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SEPTEMBER 2026

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VOL 72



Scan to Renew

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Polymer Modification Maximizes Downgauging in Thermoforming

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Better Blending



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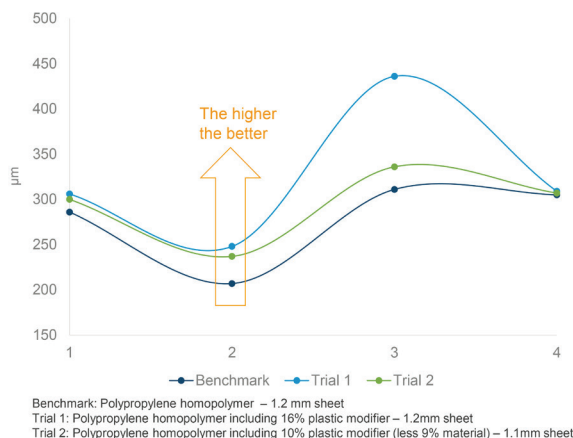


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Tips & Techniques:

Downgauging PP Sheet for Thermoforming: When Thinner Isn't Cheaper

Learn how polymer modification extends PP thermoforming downgauging beyond process optimization, preserving stiffness and top-load performance at reduced wall thickness.

By Luan Gavião & Synco de Vogel, Synthomer

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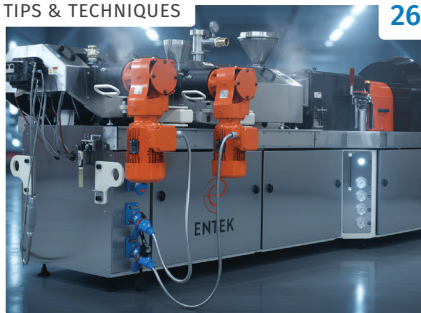
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By Dean Elliott, ENTEK



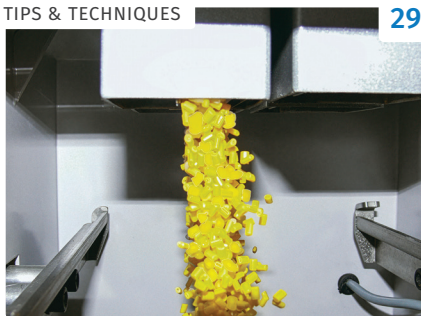
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By Paige O'Meara, Wittmann USA



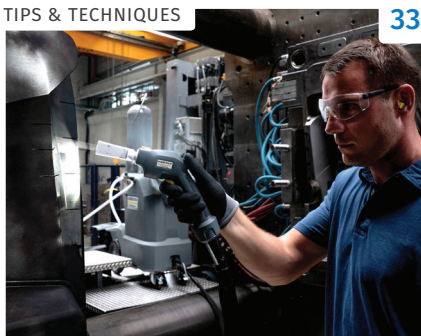
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Thermoformed PP clamshell strawberry packaging.

Source: Synthomer. See story on page 36.



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EDITOR-IN-CHIEF

Tony Deligio
tdeligio@gardner.media

EDITORIAL DIRECTOR

Jim Callari
jcallari@gardner.media

ASSOCIATE EDITOR

Matthew Stonecash
mstonecash@gardner.media

MANAGING EDITOR

Vivianne Skavlem
vskavlem@gardner.media

CONTRIBUTING EDITORS

Matthew Naitove
mnaitove@gmail.com

Lilli Manolis Sherman
lillisherman17@gmail.com

MOLDMAKING CORRESPONDENT

Christina Fuges
cfuges@gardner.media

ROBOTS AND AUTOMATION
CORRESPONDENT

Julia Hider
jhider@gardner.media

TECHNICAL EDITOR

Hannah Mason
hmason@gardner.media

SENIOR ART DIRECTOR

Claudean Wheeler
cwheeler@gardner.media

CUSTOMER SUCCESS COORDINATOR

Patty Caldwell
pcaldwell@gardner.media

MARKETING MANAGER

Andrew Roe
aroe@gardner.media

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6915 Valley Avenue
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Richard G. Kline

Richard G. Kline Jr.

Kerry Gumas

Melissa Kline Skavlem

Allison Kline Miller

Ernest Brubaker

Jeff Norgord

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Meet the Molding Moment

Molding 2026 (Nov. 18-19; Hyatt Regency, Greenville, South Carolina) is your best opportunity to learn about the cutting-edge technologies that are reshaping the injection molding industry.



Tony Deligio
Editor-in-Chief

Change is inevitable and technology advances inexorably. At various moments in history, the pace and breadth of ongoing evolutions undertake a step change as incremental tweaks give way to paradigm-shifting transformations. I think we have arrived at such a moment in injection molding, and yes, part of the reason I feel that way is AI.

As the vice chancellor and associate dean for research and graduate studies at Penn State Behrend, Erie, Pennsylvania, part of Alicyn Rhoades' job is to watch for just such transitions, making sure her school's curriculum and facilities are equipped to create young plastics professionals who can meet that new moment.

Earlier this summer at the school's Innovation and Emerging Plastics Technologies Conference, Dr. Rhoades had, I think, the perfect analogy for the pivot point that molding finds itself in as it relates to AI. In injection molding, the velocity-to-pressure (V/P) switchover point marks the transition from filling a cavity to packing it out. Switch too soon and you get a short shot; switch too late and risk overfilling and flash.

"You have to switch at the exact right point," Rhoades said, relating this molding maxim to today's AI moment. "I think right now is the exact moment to switch. If you made big investments in AI three years ago, they're now outdated. If you wait three years to get on board, you'll be too late. From an industry point of view, the switchover point is right now."

With an emphasis on new and emerging technologies, including practical, real-world application of AI, Molding 2026 is the event to ensure you don't miss the industry's switchover moment. Over two days and 24 speakers in Greenville, South Carolina, put yourself and your team in the room to learn from and network with industry leaders and subject matter experts. Topics covered range from design, quoting, simulation, material management and inspection to new molding processes and tooling technologies for multicomponent parts, including composite structures.

Above and beyond the conference's breakfasts, lunches and refreshment breaks, Molding 2026 will provide unique networking opportunities to connect and reconnect with your peers. On Tuesday, Nov. 17, one day prior to the conference launch, Molding will provide attendees the opportunity to be on the floor at Mack Molding and behind the wheel at BMW's Performance Driving School.

At Mack Molding's 281,000-square-foot facility in Inman, attendees can walk amongst presses as large as 4,000 tons, see four fully automated Class-A paint lines and learn about assembly operations at one of the nation's leading molding operations, which has been in business for over 100 years. At BMW, attendees can get behind the wheel of multiple BMW models under the

guidance of certified professional instructors to participate in handling and control exercises, braking and avoidance drills, hot laps and more. Finally, the opening night recep-



Molding 2026 takes place Nov. 18-19 in Greenville, South Carolina. Source: Getty

tion takes place at local craft brewer, Yee-Haw Brewing Co., with complimentary food and drinks for attendees.

Register today to lock in early-bird specials for the conference and accommodations, with group discounts available. Also grab your spot at the Mack and BMW pre-conference networking event, which has limited availability. [PT](#)

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Zeus Earns Intertek PFAS-Free Certification for New Catheter Liners

Zeus says its PFX Flex catheter liners have become the first medical device component to earn PFAS-free certification from Intertek, a leading independent Total Quality Assurance provider to industries worldwide.

Zeus, headquartered in Orangeburg, South Carolina, says Intertek's certification confirms that its PFX Flex Sub-Lite-Wall catheter wall liners contain total organic fluorine levels below 20 ppm and targeted PFAS below 25 ppb, which meets Intertek's published criteria for PFAS-free certification. PFAS-free is Intertek's certification designation for products that meet these thresholds. The certification covers the PFX Flex catheter liner portfolio, manufactured over either polyetheretherketone (PEEK) or silver-plated copper mandrels.



Modern surgical catheters typically feature multi-layer constructions consisting of a liner, a reinforcement layer (e.g., braid or coil) and an outer jacketing layer, Zeus explains. The liner is the innermost layer that forms the inner diameter (ID), or working channel, of the completed catheter shaft. In general, some of most desired features of a catheter liner are thin walls and a low coefficient of friction (i.e., high lubricity). Thin walls help keep the device's overall profile to a minimum, while high lubricity facilitates the movement of intraluminal devices (e.g., stents, balloons, etc.) through the catheter's working channel, Zeus elaborates.

Processed with a material formulation developed in-house, Zeus says the non-fluorinated liners offer performance comparable to film-cast polytetrafluoroethylene (PTFE) liners while also providing other benefits, such as enhanced bond strength and improved sterilization compatibility. Not to be confused with cast film, the liner is produced by a proprietary film cast process that involves coating a liquid polymer dispersion over a moving mandrel, which can be either a silver-plated copper wire or PEEK polymer.

"For nearly 60 years, Zeus has built its reputation on fluoropolymer innovation," said Paddy O'Brien, Zeus CEO. "As the medical device industry evaluates new material alternatives, we believe customers deserve objective, independent validation of the claims behind those technologies. That's why third-party certification matters. It gives engineers confidence that they can make critical material decisions based on verified data."

Introduced in January 2026, PFX Flex is engineered to deliver the performance catheter manufacturers expect from PTFE in a non-fluorinated construction. Zeus says the liner combines PTFE-like lubricity, flexibility, direct covalent bond strength, exceptional abrasion resistance and compatibility with multiple sterilization methods, giving manufacturers greater design flexibility without compromising the performance characteristics that matter most.

Maag to Buy Cloeren

The Maag Group has signed a definitive agreement to acquire Cloeren Inc., Orange, Texas, a leading designer and manufacturer of extrusion dies and feedblocks for cast film/sheet and coating. Terms weren't disclosed.

In a press release announcing the acquisition, Maag explained the purchase will "(expand) its expertise in plastics processing and strengthening its position as a leading global provider of integrated system solutions for the polymer and plastics industry." Maag Group companies also make polymer pumps and filtration systems, as well as systems for pelletizing, pulverizing and recycling.

Cloeren, which also has manufacturing locations in Marshall, Texas; Eau Claire, Wisconsin; and Micheldorf, Austria, was co-founded in 1980 by Peter Cloeren Sr. and Peter Cloeren Jr.

The company initially focused on feedblock technology but entered the flat die business in 1990 with the Epoch Two-Stage Preland Die.

In 2019, Cloeren launched the Reflex Die, billed as a revolutionary "touchless" die and control system for cast film and coating/laminating. Cloeren is also widely considered a technology and market leader in nanolayer die/feedblock technology.

The transaction is expected to close in the third quarter. (Pictured: Dereck Cloeren (l), operations manager; Alicia Cloeren-Catherine, director; and Peter Cloeren, president).



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Engel Showcases PUR Overmolding Capabilities

Engel partnered with Italian moldmaker INEVO to showcase the application of its clearmelt polyurethane (PUR) coating technology for exterior automotive components at a special event. From June 29 to July 2, the companies presented Engel Surface Innovation Days 2026 at INEVO's headquarters in San Polo di Piave, Italy, centered around a live demonstration of an Engel duo 4000 combi M two-platen injection molding machine. Featuring 4,500 tons of clamping force and a rotating platen, the machine molded a bumper with an integrated front module, combining several previously disparate parts into a single assembly using a continuous process.

In the demonstration process, an easix articulated robot placed a 2D film, matching the vehicle body color, into the cavity. Infrared emitters integrated into the gripper heated the film, which is then thermoformed in the cavity. A second film bearing the brand logo is then inserted and formed. Both films are then back-molded together with polypropylene (PP). After turning the center platen, the front panel area is flooded with polyurethane in the second station. Engel says PP as a substrate material is gaining traction in exterior applications due to its cost advantages and support of pedestrian protection. Event partner and resin supplier Borealis presented new PP compounds suited for combination with clearmelt. PUR layer thicknesses have also been continuously reduced, which further lowers material costs and CO₂ footprints, according to Engel.

Engel reports that more than 300 visitors from around the world traveled to northern Italy for the event.

Arburg Acquires Stork

On July 29, 2026, Arburg, an injection molding machine maker headquartered Lossburg, Germany acquired Stork Plastics Machinery B.V. (Stork IMM), from Stibbe Participaties B.V. Arburg CFO Steffen Kroner and CTO Guido Frohnhaus signed the purchase agreement with Philip Stibbe, shareholder of Stork IMM and founder of Stibbe Participaties.

Stork, based in Hengelo, the Netherlands, specializes in high-speed machines for thin-wall and secondary packaging, including applications like buckets, pails, flower pots, food packaging, crates and more. It has all-electric machines ranging in clamp force from 250 to 700 tons, with screw diameters from 52 to 84 mm. The company's hybrid range runs from 225 to 2,250 tons, with screws from 45 to 150 mm.

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Non-PFAS Additive Adds Solvent Barrier To Monolayer HDPE Bottles

With tightening fluorochemical regulations, brand owners and molders of high-density polyethylene (HDPE) bottles for personal care, household chemicals, home-and-garden and automotive care are looking for a per- and polyfluoroalkyl-free (PFAS) alternative to fluorinated barrier treatments for aggressive solvents.



