed a larger plant in the first place, look no further than the recycling boom. With governments in more than 60 countries having introduced levies and bans designed to outlaw single-use plastic products, recycled plastics may well be the future



Clockwise from above: A granulator being refurbished, parts in the new plant's stocking area, and the cutting blades on a custom-built carpet granulator.

of our industry — which spells a huge and growing demand for size reduction equipment. “We’re definitely moving into recycling as that industry expands,” Cyr said. “China has stopped accepting recycling from other nations, which means we have to keep recyclables in North America and find ways to use them here. And the North American recyclers who have to deal with this material all want heavy-duty granulators that can run at maximum capacity 24/7/365. We’re fortunate in that Rotogran has always specialized in building these kinds of granulators, so we know how to do it right.”

And not all of Rotogran’s recycling customers are handling plastic, which means that the company is expanding beyond its prime directive for the first time. “Our machines are now being used for recyclables such as carpeting, wood, and rubber,” Cyr said. “Non-plastics are now a growing part of our business, and we’re now manufacturing machines that can handle carpets, which have slightly different requirements than granulators for common plastics. But we’ve always custom-built our machinery exclusively from North American components, so it’s not a problem for us. Recyclers want maximum throughput, but they also want more enhanced safety guarantees than small and medium-sized plastics processors that only run their granulators at maximum capacity for short periods of time. We

can add double-redundant relays, rotor brakes, hopper locks, and anything else the recycler needs to guarantee safe operation.”

The recycling boom explains most, but not all, of the company’s recent success. “We’ve also expanded our plastics processing customer base by including white label manufacturers,” Cyr said. “And from the day I took over the company, we’ve been partnering with shredder maker Vecoplan LLC to supply stacked size reduction systems, and being associated with them gives us added credibility. Vecoplan has made Rotogran its house brand in the U.S.”

ROOM TO GROW

The larger footprint of the Bolton plant allows the company to perform most of its machine assembly in-house. “The small size of our old plant in Vaughan limited us to doing only small machining work; for larger machining jobs, we had to outsource,” Cyr said. “We now have enough space for a dedicated machining area, which lets us build bigger Titan machines and retain control of our machining.”

And there’s also enough room for the company to continue its long-standing refurbishment program. “We’ll take any Rotogran granulator, no matter how old, and totally refurbish it for the customer,” Cyr said. “Some of our com-

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size reduction

petitors just basically repaint their old granulators and call them refurbished; we replace the hardware, the bearings, and add new components, so that it really is as good as new.”

The Bolton plant also has a second storey — currently vacant — that the company plans to move into as part of the second phase of its expansion, which also includes increasing its present staff size of 25 workers. “We plan on utilizing the upper portion of the building by expanding our engineering department and eventually creating our own electrical department,” Cyr said. “If necessary, we can start a second shift for new hires. The expansion we have in mind needs new people and new ideas.”

Rotogran also used the occasion of its new facility to install an ERP system, the company’s first. “We used to use a variety of software programs to run our business, which wasn’t ideal,” Cyr said. “We now have a Genius ERP software system that allows us to optimize production, reduce costs, and streamline our operations.”

HERE COMES THE SON

The impetus behind investing in the new ERP software came from Cyr’s son Cole, a business student who recently began working at Rotogran part-time. “Cole basically grew up in the industry, and he’s always wanted to join Rotogran at some point,” Cyr said. “His involvement gives me more time to focus on selling, which is my favorite part of the business.”

The plan, Cyr said, is for Cole to manage more and more of Rotogran as it heads into the future. And Cole definitely has some ideas. “I see us becoming even more involved in making machines for recycling, because it’s going to keep becoming more relevant; the added benefit for plastics is that the granulators we design for recycling are durable enough to handle any size reduction application that a plastics processor can throw at it, so we’re actually improving our position in both sectors,” Cole Cyr said. “We’re also planning to make improvements with our machines’ data collection and connectivity features so they’ll fit into an Industry 4.0 factory, which more of our customers are operating.”

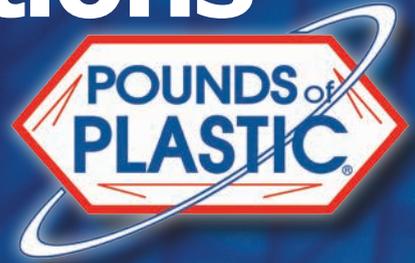
One thing that hasn’t changed from one Rotogran location to the other, Mike Cyr said, is the company’s personalized, service-oriented approach. “We strongly believe in connecting and engaging with our clients,” he said. “We don’t close an order until I’ve personally followed up with the customer to make sure they’re satisfied with our product and the service we provided. Some people call it old-fashioned, but I think it makes more sense today than ever. We build granulators but we don’t use them, so we don’t actually know how the machines hold up in real-world environments; talking to maintenance workers and machine operators to get their feedback on this is vital.”

Call it Rotogran’s law of success in the reclamation and recycling industry.

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If you think the injection molding machinery makers all shot their bolts at NPE last year, think again. Germany's Fakuma trade show is all about injection molding, and some of the industry's heaviest hitters will unveil enough new technology at the upcoming 2018 edition to keep it more than a little interesting. Here's a look at some of what will be unleashed in Friedrichshafen.