Avient says it has a “drop-in” solution in a solid pellet-blend additive that can be used in monolayer HDPE without retooling existing blow molding lines, specialized equipment or secondary processing steps. Cesa Solvent Barrier Technology for HDPE creates a tortuous path within the polymer matrix that slows solvent migration, according to Avient. It does so with a 12-20% letdown

ratio and is regrind compatible. Avient says it is eligible for APR (Association of Plastic Recyclers) compatibility with the HDPE recycling stream below certain concentrations. FDA status is pending.

Avient says this non-PFAS formulation can improve barrier to toluene migration from HDPE over seven days by two to six times, with improved mineral spirit barrier over 90 days by five to 10 times. Avient recommends this addition to its Cesa additive family for these applications:

- **Personal-care packaging:** helps maintain label adhesion and bottle geometry for body washes, oils and styling products.
- **Household cleaners:** reduces solvent loss and paneling in bottles holding terpene- and citrus-based cleaning formulations.
- **Home and garden chemicals:** supports 49 Code of Federal Regulations (CFR) hazardous-materials packaging testing for fertilizers, herbicides and pest-control formulations.
- **Automotive-care fluids:** improves containment of mineral spirits and aromatic solvent formulations such as wheel cleaners and engine degreasers.

High-Output Machines For Caps, Preforms

At its Packaging Innovation Summit, SACMI of Italy demonstrated its latest equipment, including models that raise the ceiling for production of caps and preforms.

SACMI's CCM series of continuous compression molding system's new CCM80SB model has a capacity of 4,000 flat-top HDPE caps per minute or 240,000 caps/hour. That's equivalent to a cycle time of 1.2 seconds. Until now, the highest-capacity model CCM64MD produced 2,850 caps/minute or 171,000/hour. SACMI says this approach's benefits include a lower extrusion and molding temperature than with injection molding, yielding faster cycle times and consistent part weight.

Further innovations still in development, include the FSP24M system for in-phase cutting of the cap's tamper-evident band, designed for cases where the cut must be synchronized with the morphology of the cap.

A new “flagship” machine for injection molding PET preforms. The new IPS500 has a 500-metric-ton clamp and up to 192 cavities, for output up to 140,000 preforms/hour. The previously largest model had a 400-m.t. clamp and up to 144 cavities.

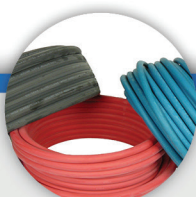
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Reifenhäuser Expands U.S. Presence

Reifenhäuser's North America has hired six people to strengthen its service and sales capabilities in extrusion:

They are:

- Micha Strong: service technician
- Caleb Thompson: customer care manager
- Joe Murphy: area sales manager
- Philipp Sterzenbach: area sales manager
- Sebastian Strack: business development manager
- Caden Glover : area sales manager for Kdesign

Products

"Our expanded team further strengthens the connection between Reifenhäuser's global engineering expertise and the practical needs of North American processors, helping our customers improve line perfor-



mance, accelerate decision-making and keep production running reliably," says Steve DeSpain, president of Reifenhäuser North America.

Through these strategic additions and the consistent positioning of Reifenhäuser North America as a strong local brand, the company is poised to deliver greater value and tailored expertise to its customers across the United States, the company said in a press release.

NexPoint Materials Now a Standalone Company

NexPoint Materials has announced its launch as a standalone engineering thermoplastics company. The news follows the finalization of its acquisition from SABIC's Engineering Thermoplastics business by German

private equity firm Mutares SE & Co. KGaA.

The new company employs approximately 2,800 people and operates an integrated manufacturing, technical and commercial network across Europe and the Americas.

The material portfolio includes Lexan polycarbonate (PC), Cycolac acrylonitrile butadiene styrene (ABS) and Valox polybutylene terephthalate (PBT). NexPoint says it will continue to provide products, expertise and support with no disruption to ongoing operations.

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Tria America Promotes Jim Hoffman to President

Tria America Inc. has appointed Jim Hoffman as president. Hoffman joined the company as executive vice president in August 2025. According to the company, Hoffman has

contributed extensive experience in the plastics size reduction market. His market expertise, leadership and customer relationships have strengthened the company's position across North America.

"Jim's promotion reflects his deep industry expertise, proven leadership and commitment to customer success," says Luciano Anceschi, executive chairman and group CEO of Tria S.p.A. "We are confident he will continue to advance Tria America's growth and support to our customers."

As president, Hoffman will lead the organization's continued growth in close collaboration with the global team, with a focus on expanding market presence, strengthening customer partnerships and advancing Tria's mission to provide innovative granulation solutions and exceptional service.



Ingenia Installs Seven-Layer Macro Blown Film Lab Line

Ingenia Polymers has installed a seven-layer blown film lab line at its newly expanded Brantford Innovation Center, Ontario (Canada) facility. Designed and built by Macro Engineering & Technology, the line consists of seven 1.25" extruders paired with Macro's proprietary blown film die and air ring technology and a 24" Automax surface winder capable of producing rolls up to 12" in diameter. The system can produce film widths of up to

500 mm (20").

Ingenia produces a wide range of materials for film extrusion, injection molding and rotomolding, notably masterbatches, purging compounds and processing aids. The new lab-scale system reportedly will expand Ingenia's capabilities to develop, evaluate and optimize advanced multilayer film structures while accelerating material innovation and product development.



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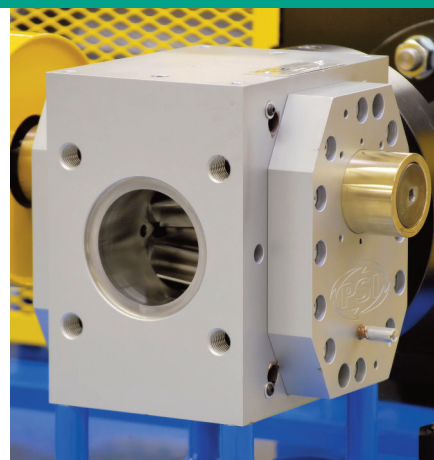
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Northeast Ohio Coalition Wins Up to \$160M NSF Grant for Advanced Materials and Polymer Manufacturing

The U.S. National Science Foundation (NSF) has selected the NEO-SMART Engine in Northeast Ohio as one of 12 new Regional Innovation Engines, awarding the effort up to \$160 million over the next decade to build out a national hub for polymers and advanced materials manufacturing.

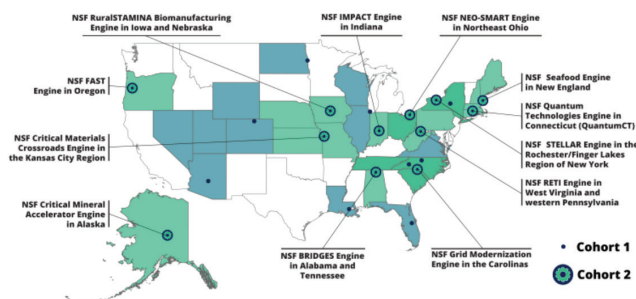
Led by Case Western Reserve University in partnership with more than 70 regional organizations — including the University of Akron, Greater Akron Chamber, and Greater Cleveland Partnership — the NEO-SMART Engine will focus on developing new feedstock materials, next-generation reprocessing technology, and AI/machine-learning tools for materials design. The initiative spans polymers,

chemicals, coatings and metals, with the stated goals of expanding domestic manufacturing capacity, growing a skilled regional workforce and strengthening the U.S. industrial supply chain.

Like other NSF Engines teams, the coalition will initially receive \$15 million over two years, with the full \$160 million contingent on hitting defined project milestones over the following decade.

The award builds on Akron's existing polymer-sector investments: the region's Polymer Industry Cluster secured nearly \$100 million in state and federal grants in 2024 and holds both state Polymer Innovation Hub and federal Sustainable Polymers Tech Hub designations. Akron Mayor Shammas Malik, in a statement marking the award, noted the city has now amassed "more than a quarter billion dollars in grant funds" for sustainable polymers and advanced materials since 2024.

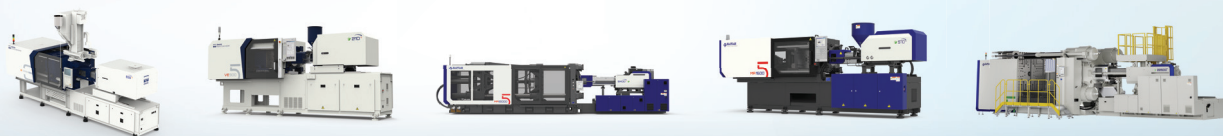
Nationally, the NSF Engines program's first cohort — funded two years ago with \$135 million in federal money — has since drawn more than \$2 billion in matching commitments from private industry, philanthropy and state and local governments, according to NSF.



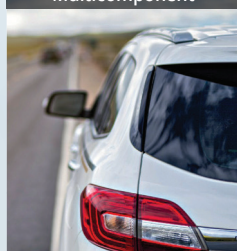
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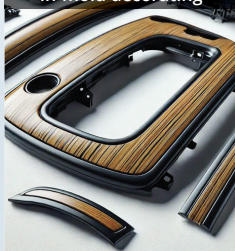
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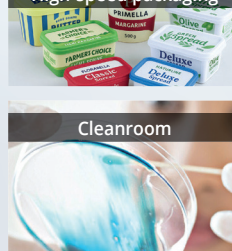
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Rheometer Moves Rotational Rheology From Lab to Production Line

GOETTERT's ROR Online Rheometer brings rotational rheometry to the production floor, measuring polymer melts viscoelastic properties in real time without manual sampling.

New technology is taking rotational rheometry out of the lab and onto the production floor.

By Jim Callari
Editorial Director

The ROR Online Rheometer from GOETTERT Inc. reportedly allows the viscoelastic properties of polymer melts, such as storage modulus G' , loss modulus G'' and the crossover point, to be measured alongside a running extrusion process without the need for manual sampling or sample preparation, according to Tim Haake, general manager of GOETTERT.

"Until now, these measurements have generally been restricted to the laboratory," Haake says. "There, samples must be removed from the process, prepared and tested manually. As a result, the information becomes available only after a delay, limiting the processor's ability to respond quickly to changes in raw-material quality or production conditions."

As Haake explains, the ROR combines oscillatory and stationary rotational measurements in one process-integrated instrument. During oscillatory testing, the storage modulus and

loss modulus are determined over a defined frequency range. This makes it possible to identify changes in polymer structure and to determine the characteristic cross-over point.

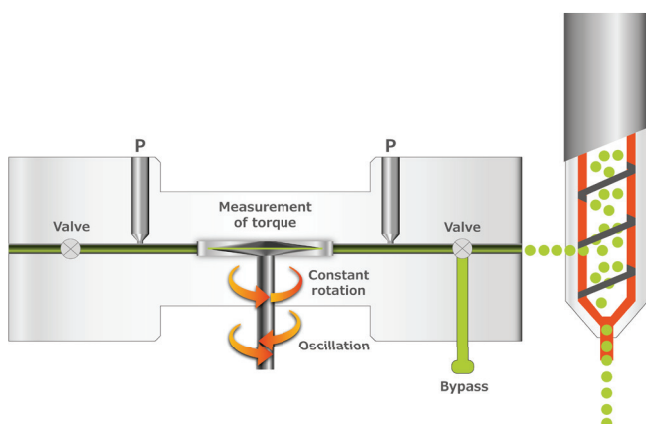
In stationary mode, the instrument measures steady-state viscosity. These results can be compared with data from conventional capillary and rotational rheometers and can also be used to evaluate the applicability of the Cox-Merz relationship. The Cox-Merz is a principle stating that the complex viscosity measured at a frequency is equal to the steady state shear viscosity measured at a numerically equivalent shear rate, allowing for the combination of complex and shear viscosities in a viscosity/temperature diagram across a wide temperature range.

INSIDE THE MEASURING SYSTEM

The measuring system consists of a heated cylindrical chamber containing a double-cone rotor. It is supplied directly by an extruder or melt pump. During normal operation, fresh polymer melt flows through the chamber. For measurement, the melt sample is isolated at a defined pressure by closing the inlet and outlet valves, while the main process flow is diverted through a bypass.

"The measurement is therefore performed in a closed chamber under stable and clearly defined conditions," Haake says. "This is important because continuous flow through the measuring geometry can introduce additional shear, pre-orient the polymer molecules and influence the measured modulus and cross-over point. Isolating the sample eliminates this superimposed flow and allows results to be obtained that closely correspond to conventional laboratory rotational rheometry."

Edge trimming is generally required in lab rheometry, but, says Haake, "With the double-cone geometry fully submerged, the primary concern is no longer sample trimming or loss of the defined measuring radius. Instead, we ensure that the cone-plate gap remains completely filled, that the surrounding flow does not introduce pressure fluctuations or asymmetric cross-flow and that any torque generated by externally wetted rotating surfaces is distinguished from the torque produced within the defined measuring gap."



ROR rheometer from GOETTERT is for online measurement of rheological properties under dynamic and stationary shear.

Source: GOETTERT

Haake continues, “These effects are taken into consideration in the instrument design and evaluation. The measuring geometry and surrounding housing are configured so that the contribution from the external flow is eliminated.”

WHAT TESTS REVEALED

GOETTFERT conducted validation tests on the ROR on a line running polyethylene and polypropylene with different viscosities and degrees of branching. “The results from the ROR were consistent with data from a laboratory cone-plate rheometer,” says Haake. “This was particularly evident for the storage modulus, loss modulus and cross-over points.”

The enclosed measuring geometry also offers advantages for highly viscous materials, Haake maintains. “Unlike conventional cone-plate systems, it prevents the sample from escaping from the measuring gap, allowing measurements to be performed at higher shear rates,” he elaborates. “In addition, the ROR can perform measurements at different pressures. This enables the influence of pressure on viscoelastic behavior to be investigated under conditions that are more representative of industrial extrusion and compounding processes.”

Online capillary rheometers have long provided information about melt viscosity and flow behavior. “The ROR extends this capability by making structural rheological data available directly from the production process,” Haake states. “This allows processors to identify material variations earlier, monitor degradation, evaluate recycled materials, compare process data with laboratory results and react more quickly to changing production conditions.”

He adds, “By bringing rotational rheology from the laboratory to the production line, the ROR provides a new level of process information. Automated measurement, direct process integration and strong correlation with laboratory data create new opportunities for faster process optimization, improved product consistency and more responsive process control.”

Haake lists the advantages of in-line viscosity measurement versus pulling samples for lab testing:

- **Real-time process conditions:** “The ROR draws material directly from the running process and measures it immediately,” he says, “at controlled temperature and pressure, without the cooling, sample preparation and reheating associated with laboratory testing. The actual rheological measurement is performed in an isolated chamber so that process-flow shear does not distort the rotational measurement.”
- **Catching variation as it happens:** “Resin lot-to-lot variability, moisture content, regrind/recycle content, additive package drift or degradation from thermal history all shift viscosity,” Haake explains. “In-line measurement catches these shifts in

real time while a lab test requires someone to pull a sample, prep it, run it and report back, which could be 30 minutes to hours later. By then, you may have made scrap for the entire intervening period.”

- **Enabling closed-loop control:** “In-line viscosity data can feed directly into control systems that automatically adjust screw speed, barrel temperatures or die gap to compensate for viscosity drift — keeping output dimensions, wall thickness or throughput consistent without operator intervention,” Haake states. “A lab result is inherently after-the-fact and can only enable a delayed correction.”

But Haake notes that current control systems are not ready to close the loop. “The limiting factor is not our system,” he states. “Current distributed control system technology and the associated control software are generally not yet at a point where they can reliably manage such a process autonomously. Our instruments provide one of the key measurement inputs, but a successful closed-loop solution would also require data from many other sensors, combined with sophisticated control algorithms.”

He continues, “High-quality, reliable data is the foundation

for any meaningful advancement in this area — and in rheology, that is precisely our focus. That said, I believe we are getting closer. Advances in machine learning and AI are likely to make this kind of intelligent, self-optimizing process control feasible sooner rather than later.”

- **Avoiding sample-handling artifacts:** “Pulling a sample and letting it cool changes its thermal and shear history,” notes Haake. “For some polymers (especially those prone to degradation or with complex morphology, like filled or reactive systems), the act of sampling and reheating in a lab instrument doesn’t perfectly recreate the melt state inside the process. In-line measurement avoids that discontinuity.”
- **Cost and labor savings:** “Continuous automated monitoring reduces the need for manual QC sampling and lab technician time, and it can reduce material waste from out-of-spec production runs that would otherwise only be caught periodically,” Haake says.

TRADE-OFFS WORTH NOTING

Haake notes that in-line systems are typically less precise than a dedicated lab rheometer, often limited to a narrower shear rate range, and represent an added capital and maintenance cost (sensors in a harsh melt-flow environment can foul or wear). “Many operations use in-line measurement for real-time trending/control and periodic lab testing for calibration and precise characterization — the two are complementary rather than one replacing the other,” he says. [PT](#)

“A lab result is inherently after-the-fact and can only inform a delayed correction.”

A New Atomic Age

Atomic Industries describes itself as offering 21st century mass production applying AI-native moldmaking and injection molding. Is this the future of molding?

Aaron Slodov isn't the first person who wanted a plastic part made that stumbled with bewilderment upon the arcane world of injection mold design and fabrication, but along with Lou Young Jr., he could be the one to reshape the world of molding going forward.

By Tony Deligio
Editor-in-Chief

Slodov's introduction to tools, injection molding and how ideas normally go from a napkin sketch to a product on a shelf came five years ago. At that time, he came to Young, then at moldmaker Linear Mold & Engineering, Livonia, Michigan, seeking a means of production for a plastic Dungeons & Dragons figurine. "He needed to get a mold built, and was like, 'This is crazy!'" Young explains. "He couldn't, as a normal person, easily work out this supply chain of getting CAD models built, then a tool built and eventually finding somebody to mold your widgets for you."

As Young explained the ins, outs and inefficiencies of injection molding, Slodov, whose background was in venture capital and startups, told Young, "I think there's probably a startup company here." At that time, Linear had made a name for itself as an innovator applying additive manufacturing to create conformal cooling in molds. While Young was explaining the benefits and challenges of conformal cooling, Slodov would help Young arrive at an epiphany of his own.

"I was telling [Slodov] that, in general, all plastic parts would be molded up to 50% more efficiently if we always did conformal cooling, but that's not feasible because you don't have enough designers or time in the day to do it," Young recalls, "and Aaron's like, 'We could make software that designs water lines automatically; it would just create the CAD geometry in the insert.' I went home that night, and I couldn't sleep. I started talking

to him every day. It was a light-bulb moment, like, 'Of course you could. It's heat transfer; it's fluid flows, it's equations.'"

And just like that, Atomic Industries was born with Young and Slodov as co-founders and serving as head of manufacturing and CEO, respectively. In August 2023, it took over the former Proper Tooling's 32,000-square-foot facility on 11 Mile Road in Warren, Michigan to serve as a "test bed" for tool design and manufacturing. Last September, it raised \$25 million in Series A funding, and this April it added a greenfield 72,000-square-foot site in Shelby Township, which houses 16 injection molding machines, ranging in size from 55 to 2,000 tons, with 14 LS Mtron's and two from Milacron, including a Roboshot. These machines run



Atomic Industries "test bed" tooling center aims to have a wide variety of metal cutting technologies. Source (all): *Plastics Technology*

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Atomic uses AI to help it design conformally cooled cavity inserts which are then 3D printed with Velo3D laser powder-bed fusion technology.

molds designed and built in Warren. When *Plastics Technology* visited those sites in July, the company was actively scouting a location for a planned 1-million-square-foot mega facility.

This rapid growth and planned expansion are tied to its business proposition — apply Nucleus, its in-house AI-powered

software — to streamline quoting, tool design, tool fabrication and injection molding, rethinking how parts get made and addressing what Young calls “scar tissue” from the industry’s status quo.

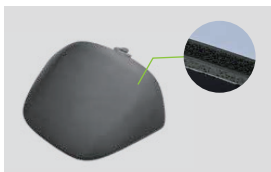
“Why don’t companies just care about whatever their widget is?” Young asks, before answering his own question. “It’s the scar tissue from previous bad mold experiences. If the tool isn’t built correctly, the line stops for any tiny little part — the tool becomes this huge issue because it’s such a complex engineering problem. It needs to be designed and built in a way that OEMs can count on it for production. It’s such a critical point in getting that little widget off the production line as fast as possible that everybody spends so much time on. We’re trying to make that go away. We just worry about your part. We’re quoting you the part, and ultimately, future state, nobody’s worried about tools anymore. They’re just giving us their part design. The tool is going to be perfectly optimized because of this tech stack that we’ve built.”

THE BARBELL

Part of how Atomic plans to deploy that tech stack is to attack the barbell-shaped issue that Young currently sees in the molding industry. A production CNC shop — making the same detail in the same part over and over again — can create one cutter pass, load in blocks of steel and walk away, letting a machine run unattended for a week. Whereas every injection tool build is a one-of-one

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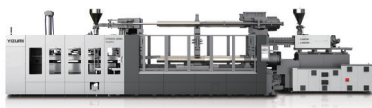


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unique scenario, with different cutters, different paths and different “fabrication strategies”, as Young calls them.

“What Nucleus is really doing, as far as fabricating the tool, is turning it into more of a productionized process,” Young says. “It doesn’t matter that the fabrication strategy is done differently for every detail we’re making because the software is just developing the fabricated strategy. It’s relieving that pain point.”

Young says if you consider a 20-week lead time for a new tool, there’s typically six weeks of design/simulation iteration, eight weeks of actual tool fabrication, and then another six weeks of first shots and trials. Atomic’s time savings and efficiencies are primarily found on the front and back ends of those processes.

“Where we’re making the biggest impact is that six weeks of simulation and design up front, and that six weeks of trial and error at the end,” Young says, “because if you can come up with a perfectly optimized tool design in a day because it’s all just cloud and compute, you’re going to have a lot less

Which pins are actually doing work and which ones are just along for the ride?

trialing because it should be perfectly optimized for that part already — all the water lines are perfect; the gate location was optimized. I would say it’s a barbell. The biggest blocks of time for a program launching are all this design and simulation up front and then this trial and error and tuning at the end, and we’re turning those from weeks into days. The fabrication time of the mold itself, that block in the middle, is being impacted too, but not as much as those other pieces.”

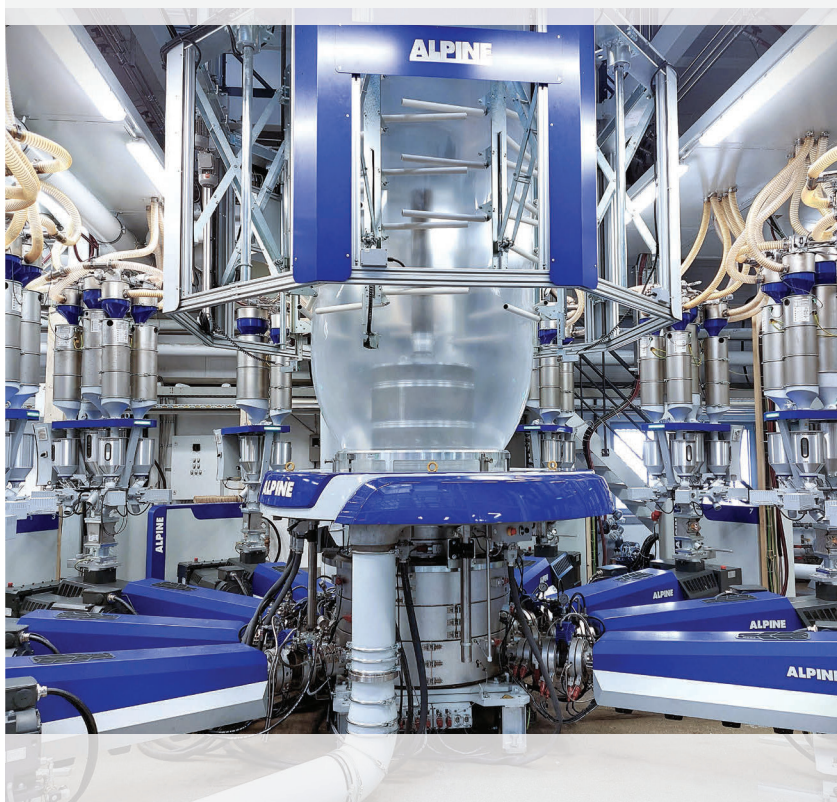
FEEDING NUCLEUS

Key to Atomic’s compression of the tool-development cycle is the gathering, interpretation and application of data it gathers from every aspect of its operation. Sensors feed data from every job — whether it’s printing an insert, cutting a cavity or molding a part — back into Nucleus. All molded parts are inspected, with the software learning from good and bad parts equally. On the molding floor in Shelby Township flat screen TVs in front of the

molding machine display real-time data as the mold runs, including screw position, injection pressure, cycle time, injection speed, clamp force, oil temperature and more. Nucleus also provides insights into the financial performance of the part run, down to margin on each shot. Cameras around the work cell track all aspects of the press and production operations required to make parts. Additional vision systems monitor mold open/close for more productivity insights. All this information is fed into data-collection systems, which Atomic made in house, that sit next to the press.

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Young uses ejector pins, and their impact on cooling channel design, to show how Nucleus and Atomic can apply all this data into making better molds and better parts. Pressure sensors under the ejector pins measure pressure in cavity but also track ejection force. "Which pins are actually doing work and which ones are just along for the ride," Young says, noting that the knowledge gained regarding the ejector pins and everything else will be applied to future tool designs. "If you don't have enough ejection you have zero parts coming off your mold. This is why, traditionally, people put ejector pins everywhere because if you don't have enough of them, you're in trouble. Whereas if you don't have enough water, your cycle time is just longer than it needs to be. People become complacent, and say '48 seconds is a pretty good cycle time.' That's how optimizing all these systems ultimately makes you make widgets faster, better. When our algorithm is deciding where to put ejector pins, it's ultimately learning how a part is shrinking and warping on a core, and where pins actually need to go to eject it. Today companies often put pins everywhere, and then try to design the water system around that. What if you just put the exact right amount of pins in? Now you have more real estate to optimize water and cooling, and now you improve your cycle time."