By Mark Stephen, editor

Following hard on the heels of a big attraction isn't easy. Picture having to perform onstage directly after Drake and you'll get the idea. The organizers of the 26th Fakuma show can probably relate. The plastics exhibition in Friedrichshafen, Germany comes just a few months after a blockbuster NPE2018 in the U.S. Which means there's a risk the industry might not be paying complete attention. But Fakuma 2018 — which runs from Oct. 16 to 20 — is expected to draw at least 45,000 attendees from more than 120 countries, which makes it a legitimate big deal. Just as importantly, Fakuma has always been predominantly an injection molding machinery show. And the 2018 edition is no exception. Some of the biggest injection machine makers and technology suppliers will be there with their latest innovations. If you can't see it all in person, here's some of what we mean.

NEW IDEAS IN DATA COLLECTION, MAINTENANCE

Arburg GmbH, a co-founder of the Fakuma show more than 30 years ago, will introduce its Arburg Turnkey Con-



KraussMaffei's all-electric PX 320 increases the clamping force range of the machine series to 3,200 kN.

Photo Credit: KraussMaffei

trol Module (ATCM), a data collector for complex turnkey systems. The ATCM has the ability to visualize the entire injection molding process, Arburg said, capturing the corresponding data and transmitting the part-specific data sets to an analysis system for "big-data" evaluation. At Fakuma, the centerpiece of the turnkey system will be an all-electric Allrounder 470 A with a clamping force of 1,000 kN producing two housing parts for a spirit level in 46 seconds using a 1 + 1-cavity family mold. The two molded parts will be removed from a Multilift V and assembled on an assembly station along with three bubble levels to produce the finished spirit level. The process will also include several test steps and the labelling of each spirit level with a QR code. In any application, Arburg said, the ATCM will use OPC-UA interfaces to collect the information from the injection molding process and the camera inspection and assign it to the relevant component by means of the QR code; users can then scan this code with their smartphones and view the corresponding process data on a part-specific website.

Austrian machinery supplier Engel will introduce new added features to its "e-connect.monitor" predictive maintenance solution. Engel unveiled the remote monitoring service with two modules for plasticizing screws and spindles two years ago; this year at Fakuma, the company will unveil two further modules for permanent monitoring of hydraulic oil and hydraulic pumps. E-connect.monitor checks the quality of the hydraulic oil online with the aid of sensors in





Photo Credit: Fakuma

the oil circuit, eliminating the need for the time-consuming manual oil checks. With the module, the user receives recommendations on filtration time and duration and is able to plan the oil change based on the current condition of the oil. Additionally, monitoring oil quality also ensures early detection of critical conditions and averts damage and unplanned failures. Also new is a pump monitoring feature that tracks and analyzes the condition of the fixed displacement pumps in servo-hydraulic injection molding machines, enabling problems to be detected before they manifest as significant cycle time changes or machine failure. The Engel solution carries out test runs on pump test beds and monitors various pumps in ongoing production. It then sends data on the precise condition of their pumps to the customer through Engel's e-connect portal. The two new modules will be offered for injection molding machines of the current CC300 control generation; Engel said retrofit solutions for older control generations are being developed.

MORE CLAMPING FORCE, LESS ENERGY USAGE

With its new PX 320 and PX 25 all-electric units, KraussMaffei has expanded the clamping force range at both ends. At Fakuma, the PX 320 — which increases the clamping force range of the all-electric PX series to 3,200 kN — will create a complete 10-inch HMI (human-machine interface) display with integrated electronics, black decorative frame, and scratch-proof coating in a single production step. A six-axis robot will insert an IML film with printed conductor

paths on the nozzle side. In addition, on the ejector side, an IMD film with single-image decor will run through the mold, transferring its paint with design layer and UV-hardening top coat to the component. The smallest model in the PX series, the PX 25 has a clamping force of only 250 kN, and is aimed at articles with low shot weight, for example precision components for clocks, gears, and gearbox elements. At Fakuma, sealing rings made of liquid silicone (LSR) with an intricate undercut and a weight of only 0.15 grams will be molded in cycle times of 14 seconds. For this application, a new plasticising process was developed with a 12-mm-thin screw and complemented with a spring-loaded check valve. KraussMaffei Automation will supply a pair of intricate precision grippers to remove the tiny components.

Milacron will debut its all-electric Elektron EVO 155 with iMFLUX technology, designed for a full range of applications in a wide variety of sizes, at the show. The machine uses 60 per cent less energy and 90 per cent less water than hydraulic systems, Milacron said, which substantially reduces operating costs. "Elektron's stroke precision of servo-driven axes is significantly greater than competing top hydraulic systems, which makes it well-suited for the reliable production of precision parts," Milacron CEO Tom Goeke said. "And with no oil disposal, leaks or slipping hazards, Elektron EVO is perfect for cleanroom environments, regardless of the machine size needed." At Fakuma, the Elektron EVO 155 will have a two-cavity iMFLUX mold producing technical parts at a cycle time of 15 seconds, Goeke said.

CONTROL, HIGH-SPEED, VERTICAL ADVANCES

Netstal will be unveiling a new control concept designed to permit a faster, simpler, and safer operation in the production environment. Optionally available for all Netstal machines of the Elios and Elion series, the Smart Operation control option is a new feature on Netstal's aXos controller consisting of four new buttons — the so-called "Smart Buttons" — as well as a pre-configurable dashboard on the main screen for the illustration of relevant process information, situational interaction notifications, and application-



Photo Credit: Milacron

Technical parts made on Milacron's all-electric Elektron EVO 155 with iMFLUX technology.

injection molding

specific instructions. “The new Smart Buttons trigger status transitions during the production process,” Netstal CEO Renzo Davatz said. “That means, for example, that with the push of just three buttons, the machine can be turned on, prepared for production, and begin production. And the production can then be ended and the machine turned off just as quickly, easily, and safely.” All conventional operating elements can be locked to ensure that the operation in a production environment is as simple and safe as possible, Davatz said, and the machine is then exclusively operated via the Smart Buttons. “As a result, Smart Operation ensures guided and safe operation in the production environment,” he said. “Standardized handling guidelines such as GMP, which are based on in-house expert knowledge, are reliably incorporated into the machine controller.” Existing plants that use an aXos controller can be retrofitted with the Smart Operation option, Davatz added.