For the parts themselves, Atomic applies 100% inspection for the data that is needed to continuously grow, teach and refine its



As part of an experiment, Atomic created this tool with various cooling technologies — human and AI designed, as well as regular and conformal — to test the efficiency of various methods.

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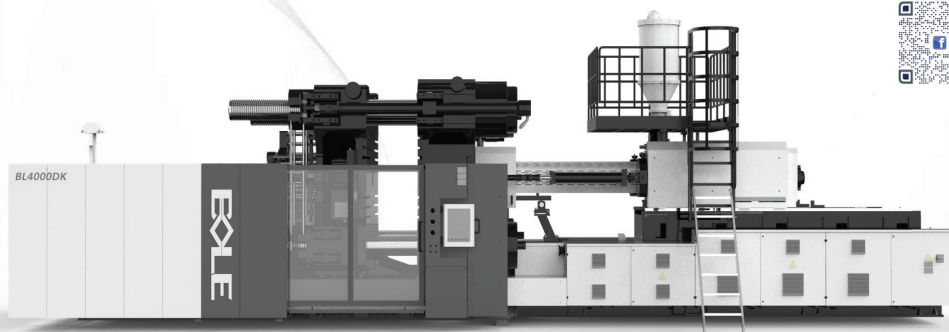


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Atomic builds these press-side data-collection units to help it gather process information to feed back into its Nucleus software.

proprietary AI model. “We learn what is making the best part,” Young says. “Within one week of starting production, we’re already learning, even for parts that passed inspection.”

AUTOMATED QUOTING, COST ESTIMATING

Atomic sees its future as ownership of the entire process, with vertical integration which has included building out its own solvers and simulation tools, benchmarked against existing programs. “Not only is part production the end market we want to affect, but to truly build what we’re building, you need to own the whole thing,” Young says. “You cannot be the best part molder if you’re not getting the best tools, and you can’t get the best tools unless you’ve got the best tools designing them correctly and optimizing them. You need to own that whole thing, and you need to know how this part ran to feed right back in to the beginning of Nucleus to retrain those models and tweak those solvers.”

As those models and solvers are continuously tweaked and improved, the software opens up additional opportunities, where if you can simulate highly accurate cycle times, which is also part of Nucleus, it can enable precision cost estimating. “It’s automated quoting too, built on physics,” Young says. “Fully autonomous quoting is the future where customers are just uploading part files.” **PT**

 The advertisement features a large cardboard box wrapped in clear stretch wrap. In the foreground, a roll of Uline stretch wrap is shown, partially unrolled. The Uline logo is prominently displayed in a red and white box on the left. Text on the box includes "WRAP IT RIGHT" and "COMPLETE LINE OF STRETCH WRAP". A blue box on the right says "ORDER BY 6 PM FOR SAME DAY SHIPPING". The bottom of the ad has a red banner with the text "COMPLETE CATALOG 1-800-295-5510 uline.com".

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The Biobased Foam Alternative to Extruded Polystyrene

TotalEnergies Corbion launches PLA for extrusion foaming applications.

Extruded polystyrene (XPS) foam provides thermal insulation and compressive strength at low weight and cost. But as litter, polystyrene (PS) products are correspondingly lightweight and persistent, making them a target of pollution control regulation in many regions.

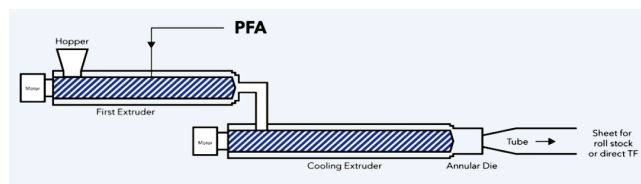
By **Matt Stonecash**
Associate Editor

Single-use PS food service ware products have been banned across 12 U.S. states, Canada, India and the European Union. The Single Use Plastics Directive (EU) and Single-Use Plastic Prohibition Regulation (Canada) apply to PS takeout containers, and U.S. state-level laws either apply specifically to take out containers or include specific exemptions for raw protein trays. But Maine's exemption expires in 2027, and an exemption to the provincial law in British Columbia expires in 2030.

Against this backdrop, TotalEnergies Corbion has introduced Luminy Foam 50F, a polylactic acid (PLA) grade specifically engineered for extrusion foaming, as a replacement. The joint venture between energy company TotalEnergies and biochemical producer Corbion is presenting the product as a drop-in substitute with a melt strength high enough that it can be processed at rates comparable to XPS.



Foam PLA food trays are the first application target for Luminy Foam. Source (all images): TotalEnergies Corbion



Basic tandem extrusion setup for Luminy Foam PLA. PFA = physical foaming agent, TF = thermoforming.

SOLVING A PROCESSING PROBLEM

While PLA offers sustainability benefits at the end of product lifespan, the low melt strength at processing temperatures has been a barrier to adoption. Low melt strength ordinarily makes PLA difficult to foam. As the dissolved gas begins to come out of solution and bubbles start expanding, cells will rupture or collapse, forming irregular foam that would result in a poorly formed surface, high density and/or voids.

Because of this, existing PLA products are generally not compatible with standard XPS processing setups. The workaround is reactive modification, which involves dosing with chain extenders and other additives during the extrusion process and slows throughput to allow time for those reactions to take place.

Luminy Foam has an inherently higher melt strength, which enables a simpler, faster processing path much closer to standard XPS processing, with no melt strength enhancers or reactive processing required. First, all PLA processes do require drying, since PLA is a polyester and any moisture will react with the polymer chains (hydrolysis). From there, Luminy Foam PLA is compatible with a tandem extruder foaming setup that would be used with XPS. The company recommends starve feeding to avoid excessive shear. The same hydrocarbon gasses are used as foaming agents, and micronized talc/PLA masterbatch is used as a nucleating agent. Because PLA will degrade to its lactic acid monomer, the company provides recommended purge sequences for startup and shut down to protect equipment.

FUNCTIONAL PERFORMANCE IN THE APPLICATION

Testing has shown that protein trays made from this material have the mechanical strength to withstand the overwrapping process,

Table from TotalEnergies Corbion comparing the functional characteristics of products made from its Luminy Foam extrudable PLA to XPS.

and sufficient water absorption for the application. The polymer properties yield a foam with lower density than what would be achieved with other PLAs. “We have managed to go down to 100 g/L and expect to go down further with process optimizations,” says Laurent Daligault, global market segment leader at TotalEnergies Corbion. Daligault explains that meat trays from XPS are typically around 60 g/L.

Sustainability characteristics of Luminy Foam include low carbon footprint: an LCA (life-cycle assessment) conducted by the company on a protein tray, using Plastics Europe reference data, showed a 70% cradle-to-gate carbon footprint reduction relative to PS, attributed to the use of biogenic carbon feedstock.

In principle, PLA can be composted or recycled at end of life. Both possible routes are infrastructure dependent. PLA degradation requires the elevated temperatures of industrial composting. In the U.S., the number of municipal composting programs is growing, but most do not accept PLA at this time.

PLA can be recycled but faces some of the same challenges as PS, such as the economics of handling low-density products and establishing a market. In the case of PS, drop-off programs with established collection points have boosted recovery in recent years. A 2022 study, sponsored by TotalEnergies Corbion and conducted with the University of Wageningen showed that PLA is at least unlikely to contaminate existing PET recycling streams: the study reported negligible impact on PET recycling streams by PLA at concentrations from 0.1 - 1%.

Luminy Foam 50F PLA is available now and has FDA and Korean Food Contact approval. In other jurisdictions, it is available for non food-contact applications. [PT](#)

TYPICAL PROPERTIES	XPS	XPLA
Product thickness	1.5mm	
Density	50-100g/l	≤100g/l
Heat resistance (TF product)	Max. 90°C	Low heat: ~50°C High Heat ~100°C
Skin	Closed, no liquid leakage	
Elastic modules	~2MPa	
Rebond resilience	10-30%	~40%
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EXTRUSION

Compliance Isn't Skill

Compliance keeps plants running. Skill keeps them profitable. Learn why operator capability — not checklists — reduces scrap, stabilizes throughput and protects margins.

In the previous articles, we looked at how cost enters during startup and persists through reduced throughput. The remaining question is why it continues to repeat.



By James G. Wilson

Most plants are compliant. That isn't a criticism. It's a fact. Procedures exist. Checklists are posted. Training records are signed. Audits are passed. Documentation is current.

Yet instability persists. Scrap repeats. Drift returns. Throughput throttles quietly after disruptions. Variability shows up in the same places shift after shift. The issue isn't paperwork — it's capability.

Compliance proves something was read. Skill proves understanding. Margin depends on the difference.

THE BINDER PROBLEM

Every plant has procedures for startup, changeover, cleaning and escalation. On paper, everything is clear. On the floor, variation remains. Procedures describe what to do. They rarely teach what to look for. A standard operating procedure (SOP) might say, "Verify temperature at setpoint." It rarely explains what unstable melt feels like at the die. It might say, "Engage puller at standard speed." It rarely explains what premature engagement sounds like or how tension should feel in the first few seconds.

The document can tell someone to inspect the first article. It rarely defines what early drift looks like before calipers confirm it. If an operator can follow the steps but can't recognize instability, control remains fragile. That's compliance. It isn't skill.

THE VALUE OF PATTERN RECOGNITION

Every operation has experienced people who "just know." They hear a subtle change in gearbox tone. They see gloss shift slightly edge to edge. They sense tension imbalance before chatter becomes obvious. They pause engagement instinctively when melt isn't ready. That intuition isn't magic. It's accumulated pattern recognition. Years of connecting cause and effect, watching what happens when the sequence is wrong and cor-

recting small drift before it compounds into visible loss.

If that pattern recognition isn't translated into teachable signals, it walks out the door. When skilled operators retire, variability often rises. Not because new hires are incapable. Because the system never codified what mattered. Tribal knowledge isn't a strategy — it's exposure — and exposure carries cost.

WHAT HAPPENS UNDER PRESSURE

Compliance works reasonably well when pressure is low. When schedule pressure rises, compliance erodes. Verification windows shrink. Hold times get shortened. Rate adjustments happen without documentation. Steps are followed loosely because output feels urgent. If the system relies on checklist memory alone, instability returns quickly, and skill behaves differently.

A skilled operator understands why the hold matters; understands why premature puller engagement creates first-hour scrap; and understands what unstable vacuum feels like before measurement confirms it. Understanding holds under pressure. Memorization breaks. When the line is behind schedule, compliance asks, "What can we skip?" Skill asks, "What can't we afford to skip?" That difference protects margin. Skill isn't abstract. It leaves evidence. Fewer micro corrections during steady state. Cleaner startups. Stable puller tone at design rate. Lower first-hour scrap. Faster return to baseline after a disturbance. Those aren't personality traits. They're outcomes of control.

You can measure how often operators diagnose upstream rather than compensating downstream. You can measure how quickly a line returns to design rate after a jam. You can track whether rate reductions are intentional and documented or quietly

normalized. If you only measure whether the checklist was completed, you'll get checklists completed. If you measure control, you'll build skill.

TURNING EXPERIENCE INTO SYSTEM

Skilled plants don't depend solely on senior operators to hold everything together. They define early signals,



Scan for more expert advice in extrusion.

explain the mechanism behind each procedural step and connect sensory cues to economic impact so operators understand what's at stake.

They don't say, "This is how we've always done it." They explain why sequence matters. Why stability precedes throughput. Why rate reductions require explanation. Why verification protects hours, not minutes. Progression is based on capability. If an operator can diagnose instability without escalation, that's skill. If they can't, documentation won't compensate.

Skill reduces variability. Reduced variability increases usable throughput. Increased throughput stabilizes margin. Fewer unstable startups reduce scrap. Fewer silent throttles protect rate. Fewer compensations reduce fatigue and confusion. Cleaner data shortens root-cause analysis.

What appears as training investment becomes cost control when control is actually achieved—not because of seminars, but because of capability.

When instability declines, throughput variance narrows and financial predictability improves. Predictability is economic strength. And predictability comes from skill.

LEADERSHIP DECIDES WHAT MATTERS

Operators respond to what leadership reinforces. If volume dominates every meeting, volume will dominate behavior. If stability is

reviewed before footage, stability will dominate behavior. If rate reductions require explanation, rate discipline improves. If early signals are discussed openly, pattern recognition spreads.

When leaders ask, "Is it running?" they get motion. When leaders ask, "Is it stable?" they get control. When leaders ask, "Who signed the checklist?" they get compliance. When leaders ask, "Who diagnosed the drift?" they get skill. That difference compounds over time.

Plants don't drift into excellence. They drift into tolerance—of drift, of quiet rate reduction and of unexamined variation. The only way out is intentional skill formation via defining signals clearly, explaining mechanisms openly and tying progression to demonstrated control rather than attendance.

People, not documentation, run the line, and whether they're compliant or skilled determines whether variability repeats or declines. The difference won't show up in a training record. It will show up in scrap, throughput and margin. Every shift keeps score.

ABOUT THE AUTHOR: James G. Wilson spent over four decades leading extrusion operations across a wide range of materials, products and plant environments. His experience spans tooling, process development and plant leadership, with a consistent focus on helping teams understand what their processes are already telling them before issues appear as scrap, downtime or missed delivery. His book, *The Line Talks Back: Generating Practical Lessons in Plastic Extrusion from the Plant Floor Up*, is available on Amazon. Contact: jimwilson4567@gmail.com.



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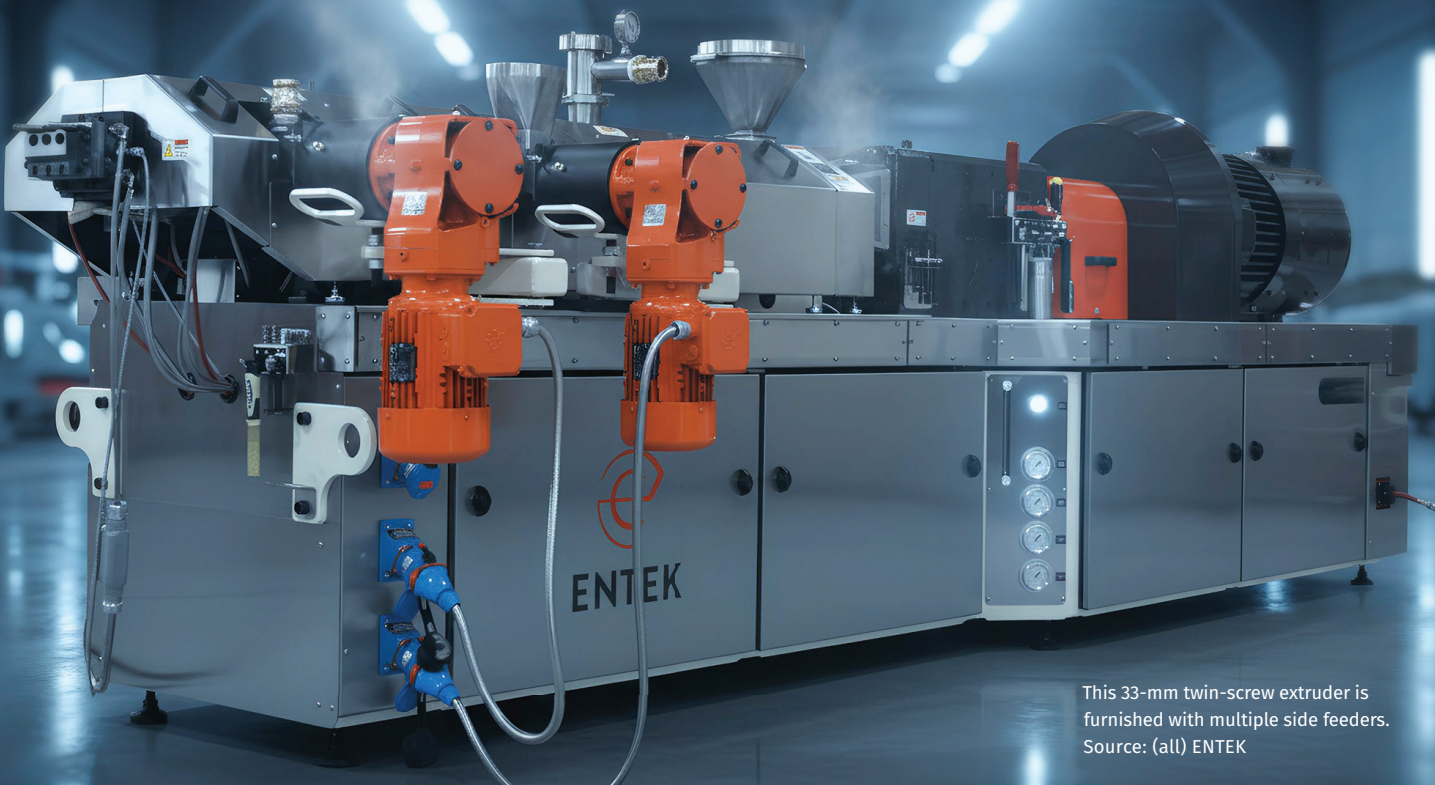
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This 33-mm twin-screw extruder is furnished with multiple side feeders. Source: (all) ENTEK

Identifying Throughput Limitations on a Twin-Screw Extruder

What is actually limiting your extrusions rates? Let's take a look at five common rate-limiting factors and how they can be fixed.

When processors look to increase production rates on a co-rotating twin-screw extruder, a common assumption is that higher output requires new equipment. Larger machines, more powerful motors and drives, or additional extrusion lines are often viewed as the

only viable path to increased capacity. In practice, however, many throughput constraints are not caused by the size of the extruder itself, but by a specific operational limit within the

existing system. On twin-screw extruders, that limitation almost always falls into one of five categories: power, volume, shear, moisture or volatiles, and pressure.

Before committing to capital investment, it is worth asking a more fundamental question: What is actually limiting your extru-

sion rates? And how can it be fixed? Understanding how these factors present themselves, and how they interact, can often reveal opportunities to increase output using the equipment that's already on the production floor.

Let's start with power limitations. In cases where material quality is acceptable, and both upstream and downstream equipment should be capable of handling higher rates, the extruder itself is operating at or near its maximum torque. While it may be tempting to view this strictly as a motor limitation, power constraints are often the result of excessive energy input within the screw design.

For better use of the conduction barrel heat, unnecessary shear can be reduced by screw layout modification and extending the

By Dean Elliott
ENTEK

length of melting zones. Reducing the motor load and/or the exit pressure by increasing die hole diameter can lower torque demand and create operating headroom, allowing higher throughput without changes to the drive system. Reducing torque fluctuations by stabilizing feeding systems allows the operator to run the extrusion line at higher torque levels, say from an average 80% torque to an average 90% torque; this in itself is more than a 10% rate gain. Any adjustments, however, must be evaluated in coordination with quality teams to ensure material properties are maintained.

INVESTIGATE THE FEED SECTION

Volume limitations typically originate in the feeding section of the extruder. As processors attempt to increase rate, material begins to back up at the feed throat, even though screw speed has already been increased as far as the process will allow. Options may include adding undercut or higher-pitch feed elements in the screw design, introducing additional feed ports, relocating feed points or incorporating oversized side feeders. Atmospheric vents coupled with extruder screw geometry allow for relief of the air that is dragged into the extruder with filler materials.

Shear-related limitations are usually identified through

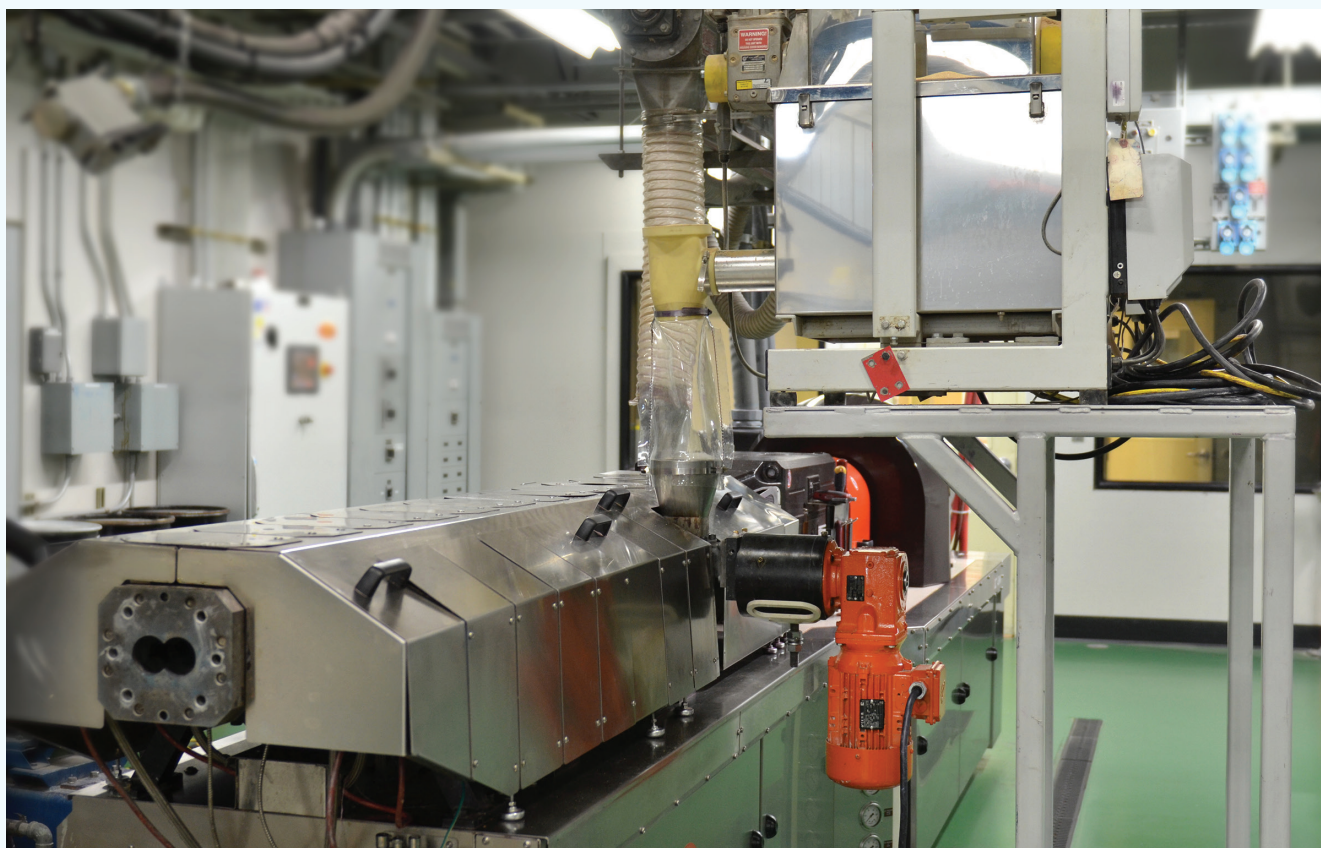
This 43-mm twin-screw corotating extruder is furnished with patented Vacuum Feed Technology. It uses a vacuum system attached to the extruder to extract air out of the raw materials to overcome volume limitations and increase throughput rates, in some cases as much as doubling them.

changes in material quality rather than through mechanical indicators alone. At lower rates, the quality of the product is acceptable, but as throughput increases, screw speed and shear rates are increased with signs of degradation beginning to emerge. Discoloration, burning or loss of physical properties indicate that excessive mechanical energy is being introduced into the melt.

Reducing shear often involves removing high-shear elements from the screw layout, increasing die flow area to lessen stress, increasing die-hole diameter, and reviewing barrel temperature set-points to ensure that external heating is not compounding internally generated heat. Run the extruder at feed rates as high as possible for a given screw speed to minimize frictional heat generated.

Moisture and volatile limitations can remain hidden at lower production rates and only become apparent as throughput is increased. Pellets that appear uniform and solid at low rates may develop dimpling, voids or surface defects as production is pushed higher. These symptoms typically indicate that devolatilization capacity is being exceeded. Adding or upgrading vacuum systems, incorporating vent stuffers to prevent material carry-over, and modifying screw design to increase surface exposure can all enhance moisture and volatile removal at elevated rates. Improving venting efficiency is critical in these cases.

Pressure limitations are most commonly associated with restrictions at the die. As output increases, pressure builds, leading to unstable flow or signs of fractional melt. Relatively

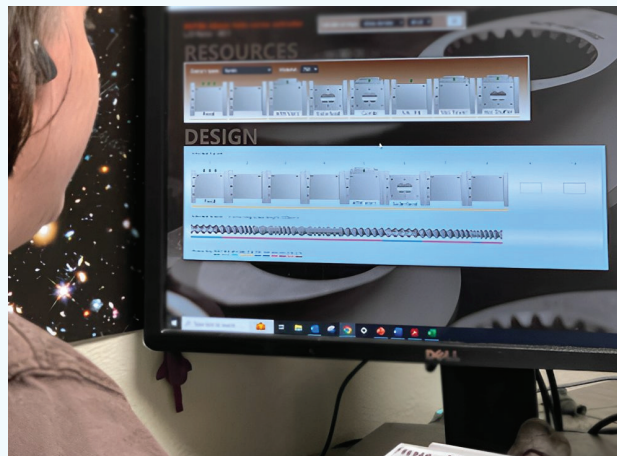


small changes at the die can stabilize the process and unlock additional capacity. Increasing total die flow area by either adding more holes or increasing existing hole sizes of the die-head is frequently an effective way to reduce pressure while maintaining or increasing output.

A BALANCING ACT

In many extrusion operations, throughput is limited not by a lack of installed capacity, but by one dominant constraint that has not been fully identified. These five rate-limiting factors rarely exist in isolation, and changes made to address one limitation can influence others. As a result, increasing output is often less about pushing the machine harder and more about balancing energy input, material flow and thermal management across the entire process.

Before investing in new capital equipment, processors can benefit from a systematic evaluation of power, volume, shear, moisture and pressure limitations. By identifying the true constraint and applying targeted process or mechanical adjustments, it is often possible to increase rate, improve stability and extend the useful capacity of existing equipment. In an environment where capital costs and downtime are significant considerations, fully utilizing the capability of the extruder already in operation can deliver immediate and measurable returns. **PT**



Processors can use software to modify the layout of both screw elements and barrels.