Sumitomo (SHI) Demag Plastics Machinery GmbH plans to take the wraps off its new all-electric high-speed IntElect S machines, available with clamping forces between 500 and 1,800 kN and with injection speeds between 350 and 500 mm per second. Built for high-speed applications with cycle times between three and 10 seconds, the units have been optimized to outperform the company’s standard IntElect machines in terms of mold movements, injection and metering speeds, and ejector movements. In a live demonstration at the show, Sumitomo Demag will premier an IntElect S 130/520-450 with options specially developed for medical engineering requirements and a clean production environment. The machine will run a 32-cavity pipette application, with a VarioTip compact automation system with 100 per cent camera inspection from German manufacturer Waldorf Technik for sorting pipettes according to cavities into the corresponding racks. The system will also be equipped with a Max Petek laminar flow hood and connected to a master computer from bfa solutions, to ensure the perfect traceability of process data as well as monitoring changes to the set machine data. In a related development, Sumitomo (SHI) Demag will also introduce the SDR Speed robot series to



Netstal's aXos controller is now available with a new Smart Operation option.

Photo Credit: Netstal



Wittmann Battenfeld GmbH's Vpower vertical injection molding machine.

Photo Credit: Wittmann Battenfeld GmbH

vertical machines to fit with its PowerSeries portfolio, a conversion process that began when Wittmann acquired Battenfeld a decade ago. The machine's rotary table is powered by a servo-electric drive as standard and laid out for short rotation times. It offers flexibility, as the injection unit can be converted from vertical to horizontal and vice-versa even after commissioning. In addition, Wittmann Battenfeld said, the absence of a central tie-bar enables central media supply from below through the rotary table or the installation of a compact rotary manifold. The machine also has an open design that makes it well-suited for the integration of automation systems with insert feeding and finished part removal functions, the company added.

The next edition of Fakuma isn't scheduled until October 2020, so as to avoid overlap with K 2019. Which might just be lucky for the K. **CPL**

RESOURCE LIST

- Arburg Inc.** (Newington, Conn.); www.arburg.com; 860-667-6500
- DCube** (Montreal); www.dcube.ca; 514-272-0500
- Engel Canada** (Waterloo, Ont.); www.engelglobal.com/na; 519-725-8488
- KraussMaffei Corp.** (Florence, Ky.); www.kraussmaffei.com; 859-283-0200
- Milacron Canada Corp.** (Burlington, Ont.); www.milacron.com; 888-254-1919
- Netstal** (Florence, Ky.); www.kraussmaffei.com; 859-283-0200
- Sumitomo (SHI) Demag** (Strongsville, Ohio); www.sumitomo-shi-demag.eu; 440-876-8960
- Wittmann Battenfeld Canada Inc.** (Richmond Hill, Ont.); www.wittmann-group.ca; 905-887-5355



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Views of tomorrow HUES

Unless consumer product makers want their sales to flatline faster than Venezuela's economy, they have to offer things the marketplace actually wants. Making products in the right colours is a good start. Here's what some colourant makers say will be the hot palettes in 2019.

POLYONE CORP.

The four themes of PolyOne's Color Inspirations 2019+ forecast cover a lot of ground: from minerals of the Stone Age and hand-made art of indigenous cultures to the techno aesthetic of today.



Stone Age. Primitive materials such as stone, marble, and minerals resonate globally, PolyOne said, and are valued for their imperfect beauty, multifaceted textures, perpetuity, and strength. "Palettes across unexpected product categories are inspired by these

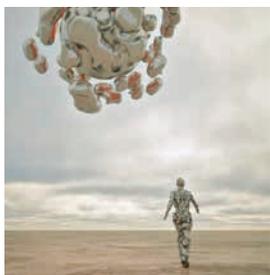
materials," the company said. "Colours are tweaked and mixed into thousands of shades of taupe, mushroom, charcoal, and oyster colours, all of which are common in natural stone."

Human Trace. As technology becomes more and more embedded in our lives, PolyOne said, people want to be reminded of the human touch. "This palette reflects ways in which our human need to leave a mark has evolved over time," the company said.



"Colours can be traced back to earliest civilizations, drawing inspiration from materials and pigments found in nature, including rich deep hues, jewel-toned blues and greens, warm terra cotta, and translucent amber."

Uncanny Valley. Informing this theme is the plain fact that as science and technology become more intrusive, things can get weird. "Thanks to such developments as synthetic materials that mimic human skin, lifelike robots, and augmented reality, the line between human and artificial is becoming blurred, making us uncomfortable," PolyOne said. "This palette explores the premise that facsimiles appearing almost, but not exactly, like real



human beings elicit feelings of eeriness and uncertainty. In response, a post-human aesthetic emerges, one which embraces this discomfort, playing upon it to create something original. Colours in this palette challenge the status quo with uncomfortable pairings."



Heritage. The idea behind this theme is that humanity honours the connection between generations and understands that the effects of our actions will materialize only after decades or centuries. "This understanding is changing our attitudes towards consumption," PolyOne said.