ABOUT THE AUTHOR: Dean Elliott is director of process development at ENTEK and has more than 26 years of experience in extrusion. In his current role, he leads R&D projects, provides extrusion training and support for customers and oversees pilot plant trials. Elliott earned a BS in Mechanical Engineering from the University of Durban-Natal in his native South Africa. Contact: 541-259-1068; delliot@entek.com; entek.com.



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FIG 1: Color and additives can be free-flowing or non-free flowing (pulsing). Image shows the former. Source: Wittmann

Follow These Best Practices for Better Blending

Learn how gravimetric blenders can improve material handling, reduce costs and optimize production with precise dosing, smart integration and real-time data tracking.

By **Paige O'Meara**
Wittmann USA

Many processors use multiple materials in their operations, but the way they combine them can widely differ. Whether you are hand mixing or have a dedicated material blender, you might not be realizing optimal output. Material cost fluctuates, and it is hard to find experienced technical staff, leading many to ask how they can more effectively manage production with costs and people always changing.

The ideal solution is the use of a gravimetric blender. A well-curated, homogenous blend plays a large role in how efficient or inefficient a process is. Inaccurate blending can lead to major structural or aesthetic product defects. A gravimetric blender

should offer a quick return on investment, and your distributor should also be able to calculate exactly what your ROI is. There are several key features that a blender should have, and several considerations of how it integrates into your process that should be taken into account before adding a new blender to your facility.

PRECISE MATERIAL HANDLING BASED ON CHARACTERISTICS

With so many variations in applications and materials, a blender must capably process virgin resins, regrind, colorants and additives. Each material possesses unique properties and requirements, necessitating customized handling strategies during

blending. The way the blender handles material should be based on characteristics of the material being used. Recognizing and adapting to these differences leverages the benefits of each material while maintaining the integrity of the end product.

Virgin material: Virgin pellets, typically being the main component of a recipe, are a significant factor to consider. Whether you produce bottles, containers, auto parts, medical components or packaging, these products are all made with different polymers for their own reasons. The bulk density and geometry of virgin pellets differ when using different polymer types, so the blender should be able to precisely measure, dispense and react immediately to what material you are using.

The ideal blender will adapt its dosing algorithm progressively as it approaches the target set point. A blender that can remember the previously learned algorithms to understand material properties and implement that learned data is ideal. If the blender does over or under dose, it should make the correction mid-batch to ensure all your ratios are accurate.

Colorants and additives: The dispensing algorithm your blender uses is increasingly important as you add multiple components, such as colorants or additives. The use of additives is often crucial for enhancing part performance, safety and durability across various applications. Additives such as stabilizers, flame retardants, impact modifiers and plasticizers can also vary widely in composition depending on what their purpose is in your process.

Colorants are often considered a type of additive, but ideally, the blender should be able to distinguish between a colorant

and an additive that impacts part performance. For this reason, colorants and additives that are used in a recipe should each have their own individually defined material type. The best method is defining the additive as a percentage of the batch weight and the colorant as a percentage of the virgin component. By using the colorant or additive as a reference, the absolute dosage of virgin material is adapted to the specified color and/or additive amount.

Over adding colorant is a common oversight for those who don't use a gravimetric blender. For example, a part can never be too blue, but you can tell if it's not blue enough, so many operators add more color than they truly need to compensate. Meeting the required setpoint to achieve the desired color across batches prevents over-consumption of colorant, saving valuable time and money.

Both colorants and additives can be free flowing (Figure 1) or non-free flowing so having specific dosing methods tailored to the materials you are using is a valuable feature. By prioritizing specific components and using multiple dispensing modes, users can effectively handle an assortment of materials. Dosing types such as free fall or pulsing can be assigned individually for every material hopper for greater control and preventing the addition of too much material.

Assigning priority to a specific component and ensuring that the dosing of this component is completed first, help ensure the target percentage for the overall batch is achieved. This is especially useful for fast cycle times and dispensing long-fiber material when in free-fall mode.

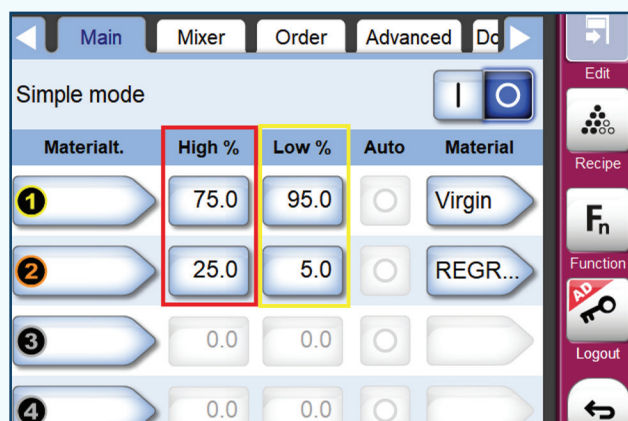
A sequential dosing mode can be very useful for processors who are hand filling the colorant or additives into the hoppers by essentially creating a backup hopper. If the required volume of the colorant exceeds the stored capacity of the bin, sequential dosing can be used to switch over to another hopper containing the same colorant allowing your production to continue without requiring operator intervention.

Regrind: Many facilities are also using recycled plastic material in their process. Although using regrind can lower costs and reduce waste, it's important to note that its mechanical properties may differ from those of virgin plastic. Most regrind is a non-free flowing material and might also have a lower bulk density and lower average molecular weight compared to virgin material.

The original form of the regrind, whether it's nylon runners, thin-walled scrap bottles or another material, affects the geometry of the resulting granulate. Specialized dispensing modes should also be used to facilitate movement of non-free-flowing regrind. Dosing in controlled bursts can help manage the challenging flow characteristics for more accurate and controlled dispensing. This helps overcome issues you may have seen such as clogging, inconsistent flow, or difficulty in moving the material.

Usually, the regrind is made from the same material as the virgin component in the recipe. During a standard cycle, runners

FIG. 2: When two recipes are defined, operators can set one for standard operation and one for when the hopper is low. The unit will automatically switch between recipes whenever a low level is detected. As shown here, when the material is above the sensor, 25% regrind is used, but when we are below the sensor, 5% regrind is used. Source: Wittmann



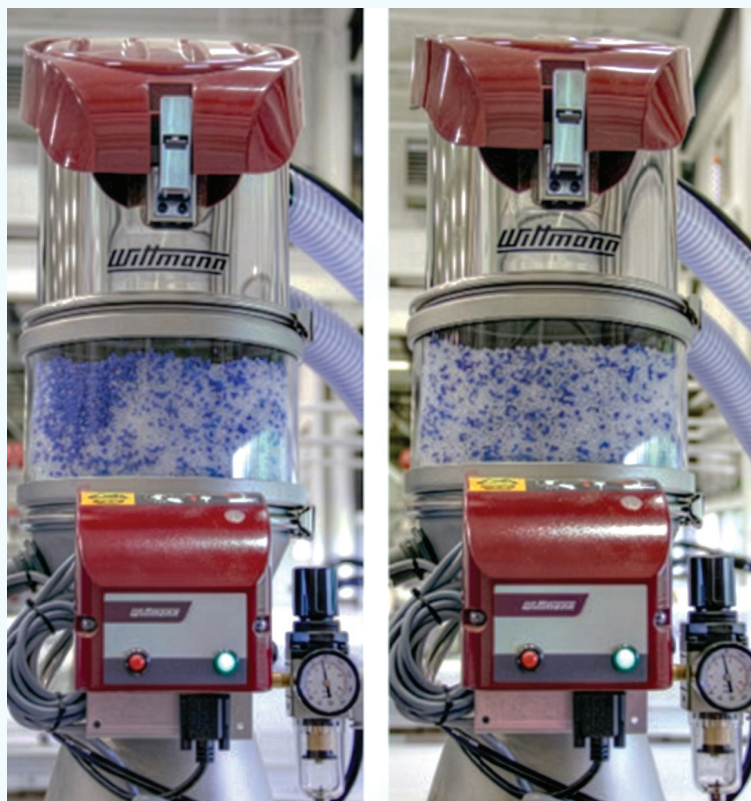


FIG 3: Conveying distances can make a big difference when it comes to blending. Left shows a blend conveyed more than 200 feet from the press. Right shows a blend that has been conveyed from beside the press. A quick glance reveals the blend conveyed close to the press is much more homogeneous. Source: Jon Fowler

usually operate at regular intervals. However, fluctuations in the amount of regrind in the cycle can occur depending on quality control checks and the introduction of scrap. Most processes will have a known maximum percentage of regrind that can be used to ensure the part maintains its required properties.

Having a solid plan for variable amounts of regrind prevents downtime and overconsumption of other resources. The best way to use recycled material in the blending process involves careful planning and control over material quality and ratios. If there is not enough regrind to complete the batch, the blender can revert to completely substituting with virgin and colorant or use a second recipe that entails a reduced amount of regrind.

Since regrind has a lower average molecular weight than virgin material, the amount used will have an effect on the viscosity of the melt which as we know can affect the final quality of the part. When two recipes are defined, you can set one for standard operation and one for when the hopper is low. The unit will automatically switch between recipes whenever a low level is detected. As shown in Figure 2, when the material

is above the sensor, 25% regrind is used. But when the hopper is low, 5% regrind is blended. This narrows the fluctuation of regrind usage, decreasing viscosity variations.

IMPLEMENTATION AND INTEGRATION

Each piece of equipment is part of a larger operation. There are a couple approaches to implementation that you should evaluate when adding a blender to your process. Physical placement within the system, different mounting methods and the desired level of data integration should all be considered.

One method of physical implementation is mounting your blender directly to the feed throat. Throat mounting allows you to save floor space, but things like height requirements for maintenance activities, crane usage or robot movement also need to be accounted for.

If you can't mount directly on the feed throat, you can always mount the blender on its own stand. Stand mounting will take up more floor space but allows for better access for maintenance and cleaning in between material changes.

When choosing where to place your blender, you also have to be mindful about how far away the blender is from the work cell. If the recipe contains different materials with different geometries and bulk densities conveying a farther distance may result in separation of the blend. In Figure 3, the blender on the left shows a blend that has been conveyed more than 200 feet from the press. The

one on the right shows a blend conveyed from beside the press. Just from first glance, you can tell the blend on the right is much more homogeneous than the one that has been conveyed from a long distance. This is why conveying distances can make a big difference when it comes to blending.

DATA EXCHANGE WITH OTHER EQUIPMENT

The best blending system is one where equipment works well as individual components and together as part of a whole process. Increasing capabilities of equipment does not have to mean sacrificing ease of use. You should be able to operate all components of your system centrally from the production cell or remotely from a PC in your office. By simply connecting a cable, you should have full data-exchange abilities, without the need to supply peripheral equipment with information manually.

A blender that is capable of accepting Open Platform Communications Unified Architecture (OPC UA) is ideal as it can be integrated into a Manufacturing Execution System (MES) to track material consumption in real time. OPC UA supports

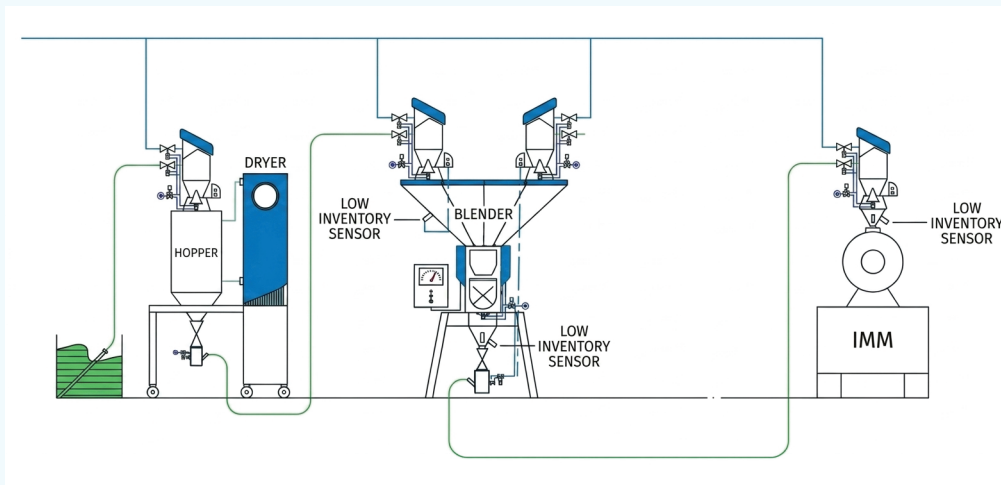


FIG 4: Integrating the blender with other equipment is critical especially when working with dried materials. As shown here, material is being conveyed from a dryer to a blender, and from the blender to a machine. Source: Wittmann

preventing production delays. The integration allows for automated reordering and more efficient inventory management, recipe management and material consumption tracking.

Integrating the blender with other equipment is also very valuable, especially when working with dried materials. When dealing with dried polymers, the material needs to be assessed at every intermediate storage point between

both read and write actions for blender-specific data tags, such as recipes, materials, scales or alarm data. You can also process customized values within your MES. This provides valuable data on how much material is being used throughout the production process.

By continuously monitoring material usage, the system can help identify trends and predict when materials are running low. This data can then be used to manage material reorder points, ensuring that inventory is replenished before running out, thus

the dryer and the machine to minimize moisture regain from ambient conditions.

In Figure 5, material is being conveyed from a dryer to a blender, and from the blender to a machine. The drying process is completely reversible. Hygroscopic materials that have been dried can regain moisture from ambient air. By integrating your blender with your dryer, you reduce the need for separate handling or additional steps.

Using sensors in the blender hopper and blender bin can prevent moisture regain. A loader demand sensor in the hopper is an important component used to monitor and regulate the material level inside a hopper, especially in systems where dried material is being used. This sensor helps ensure that the hopper is properly filled with the required amount of material but also prevents overfilling in the effort to mitigate moisture regain.

A low-inventory demand sensor for a lower mixed material bin is designed to monitor and track the levels of materials.

A purge valve should also be used for every intermediate storage point between the dryer and the machine. The purge valve facilitates the removal of any residual material in the system after each loading cycle; making sure the material is fully evacuated mitigates moisture regain. PT

FIG 5: The best blending system is one where equipment works well as individual components and together as part of a whole process. A blender that is capable of accepting OPC UA is ideal as it can be integrated into an MES system to track material consumption in real time. Source: Wittmann



ABOUT THE AUTHOR: Paige O'Meara is the product manager for the material handling and auxiliaries division at Wittmann USA. She began her career with Wittmann as a product coordinator, quickly demonstrating her expertise and dedication, which led to her promotion to applications engineer. With a strong foundation from her associate's degree in engineering science, O'Meara is now pursuing a bachelor's degree in technology management, further enhancing her technical knowledge and skills. Contact: 860-496-9603; Paige.OMeara@wittmann-group.com; wittmann-group.com.

Dry-Ice Blasting Aims To Freeze Out Competition in Industrial Cleaning

Industrial cleaning has always been messy, time consuming and often damaging to the very

By Michael Stemm,
PCS Company and
Ottavio Cautilli,
Surpass Industrial

equipment it's meant to protect. Dry-ice blasting is changing that equation — and the latest generation of machines with

on-demand pellet production is eliminating the last barriers to adoption.

Dry-ice blasting accelerates solid carbon dioxide (CO₂) pellets — at -78.5°C — through a compressed air stream onto a surface. Upon impact, the pellets sublime — transitioning directly from solid to gas — leaving no blasting media residue behind. Only the dislodged contaminant remains to be swept up or vacuumed away.

THREE SIMULTANEOUS EFFECTS IT IMPARTS MAKE DRY ICE REMARKABLY EFFECTIVE:

Kinetic energy from the high-speed pellets loosens contaminants.

Thermal shock from the extreme cold causes the dirt layer to contract and crack away from the substrate.

Sublimation expansion. As dry ice transitions to a gas and expands to roughly 700 times its solid volume, it creates a micro-lifting effect that peels contaminants off the surface. This combination of effects can clean surfaces of oils, greases, adhesive residues, soot, carbon deposits and other stubborn encrustations on industrial molds, all without damaging the underlying material.

MYRIAD MOLD-CLEANING BENEFITS AND MORE

Dry-ice blasting outperforms traditional methods across multiple metrics: speed, effective-

ness, environmental impact, surface preservation, worker safety and total cost of ownership. By the numbers: mold life can be extended by up to 500%, chemical costs can be eliminated, health risks are mitigated and production uptime can be maximized.

With on-demand pellet production now removing the logistical complexity of dry-ice supply chains, the technology is no longer reserved for large-scale industrial operations with dedicated dry-ice delivery contracts. Any facility with access to liquid CO₂,

Dry-ice blasting can be applied to tools still in production in the press.
Source: (all) Surpass Industrial

Could on-demand pellet production eliminate one of the final barriers to the technology's adoption? Why some plastics processors are abandoning traditional cleaning methods.

compressed air and a standard electrical outlet can deploy dry-ice blasting wherever and whenever cleaning is needed, with no planning and no waste.

For industries ranging from oil and gas to automotive, food processing and precision manufacturing, dry-ice blasting isn't just a better cleaning method; it's a competitive advantage that can pay for itself.

DRY ICE VS. TRADITIONAL ALTERNATIVES

Comparisons with traditional industrial cleaning methods help illustrate the potential benefits of dry-ice blasting.

Abrasive media (sand, glass bead, plastic): Abrasive blasting leaves behind secondary waste, erodes sensitive surfaces, alters precision tolerances and embeds particles in soft materials. Dry

ice, alternatively, produces zero secondary waste and causes no erosion, making it safe for injection molds, electrical components and delicate surfaces like rubber, plastic and copper.

Chemical cleaning: Solvents create waste streams that require specialized disposal and can expose workers to fumes, skin irritants and respiratory hazards. CO₂ is a significantly more cost-effective cleaning medium when factoring in chemical purchase costs, waste disposal fees, regulatory compliance and the potential cost of worker health. Liquid CO₂ is inexpensive, widely available from industrial gas suppliers and leaves nothing behind to dispose of. By replacing chemical agents with a non-toxic, naturally occurring gas, facilities eliminate an entire category of occupational health exposure, reduce liability and create a safer workplace without sacrificing cleaning performance.

Pressure washing: Water introduces moisture risk to electrical components and electronics, demands drying time and creates a wastewater stream that requires treatment. As the name suggests, dry-ice blasting is completely dry: no corrosion, no drying time, no wastewater.

Manual scrubbing: Wire brushes and scrapers are slow, inconsistent and typically require equipment disassembly. Dry-ice blasting cleans in-place without disassembly, reaching complex geometries and tight spaces that manual methods cannot.

IMPACT ON MOLD LIFE AND UPTIME

For manufacturers using injection molds, die casting molds or any precision tooling, the benefits are transformative. Because dry-ice blasting is non-abrasive, it preserves mold surfaces rather than degrading them the way wire brushes, scrapers and chemical solvents can.

Field experience has shown that dry-ice cleaning can extend the usable life of molds by up to 500% compared to traditional methods. That's not a marginal improvement — it's the difference between replacing a \$50,000 mold every two years versus getting a decade of service from it.

The production impact is equally dramatic. Molds can be cleaned directly inside the machine at operating temperature, with no disassembly,

The Karcher dry-ice blaster unit provides a self-contained system for processors.





Dry-ice blasting as a means of cleaning tool surfaces can increase uptime and extend the life of a mold.

cool-down or drying time. This directly increases machine utilization rates, keeping production lines running instead of idling during cleaning cycles. In high-volume operations, even a 10-15% improvement in uptime can translate to hundreds of thousands of dollars in additional annual output.

ON-DEMAND DRY-ICE PRODUCTION

Traditional dry-ice blasting had one major limitation: logistics. Pre-made pellets begin sublimating immediately, could only be stored for two to seven days and required just-in-time delivery. Leftover pellets simply vanished, so that every cleaning operation had to be planned well in advance.

The latest equipment trend eliminates this entirely through two complementary technologies.

Integrated blasters with built-in pellet production use a patented compressor unit to convert liquid CO₂ directly into dry-ice pellets during blasting. Liquid CO₂ stored in gas cylinders has unlimited shelf life — you can stock bottles and use them weeks or months later. Pellets are produced exactly as needed, with zero waste. Advanced models incorporate a heat exchanger that boosts conversion efficiency by 50-60%, meaning more dry ice per kilogram of CO₂ and lower operating costs. These machines only require a standard compressed air connection (as small as a 15-hp compressor) and a standard 120-volt electrical outlet.

Portable on-demand pelletizers produce high-density dry-ice pellets from liquid CO₂. Compact enough to move to any job site, these units offer mechanical operation with minimal maintenance, oil-free output for contamination-sensitive applications and interchangeable dies for multiple pellet sizes (3, 9 and 16 mm). They can also connect to CO₂ recovery systems to recapture exhaust gas.

Together, these technologies give operators complete independence from dry-ice delivery schedules and the flexibility to clean spontaneously — wherever and whenever needed. Across all these sectors runs a common thread: dry-ice blasting handles cleaning jobs that were impossible without disassembling, damaging equipment or posing a safety risk to workers. PT

ABOUT THE AUTHORS: Michael Stemm is business development manager for PCS Company, a supplier of mold bases, mold components, hot runner products and mold maintenance offerings, including the Karcher dry-ice blasting systems. His responsibilities include developing new business while working closely with mold builders, injection molders and brand owners to support their tooling and molding operations. **Contact:** 810-969-5522; mstemm@pcs-company.com.

Ottavio Cautilli is president of Surpass Industrial, a Houston-based provider of Karcher dry-ice blasting and industrial cleaning equipment for plastics manufacturers and other industrial markets. He has more than 25 years of experience in the plastics industry, helping manufacturers improve productivity, reduce downtime and extend tooling life through innovative cleaning technologies and process expertise. **Contact:** 281-846-4606; info@surpasscorp.com.

Downgauging PP Sheet for Thermoforming: When Thinner Isn't Cheaper

Learn how polymer modification extends polypropylene (PP) thermoforming downgauging beyond process optimization, preserving stiffness and top-load performance at reduced wall thickness.

In thermoforming, sheet thickness is one of the most direct levers for reducing part cost. As processors pursue material efficiency, downgauging remains an attractive route to lowering resin consumption while maintaining productivity and part functionality.

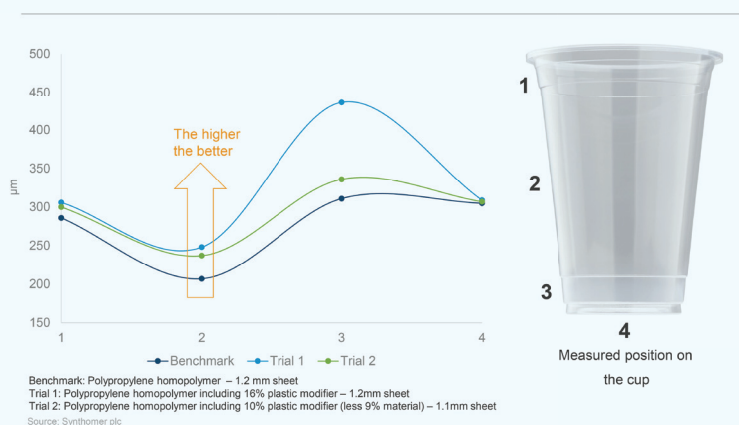
Frequently, the assumption is that the main challenge lies in processing thinner sheet. In practice, thermoformers frequently find that thinner polypropylene (PP) can heat faster, form readily and may even create opportunities for shorter cycle times. The greater challenge often appears after forming, when the finished article must still meet its mechanical and functional requirements.

By Luan Gavião, and
Synco de Vogel
Synthomer

As wall thickness decreases, top-load resistance, sidewall stiffness, dimensional stability and handling performance decline rapidly. Eventually, the limiting factor isn't whether the sheet can be formed, but whether the finished part can perform as intended.

This distinction changes the nature of the downgauging challenge. Early reductions in gauge can often be achieved through process optimization alone. Deeper lightweighting, however, increasingly depends on the way the polymer responds during stretching and forming.

FIG 1 Wall thickness distribution in thermoformed PP parts at standard and reduced gauge, showing improved uniformity with a modified material system. Source: (all) Synthomer plc



WHERE THE DOWNGAUGING LIMIT BEGINS

The first signs of a limitation often appear as uneven material distribution within the formed article.

As thickness decreases, there is less material available to compensate for local stretching. Regions exposed to high draw ratios become increasingly susceptible to thinning, while less-stretched areas may retain excess material. The resulting wall thickness variation can create local weak points that ultimately determine the performance of the finished part.

At the same time, the mechanical consequences of downgauging become more pronounced. Structural rigidity is highly dependent on wall thickness, meaning that even modest gauge reductions can result in a disproportionately large loss of stiffness and load-bearing capability.

For applications such as trays, tubs, cups, lids and technical packaging, this structural performance reduction often becomes the true downgauging ceiling, shifting the question from “Can the sheet still be formed?” to “Can the formed article still perform?”

WHY PROCESS OPTIMIZATION EVENTUALLY REACHES A CEILING

When performance limitations begin to emerge, thermoformers typically focus on the variables they can control directly.

Heating profiles may be adjusted. Plug-assist geometry can be optimized. Forming pressure, mold temperature and cycle timing may be refined to improve material distribution and reduce local thinning. These measures are often highly effective during the early stages of a downgauging program.

Process optimization does have a fundamental limitation. While it can improve how the available material is utilized, it can't fundamentally change the resin's mechanical behavior after stretching and forming.

This becomes particularly relevant when processors are already using modern nucleated PP homopolymers that have been optimized for stiffness, crystallization speed and thermoforming productivity. At that point,

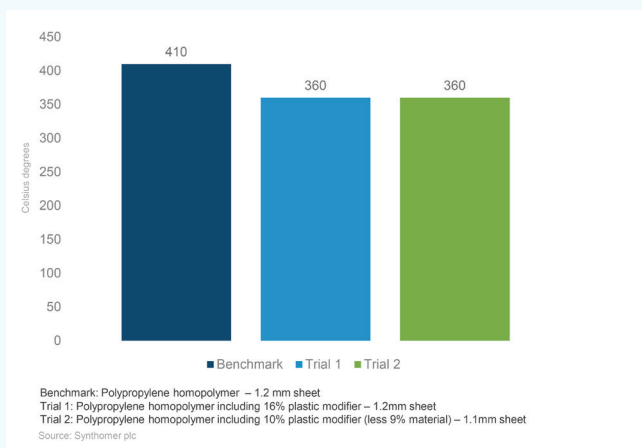


FIG. 2 Improved thermal response during heating and forming, supporting efficient thermoforming at reduced gauge.

the challenge is not only how to improve the process, but how to improve material performance at lower wall thickness.