"We celebrate the beauty of decay and do our part by recycling and upcycling. Old becomes new, becomes old again, and so on." Using biodegradable and compostable resins, PolyOne said, this palette was created with future generations in mind. "Colour formulations are also based on advanced bio-based masterbatches that include elemental pigments," the company added.

row's

Looking into the past isn't easy. NASA spent billions on the Hubble Space Telescope to observe galaxies hundreds or thousands of light years away, which means they're being seen as they were hundreds or thousands of years ago. But as any colour trends forecaster could tell you, that's a cakewalk com-

pared to trying to look into the future.

Colour is one of the biggest factors influencing consumer preferences, which is where looking into the future comes in. By working with colour forecasters to understand global megatrends and develop palettes that will resonate with emerging consumer trends, material suppli-

ers can get their next-generation colourants to the product makers in time for them to deliver the goods before these hues are more out-of-date than dial-up Internet. It's a tall order, and there's a ton of investment money on the line. Here are the latest hues and themes that some colourant makers are betting on.

By Mark Stephen, editor

CLARIANT MASTERBATCHES

Now in its 13th year, Clariant's annual ColorForward directions are the result of the collaborative effort of plastics colour specialists throughout the world. They've identified four key trend themes for 2019.

WHITE NOISE

Do not disturb. This trend theme is based on the idea that technology makes it very easy for people to become distracted. "We have realms of information at our fingertips, but every Google search turns up other interesting stories and ads that beg for attention," said Judith van Vliet, a leader of

Clariant's ColorForward team. "Overwhelmed by choice, consumers welcome what's become known as 'anti-choice architecture,' which intentionally limits product options to make decisions easier." The colour palette for "Do not disturb" is simple: like pastels, they're serene, soft, and minimal, though all but one — a transparent light green called "Focus" — have a dusty cast that quiets them even further. "A slightly grey/white, for instance, is called 'White noise,' and a greenish blue is named 'ἀταραξία von has fidanken,' a Greek word for calmness or composure," van Vliet said.

CTRL+F. This trend story is more fearful, van Vliet said, focusing mainly on the apparent loss of control — or the wish for greater control — we experience in a world where fake news is everywhere and social media, which was first used to connect people, is now used to actively filter what we see.

"Colours representing the 'CTRL+F' trend are ambiguous, enigmatic, and contrasting: both light and dark, solid and transparent, with two of the five including a glitter effect," van Vliet said. "One of those is a smoky, translucent black called 'The Unknown: now boarding'; a neon orange called 'The dawn of robotocene' is punchy, energetic, and synthetic; and a Champagne gold called 'Mirroring human' is a dynamic neutral."

THE UNKNOWN: NOW BOARDING

Made in Human. "In our increasingly technical world, we can still take comfort and pride in the things that make us uniquely human, like having individuality and intuition," van Vliet said. "One of the colours in this theme is called 'ColorWorks, Untitled, 2017, ABS on ABS, 9x6 cm,' and is made by 3D printing, which is a first for ColorForward. This 3D-printed plaque is beige with a brush stroke of purple symbolizing the human creativity in this machine-made artifact." A second colour in this theme is called 'One face, one human race,' described as a totally random combination of several colours.

Umswenko. A Zulu word that describes being an individual without forgetting one's heritage, this theme is meant to reflect the fact that 1.1 billion African Millennials — called "Afrillennials" for short — are entering the workforce, creating African versions of Silicon Valley and the flourishing Nollywood film industry hub in Nigeria. "The colours chosen to represent this trend are not stereotypically African — they're actually the brightest of the ColorForward 2019 palettes, but also somewhat toned down," van Vliet said. "They are juicy and energetic like 'Tribeat,' which is an apricot orange; or a jade green called 'La Sape.' This word describes a flamboyant style of dress adopted by so-called Congolese Dandies who, despite crushing poverty, spend lavishly on colourful clothing that they use to assert their independence and dignity."

TRIBEAT

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colourants

AMERICHEM INC.

Americhem's six colour trends for 2019 revolve around a common musical theme: sounds of the past and present.

SUPERSTITION

Motown. Deep tones of blue, with a green that's almost brown, are brightened with orange and rusty tones to provide a palette meant to be both edgy and mysterious. Sample: "Superstition."

Techno. "Bold shades of hi-tech blues and futuristic greens are highlighted by neon yellow and brought back to earth by a subtle, golden beige," said Sydney Gardner, Americhem's lead colour trends specialist. "Funky and daring, this palette speaks to our inner geek."

Festival. Described as an airy taupe contrasted by blazing shades of orange and red, and brightened by shadowy purples and violets in the vibrant palette, inspired by summer music festivals from Monterey and Woodstock onwards.

Bossa Nova. "A fusion of samba and jazz, bossa nova is the predominant Brazilian music genre, and usually triggers a calm, tranquil mood," Gardner said. "These colours — consisting of calm, refined greens and fluid, soft beiges — do the same." Sample: "Rhythm."

RHYTHM

Lullaby. "Reach-out-and-touch-me pastels are paired with cozy greys in this understated and comforting palette that invokes peacefulness and content," Gardner said.

GALANT

Concerto. "This trend blends colours the way that classical music blends instruments," Gardner said. "It's a sophisticated palette of soft pinks, peach tones, subdued blues, and extravagant greens." Sample: "Galant."

CPL

The Montreal Expos

Quebec's only plastics trade show is also Canada's only plastics trade show this year, and it's part of the larger ADM Expo. Here's what you need to know about it at a glance.

With a 40-year history as the dedicated resource to custom and captive molders in Quebec, the Expoplast plastics trade show in Montreal features the top suppliers of processing machinery, auxiliary equipment, molds, molding components, materials, and services providers. And Quebec is home to lots of them — almost 650 plastics processors in the province, in fact, molding more than one-quarter of all plastic products made in Canada. Quebec plastics processors employ more than 21,000 people, according to the Institut de la statistique du Quebec, generate an annual payroll of \$926 million, and spend a whopping \$2.6 billion per year on materials and supplies used in production.

Held every two years by UBM, the latest edition of Expoplast takes place November 14-15 at Montreal's Palais des congrès. As with previous editions, the show is part of the Advanced Design & Manufacturing (ADM) Expo, which means it's co-located with the PACKEX, Automation Technology Expo (ATX), Design & Manufacturing, and Powder and Bulk Solids trade shows. The ADM Expo is designed to offer everything from design to manufacturing — concept to market — with free content available throughout the event at Centre Stage.

If Quebec is even remotely on your business radar — and if it's not, it should be — don't miss this one.

CONFERENCES AND SEMINARS

(Schedule as of press time. All events are being held at Booth 2517, Centre Stage.)

WEDNESDAY, NOVEMBER 14

10:30 – 11:00	Optimizing Existing Pneumatic Conveying Systems
11:00 – 11:55	Collaborative Robots Panel
12:00 – 12:30	Smart Manufacturing Artificial Intelligence
12:30 – 1:00	Lightweighting in Aerospace
1:00 – 1:55	Food and Beverage Big Picture Packaging Panel
3:00 – 3:55	3D Printing Panel
4:00 – 4:30	Trends in Pharmaceutical Processing and Packaging
4:30 – 5:00	Upcycle That Package!

THURSDAY, NOVEMBER 15

10:30 – 11:00	New Trends in Composites
12:00 – 12:30	Dust Explosion in the Manufacturing Plant
12:30 – 1:00	Meal Kits: Convenience vs. Packaging
1:00 – 1:55	Factory of the Future Panel
2:00 – 2:55	Aerospace Big Picture Panel
3:00 – 3:55	Automation Trends Panel



WHEN:

Wednesday, November 14,
10:00 a.m. to 5:00 p.m.
Thursday, November 15,
10:00 a.m. to 4:00 p.m.

WHERE:

Palais des congrès de Montreal
1001 Place Jean-Paul-Riopelle,
Montreal

WEB:

<http://admmontreal.com/en/expoplast>

- **Registration fee:** Free for all qualified attendees, \$125 plus tax for a two-day pass unless qualified.
- **Parking:** There are several parking lots at or near the Palais des congrès, including: Quartier International de Montreal (QIM), 249 Saint-Antoine Ouest, 1,200 spots, \$18 maximum for 12 hours; and Viger, 1025 rue Chenneville, 400 spots, \$20 maximum for 12 hours.

AUXILIARY EQUIPMENT

Large desiccant dryer uses 25 per cent less energy

Based on its successful 750 FM design, **Dri-Air Industries Inc.** recently introduced the new 1500 FM model that expands the company's range of large desiccant dryers while continuing its reputation for the smallest footprints in the dryer industry.



With a compact footprint of 30 square feet, the 1500 FM has a new regeneration air flow design that reduces the previous energy usage level, already one of the industry's lowest, by an additional 25 per cent. And dry air is used for regeneration or cool down of desiccant towers, allowing for dewpoints of -26°C (-80°F) or lower.

The unique regeneration valve with positive sealing is positioned so that it can easily be seen for quick troubleshooting without removing any dryer panels, and all external panels are hinged for quick access to internal components. To conserve space, the panels can be slipped off their hinges at will.

The high-pressure fan reduces the ambient noise level to less than 70 dB and allows the dryer to operate at very low process temperatures to accommodate resins such as PLA.

Additionally, the 1500 FM has Dri-Touch controls that display the important operating parameters on a highly visible seven-inch touchscreen. The menu screen provides immediate access to all settings and other parameters needed for set-up and troubleshooting.

Dri-Air Industries Inc. (East Windsor, Conn.);
www.dri-air.com; 860-627-5110

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

EXTRUSION

Discontinuous large-area in-line filtration system

New from **PSI-Polymer Systems Inc.**, the *ILF-55* in-line filtration system is a discontinuous, high-capacity filter designed for long-batch production runs where the extrusion process can't be disturbed and where uncompromised ultra-high filtration levels must be continuously maintained.

ILF filters are typically used where screen changers are either too large for the application or otherwise can't satisfy the filtration level requirement without incurring an unacceptable pressure drop. These



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

ILF vessels can be fixed in-line or interchangeable, and are supplied with three or seven filter tubes. The interchangeable vessel option accommodates quick change-outs. Standby vessels can be preheated to minimize downtime. Vessels can be arranged for electric heat or jacketing for steam/oil heat systems.

All models are designed for operating pressure up to 4,500 psi (310 bar) and process temperatures to 400°C (750°F).

PSI-Polymer Systems Inc. (Conover, N.C.);
www.psi-polymersystems.com; 828-468-2600

BLOW MOLDING

Universal two-stage PET SBM machine

The new all-electric two-cavity *Flex-Blow2* blow molding machine from **FlexBlow** is designed to be the most universal two-



stage PET SBM machine on the market, enabling the production of a wide range of PET containers on one piece of equipment, with necks ranging from 18 up to 110 mm and bottle volumes from 50 up to 6,000 ml.

Changing the bottle format — including molds, neck, and gripper parts — and fine-tuning the machine afterwards takes no longer than 30 minutes.

A dedicated Siemens control panel now has several new functions to make the experience of operating the machine intuitive, and an integrated operator's manual guides the user along every step of operation to make it repeatable and to minimize the impact of the human factor. There's also an integrated catalogue to achieving top PET bottle quality with a pictured troubleshooting guide, as well as machine production and efficiency statistics for performance tracking.

The challenge of automatically loading a range of preforms with significant differences in neck diameter, from narrow neck to wide mouth, has been tackled by the use of a dual-preform loading system. When it comes to minimizing the support ring, FlexBlow uses the adjustable feeding slides that allow loading preforms with support rings starting from 0.8 mm. Inversed preforms with the body wider than the support ring are also compatible with the FlexBlow universal feeding system due to an innovative gate-like structure that opens slightly at the end of the preform

slide, allowing the thicker preform body to come out.

FlexBlow/K&G Machinery Works Ltd. (Mississauga, Ont.);
www.flexblow.com; 905-361-0605

PROCESS COOLING

TCUs use water instead of oil

Frigel recently announced the availability of its *HB-Therm* TCUs in North America that use water — not synthetic oil — as a heat transfer fluid to cool plastic molds at operating temperatures of 200 to 230°C (392 to 446°F), allowing processors to maintain precise cooling at high temperatures without the environmental concerns normally associated with the use of oil as a heat transfer fluid.



The portable HB-Therm units are highly compact with footprints from 1.3 to 3.2 square feet. With the HB-Therm racking system, users can easily stack multiple units together to deliver precise cooling to as many as eight mold zones and with an available central control module for as many as 16 separate zones.

HB-Therm TCUs come standard with user-friendly digital controls for highly accurate and automatic optimization of temperature control. The controls eliminate temperature fluctuations and also support rapid start-up. In addition, users can record operating data for up to 10 molds. A unique, non-contact heater design ensures process water does not come into contact with the heater. As such, it eliminates scaling and stress cracks, in turn, increasing heater reliability and longevity.

Additionally, ultrasonic flow meters detect changes in flow rate and issue an alarm if the rate violates limit settings, which helps to ensure product and part quality. The flow meters also allow for fast responses and highly accurate temperature control even at low flow rates, further contributing to product and part quality.

The high-temperature water HB-Therm TCUs complement Frigel's existing line of HB-Therm water TCUs rated to deliver and maintain process cooling water from 100 to 180°C (212 to 355°F).

Frigel North America Inc. (East Dundee, Ill.);
www.frigel.com; 847-540-0160

PACKAGING

Five-in-one system for water and CSD beverages

The new *Super Combi* from **Sidel Inc.** integrates five process steps — preform feeder, blower, labeller, filler/capper, and cap feeder — in an all-in-one smart system to enable

continuous production optimisation and enhanced performance for producers of PET bottled water and CSD.

For improved reactivity of the operator, the system has an automated alert system to provide advanced timely reports through the Efficiency Improvement Tool audio and smart portables, on events such as changeovers, label or cap shortages, and possible faults. Additionally, guided troubleshooting reduces operator skill requirements and offers increased repeatability of changeover and maintenance procedures.

To ensure sustainable production, the Super Combi minimizes the use of resources. Consumption of electrical power is reduced by up to 45 per cent, the preform heating time is lowered by up to 15 per cent, and the use of compressed air is reduced by 35 per cent. To further reduce the environmental footprint, the entire system is based on brushless motors.

With different machine configurations possible based on the output required, the labelling process is highly efficient, with the integrated labeller being able to carry out different labelling processes, including the application of pressure sensitive labels and roll-fed labels.

The labelling process can be optimised to work with up to three stations running simultaneously or with a “master/slave” format, in which the one or two stations run while the designated “slave” station remains idle; and when a reel-change is required, the roles automatically switch.

Sidel (Canada) Inc. (Laval, Que.); www.sidel.com; 450-973-3337

AUTOMATION

Wear-monitoring function simplifies maintenance

A new *wear-monitoring function* for the suction cups now available for all **Wittmann Battenfeld** W8 servo robots is designed to simplify the scheduling of maintenance work.



Previously, the Wittmann R8 robot control system already allowed operators to set the vacuum level on the TeachBox for every individual suction circuit and to save these settings as a part of the process sequence. Now, the updated vacuum analysis function provides an additional advance warning system. Should the vacuum levels deteriorate — which could be an indicator of increasing wear — a warning signal to that effect will be issued. The robot, however, can continue to operate until an actual part loss occurs; or until early remedial action in the automatic system is taken, which

would prevent an unplanned machine standstill.

Wittmann W8 robots permit the support of eight vacuum hoses as standard, each of which can be configured separately. The individual vacuum levels are imported via an analog measuring input and analyzed for the early warning system. The threshold values for early warning can be set by the operator. This function is included as a standard feature in the functionality of the R8 control system.

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

Wide selection of vacuum cups for end-of-arm tooling

Vi-Cas Manufacturing Co. offers a wide range of *vacuum cups* which are well-suited for end-of-arm tooling, ergonomic lifters, and other pick-and-place devices.



Round, rectangular or oval cups are available from stock for immediate shipment for a variety of lift manufacturers including Cynergy Ergonomics, Indutrol, and others. Sizes and types of cups are available to fit virtually any type of vacuum equipment used for lifting, manipulating, or pick-and-place applications. Vacuum valves, swivel joints, level compensators, and other accessories can increase the productivity and energy efficiency of lifting systems. Materials are available to suit most any application, including food handling, high-temperature materials, anti-static for handling electronic components, and more.

Vi-Cas can quote custom designs from customer-supplied drawings, or reverse engineer from customer-supplied cups.

Large or small orders ship with short lead times, and on-demand delivery is also available. Vi-Cas offers vacuum cups of all sizes, soap cups, grabbers, suction cups, tightening discs, and grippers, and accessories such as level compensators, swivel joints, vacuum valves, and fittings and adaptors to suit any application.

Vi-Cas Manufacturing Co. (Cincinnati, Ohio);
www.vi-cas.com; 513-791-7741

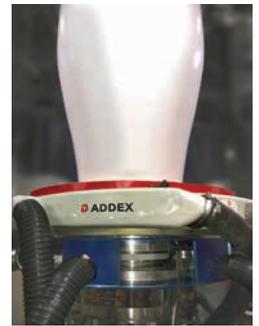
BLOWN FILM

Intensive cooling, height-adjustable twin-stack system

Addex Inc. recently launched its new height-adjustable, intensive cooling *twin-stack system*, designed to optimize performance for both high- and low-melt processes.

The fully-enclosed intensive cooling twin-stack elements can be separated over a range of one to 16 inches, allowing

the operator to change the height between the cooling elements to control the amount of cooling. For super low-melt materials, a short distance between the elements is ideal. For high-melt strength operation, the cooling zone can be extended to its maximum by the push of a button.



Highly adaptable to changes in materials and supporting fast changeovers, the system operates over a wide range of configurations and materials, while also enhancing bubble stability. These retrofits are aimed at blown film lines that have been designed for higher outputs and have sufficient extruder and blower capacity to handle the output gains of intensive cooling twin-stack. With the addition of Addex's automatic external gauge control, customers are generating high-quality film at unprecedented output rates. The height-adjustable system is fully compatible with Addex's other cooling products, including the digital internal bubble cooling control, manual gauge control, and laminar air rings.

Addex Inc. (Newark, N.Y.);
www.addexinc.com; 315-331-7700

TESTING EQUIPMENT

Non-contact spectrophotometer provides improved colour formulation

New from **X-Rite Inc.**, the *MetaVue VS3200* is the first non-contact imaging spectrophotometer for industrial



applications that combines colour imaging with spectrophotometry to measure and characterize liquids, powders, gels, or other small and oddly shaped samples.

The device features an adjustable aperture size, ranging from two to 12 mm, enabling measurement of a wide range of samples. Users can measure difficult samples such as small and non-planar items, as well as liquids, pastes, powders, and gels without contaminating the instrument or damaging the sample. Adaptable accessories for MetaVue VS3200 include an instrument stand to place the instrument three inches above a table with replaceable trays that slide in and out, an adjustable stand for accurate measurement of samples with varying thickness, and a benchtop stand that converts the instrument to a benchtop with a sample arm for measuring plastic parts.

MetaVue VS3200 integrates with X-Rite Color iMatch and Color iQC software for fast accurate colour formula-

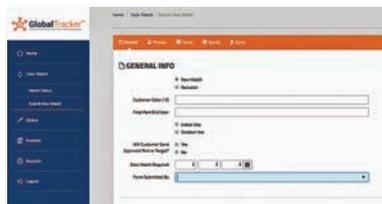
tion and efficient quality control operations. The device can store sample images, providing an audit trail and easy retrieval of images for future reference. It also works with existing workflows and is backward compatible with X-Rite VS450 and 964 data.

X-Rite Inc./Prism Instruments (Pickering, Ont.);
www.prisminstruments.com; 888-717-7476

COLOURANTS

Colour tracking system automates purchasing and production management

A new colour tracking capability available at no cost from **Riverdale Global** uses real-time, company-wide data from liquid colour metering devices to automate many of the customer's purchasing, production management, and compliance functions, and it makes remote troubleshooting possible.



In the *GlobalTracker* system, special transmission boxes at the customer's plant receive data from

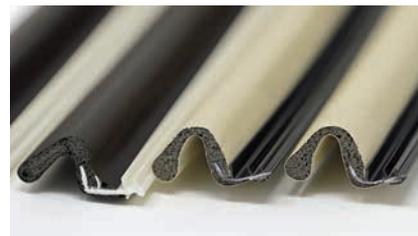
the controllers on liquid colour metering devices and transmit it to Riverdale Global via the Internet or a cellular network. The GlobalTracker software on the Riverdale Global servers tracks material usage and records such job-specific data as operator ID, work order, lot number, and colour ID. This capability extends to all production lines, whether in a single facility or at multiple plants. In turn, the customer can access GlobalTracker information using a desktop, tablet, or smart phone.

Once customers log in to the GlobalTracker system, they can also obtain information on open, invoiced, and paid orders; search their order history by order or by production job; see their current colour match status; submit new colour matches; and document production runs for compliance with job specifications or regulatory requirements.

Riverdale Global (Aston, Pa.);
www.riverdaleglobal.com; 610-358-2900

MATERIALS

TPVs for door and window seals



A new series of TPV compounds from **Teknor Apex Co.** exhibit the high resilience required for door and window seals and provide effective alternatives to widely used thermoset polyurethane foams.

Available from 40 to 70 Shore A, the *Sarlink 8100* series can be foamed to a density of 0.20 g/cm³ range, which is comparable to those of urethane foam used in door seals but is difficult to achieve with standard TPEs. As TPVs, they exhibit lower compressive set than standard TPEs, providing more of the resilience needed to withstand the repeated opening and closing of doors. The new compounds can be foamed using both chemical and physical blowing agents and, unlike urethane foams, are processed in standard equipment for thermoplastics.

In other key differences from urethanes, TPVs do not require a curing step, are recyclable, and do not present concerns about isocyanate monomer.

The Sarlink 8100 series of TPVs adhere well to, and can be co-extruded with, other TPVs, TPOs, and PP.

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

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Rotational molding design guidelines (part 2)

By Greg Stout, Blue-Reed LLC



Rotational molding design is a specialized field that has a unique set of rules and guidelines to ensure that a product can be successfully rotomolded and achieve all the required specifications. Designing and creating a good part not only takes experience with the rotomolding process, but also good familiarity with materials, tooling, material flow, and a strong plastics engineering background.

Last issue, I discussed how to solve problems relating to parting lines, shrinkage, and flatness and stiffening. Here are some tips for overcoming some other trouble spots.

RADIUSES AND ANGLES

Sharp corners can cause blow holes and porosity in the corners. Adding a generous radius improves the molding of corners and distributes the stress over a broader area, adding to a product's strength. The minimum recommended angle at the corner of a part for PE and PVC is 30°, nylon is 20°, and PC is 45°. Corner angles of less than these amounts can result in a bridging of plastic, increased porosity, and excessive shrinkage.

DRAFT ANGLES

Incorporating draft angles perpendicular to the parting line will reduce warpage when demolding a product in areas where the product shrinks against/around the mold — for example, if you're molding a doughnut shape. The outer diameter will shrink in free of the mold wall; the inner diameter will shrink against the mold, requiring draft angles here.

VENTING

Due to gasses that are expelled when the resin cures, a vent hole is required in all molds, and therefore all products. The size of the vent depends upon the volume of the cavity. Multiple vent holes may be required for larger, more complex parts.

DOUBLE WALL PRODUCTS

For material to flow and form properly, it's recommended that the distance between the parallel walls be a minimum of five times the nominal wall thickness of the part.

WALL THICKNESS

Uniform wall thickness is an inherent benefit of the rotomolding process if all areas of the mold achieve uniform heating. Basically, the hotter the

inside surface of the mold gets, the more material will form in that area. Therefore, shielded areas and deep cores will reduce the amount of heat, resulting in thinner walls in those areas. Through the use of air amplifiers, preheating molds, black paint, heat fins and pins, and Protherm, the molder can achieve different wall thicknesses as required by a specific product design.

LOADING

Material is usually loaded into the mold cavity when the mold is open. If there isn't enough room to load material with the mold open, a fill port can be added. The fill port enables the operator to load the mold when closed. If there still isn't enough room for material, a drop box (see below) can be added to provide a second or additional charge of material during the cycle.

DROP BOXES

These are primarily used to mold multiple layers of material to provide insulation, strength, multiple colours, foaming, and/or differing internal/external part requirements. The drop box usually mounts on the outside of the mold and holds a second charge of material. After the first charge inside the mold cavity has formed, an air-actuated cylinder inside the drop box releases the second charge into the mold. A second drop box can be added to produce products with three layers of material. **CPL**

Greg Stout is the president of Blue-Reed LLC, a rotomolding design consultancy located in Stow, Ohio. For more information, visit www.plasticproductdesign.com, or call 330-322-8707.

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- Tank: Seamless Roto-Molded MDPE
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- Integral grounded motor switch box mounted on Pump Motor
- Height Overall: 33" or 34"
- Tank Dimensions: 13" H x 17" W x 24" L
14" H x 24" W x 31" L
- Caster mounted, swivels, 4" dia.
- Special polypro acid resistant outlet-inlet manifolds included.
- Integral roto-molded handles & power cord storage.

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CORROSION INHIBITORS,
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FOR LOWER OPERATING COSTS.
FOR STEEL OR ALUMINUM.

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Dynamic Descaler® for Steel and Aluminum Descaler are two revolutionary liquid descalers that rapidly dissolves all water scale and lime plus it removes mud, rust, and other non-soluble sedimentation deposits safely and effectively. No neutralizing necessary. No harsh acids. Non-Hazmat for shipping. **That's safe!**



**STEEL
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Safe for use on:
Steel - Iron
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AFTER

**ALUMINUM
DESCALER**
Safe for use on:
6061 & 7075
Aluminum
Steel - Stainless
Steel - Iron
Copper - Plastic
Rubber & more.



PART NO.	STEEL TYPE SIZE	QTY PRICES	
		1-4	5+
DYN05	5 Gal. Pail	\$69.50	\$66.00
DYN15	15 Gal. Drum	\$195.75	\$184.90
DYN30	30 Gal. Drum	\$373.50	\$352.80

- **Biodegradable.** Won't harm the environment. Empty into sanitary sewer and flush with water. No neutralizers needed.
- **Safe.** Won't harm workers when used as directed.
- **NSF Category Code A3 Certified.**
- **Non-Hazmat** for shipping & handling.
- **Fast.** Equipment is cleaned within a few hours. 25% faster than acid.
- **Superior corrosion inhibitors.** Lowest corrosion rate of any descaler.
- **Powerful detergents & penetrating agents.** Descaler lasts 3 times longer before breaking down.

PART NO.	ALUMINUM TYPE SIZE	QTY PRICES	
		1-4	5+
ALD05	5 Gal. Pail	\$99.00	\$94.00
ALD15	15 Gal. Drum	\$292.00	\$271.00
ALD30	30 Gal. Drum	\$556.00	\$516.00



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