WHY CONVENTIONAL STIFFNESS APPROACHES RESULT IN DIMINISHING RETURNS

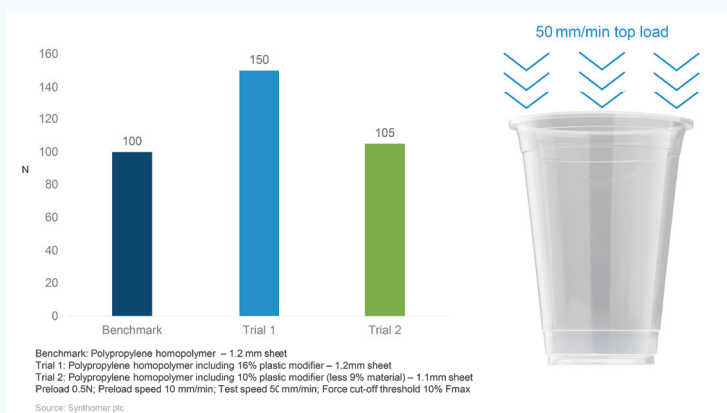
For many thermoforming applications, increasing PP stiffness has traditionally meant optimizing the crystalline phase of the polymer.

Nucleated homopolymers have become common because they provide an attractive combination of stiffness, productivity, clarity potential and cost efficiency. For many converters, these grades already represent a highly optimized starting point.

The problem is that additional gains become increasingly difficult to achieve once this route has been largely exhausted. Converters often find themselves in a familiar situation: they are already processing a stiff nucleated PP grade, but further downgauging causes unacceptable losses in top-load strength, dimensional stability or handling performance.

At that stage, further lightweighting may require a different

FIG 3 Top-load performance maintained despite reduced sheet thickness, demonstrating structural viability of downgauging.



approach. Rather than focusing exclusively on the crystalline phase of PP, increasing attention is being paid to the amorphous phase and its contribution to the performance of the finished article.

EXTENDING THE DOWNGAUGING WINDOW

A one material-based approach uses plastic modifiers designed to influence polyolefin behavior during and after deformation.

Unlike traditional stiffness-enhancement strategies that primarily rely on increasing crystallinity, these modifier systems can alter how the polymer matrix responds to stretching and orientation. This distinction is particularly relevant in thermoforming because the process is not only a shaping operation; it is also a stretching operation.

As the polymer is drawn into the mold, molecular orientation develops within the sheet. Depending on formulation, modifying polymer structure can increase the contribution of the amorphous phase to the finished article's mechanical performance.

The result can be improved stiffness retention at reduced thickness, more efficient heating behavior and enhanced material distribution during forming. In practical terms, this means the downgauging window can be extended beyond what might be achievable through process optimization alone.

WHY STRETCHED PARTS OFTEN SHOW THE STRONGEST RESPONSE

The influence of polymer modification is often most apparent in applications involving significant stretching and orientation.

In shallow thermoformed parts, deformation levels may be relatively limited. The mechanical benefit derived from a modified polymer structure can therefore be modest. In deeper-draw articles, however, the situation changes considerably.

Higher levels of stretching create greater orientation within the polymer. Under these conditions, modifications to the polymer matrix can contribute more strongly to stiffness retention and load-bearing performance in the final article.

The effect is not unlimited. Part geometry, draw ratio, corner design, local thinning and wall-thickness distribution remain critical factors. Nevertheless, in many highly stretched thermoformed articles, material modification can become an increasingly important complement to process optimization.

CASE STUDY: EXTEND THE DOWNGAUGING LIMIT

In one thin-gauge PP thermoforming application, additional downgauging had reached a practical limit. The sheet could still be processed successfully, but the finished article no longer met the required stiffness and top-load specifications after weight reduction.

Further process parameter adjustments delivered only marginal improvements. The limiting factor was no longer

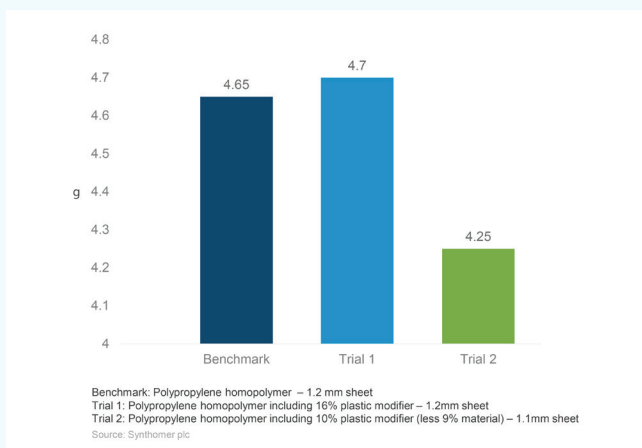


FIG 4 Reduction in part weight achieved through downgauging while maintaining geometry and functional performance.

the thermoforming operation but the formed part's performance.

The PP formulation subsequently added a polymer modifier package to improve its response after stretching and forming.

The modified formulation demonstrated improved wall-thickness distribution and better retention of critical mechanical properties at reduced gauge. Top-load performance remained within specification while part weight was further reduced.

Importantly, these gains were achieved within the existing thermoforming infrastructure without requiring changes to tooling, equipment or downstream packaging operations. The case highlights an important principle: once process optimization approaches its practical limits, material modification can provide an additional pathway for extending lightweighting potential.

THE ECONOMICS STILL HAVE TO WORK

Successful downgauging is not defined by thickness reduction alone. A lighter part creates value only if the finished article continues to meet performance requirements while production remains stable and economically viable. Material savings can quickly be offset by higher scrap rates, increased variability, handling problems or reduced package performance.

For that reason, validation typically focuses on end-use functionality rather than weight reduction by itself. Properties such as top-load strength, dimensional stability, stacking performance, handling resistance and application-specific durability remain essential measures of success. Ultimately, the objective is not simply to use less material, it's to use less material while preserving the performance customers require.

BEYOND THERMOFORMING:

A BROADER ROLE FOR MODIFIERS

Although thermoforming provides a clear example of the challenges associated with downgauging, similar principles are relevant across a wide range of polyolefin applications.

Plastic modifiers can be used not only in PP thermoforming but also in rigid and flexible polyethylene (PE) and PP applications where processing improvement, lightweighting, material efficiency and performance retention are important objectives.

Examples include rigid polyolefin packaging, flexible polyolefin films, oriented sheet and film structures, molded thin-wall packaging, blow molded containers and monomaterial packaging.

Across these applications, the challenge remains similar: reducing material consumption without sacrificing the performance that end users expect. As sustainability influences package development, material-modification has an important role alongside process optimization and product design.

WHEN TO SHIFT APPROACH

SITUATION	RECOMMENDED ACTION
Early downgauging initiatives	Optimize process conditions
Emerging wall-thickness variation	Combine process and design adjustments
Persistent performance limitations	Evaluate material modification strategies
Lightweighting beyond conventional PP limits	Consider advanced plastic/polymer modifier technologies

PRACTICAL TAKEAWAY

Downgauging often begins as a processing challenge that evolves into a materials one. As wall thickness decreases, maintaining stiffness, top-load strength, dimensional stability and handling performance becomes increasingly difficult, particularly when processors are already working with highly optimized PP grades.

In these situations, polymer modification can serve as a valuable complement to conventional process optimization. By influencing how polyolefins respond during stretching and deformation, plastic modifiers can help preserve functional performance while extending the practical lightweighting potential of the finished article.

The most successful downgauging strategies therefore combine three elements: optimized processing, intelligent design and material innovation. For thermoformers seeking the next step in lightweighting, understanding the role of polymer modification may be just as important as understanding the process itself. **PT**

ABOUT THE AUTHORS: Luan Gavião is market development manager at Synthomer, focused on packaging, lightweighting and sustainability-driven polymer solutions. He holds a degree in chemistry and an MBA in marketing management.

Synco de Vogel is principal scientist at Synthomer, with extensive experience in modified polyolefin compounds and application development. He holds masters degrees in plastics engineering and polymer science. Contact: adhesive.technologies@synthomer.com

INJECTION MOLDING

Full Line of Auxiliaries, Robots and Molding Machines Debuts

Wittmann Group will present the complete range of primus products, including auxiliaries, robots and injection molding machines at Fakuma 2026. Wittmann says the primus products are in response to the fact that “not every injection molding challenge requires a customized solution with many options and special technologies.”

A special presentation area at Wittmann’s booth will be dedicated to the primus auxiliary equipment, ranging from materials handling to in-line recycling. This display will include the Drymax primus granulate dryer, Temprow primus temperature control unit (TCU) and the S-Max primus screenless granulator. In addition, the company will show a Card primus dryer for small volumes, a Feedmax primus central material loader, a primus Robot and an EcoPrimus injection molding machine.

The Temprow primus 90 TCU will debut at the show, with a new 3.5” color TFT LCD display. Wittmann says it gives molders precise temperature regulation, via PT1000 temperature sensors. The company says “generously dimensioned” pipe diameters inside the cooling coils increase the cooling capacity.

Also on hand will be the S-Max primus screenless granulator, introduced at K2025 for beside-the-press size reduction. Rotor speeds of 27 rpm with 50 Hz of power enable the unit to break down engineering plastics and reinforced materials. The low motor speed also reduces energy consumption and generation of noise and dust.

The latest robot model in the series, the primus 118, handles payloads up to 8 kg (18 lb), with higher load capacity possible thanks to a new design, including more powerful drives. Up to 10 valve slots offer a variety of gripper and vacuum circuit

combinations, with up to eight vacuum circuits possible. To shorten part removal and cycle time, the robot comes equipped with the Smart Removal function as standard.

The primus 118 can work with presses up to 250 tons in clamping force, and since the



drilling pattern inside the robot’s main frame is the same as its predecessor, it can be retrofitted to existing equipment. The R9 control system, including the R9 Teachbox, provides full scale-up flexibility, with additional rotation and tilt axes. Wittmann says this enables a variety of part-depositing patterns to be implemented with one B servo axis, with an A+C servo axis used where pivoting motions are required.

MOLDS & TOOLING

Stainless Steel Ejector Pin Line Expanded

Progressive Components’ new line of stainless steel ejector pins is specially suited for medical and cleanroom environments, as well as applications involving polyvinyl chloride (PVC) or other corrosive plastics. Progressive says the pins are engineered and manufactured to meet the demanding conditions of injection molding, with tight tolerances held for sizing, roundness and straightness.



Constructed from 440C stainless steel and heat-treated to 55-60 Hardness Rockwell C (HRC), the ejector pins reportedly provide an optimal balance of high hardness and wear resistance and corrosion resistance.

The pins are available in a straight style with diameters ranging from 1/8-3/4” and lengths from 3-18”, as well as a shoulder-style version, featuring diameters from 1/32-7/64”. Here, options for 1/2-, 2- or 3” shoulders and lengths of 6” or 10” are available. Additionally, Progressive says it can provide keyed, cut-to-length and custom options.

MATERIAL HANDLING

Flexible Screw Conveyor Equipped with Trough Hopper

Flexicon's flexible screw conveyor with trough hopper can receive material from multiple outlets of feeders, grinders, blenders, bulk bag dischargers or other wide-style discharges.

Measuring 108" (275 cm) in length, the hopper's low 36" (92 cm) profile enables it to be positioned beneath the discharge point of most vessels. The hopper's bottom features a U-shaped channel that exposes the flexible screw for the entire length of the vessel, allowing material entering the hopper at any point to charge the conveyor, while a stainless-steel grate provides worker safety and prevents oversized particles from entering the conveyor.

Ports on the hopper walls are designed for the optional installation of level sensors, which enable real-time material-level monitoring and transmit signals to address critical issues such as overflow or conveyor starvation, ensuring efficient and uninterrupted operation.

The inner screw is the only moving part contacting material

and is offered in numerous designs to handle both free- and non-free-flowing materials, including products that pack, cake or smear, with no separation of blends. As it rotates, the flexible screw self-centers within the tube, providing

ample clearance between the screw and tube wall to eliminate or minimize degradation.



EXTRUSION

Servo Cutter for Medical Tubing



Versa Machinery's Servo MiniCutter is a high torque servo-driven tabletop cutter said to be ideal for medical applications such as PVC tubing for IV sets, polyurethane tubing for venous catheters and feeding tubes, silicone for drainage tubes, nylon impregnated silicone tubing and more.

The unit can feed, measure and cut up to 0.75" (19-mm) outside diameter at rates up to 1,000 cuts/min. with the servo-controlled accuracy medical product manufacturers mandate (material hardness, wall thickness and construction may limit maximum size). This compact automated cutter reportedly features the power of a large cutting system in a small footprint and is easy to program for automatic operations, making it ideal for test labs, cleanroom environments and the production floor.

Versa says the cutter can hold tight tolerances on cut lengths from 0.01 to 9,999.99". In addition to medical tubing, it works with rubber hose, silicone and plastic tubing and small plastic and rubber profiles.

In the MiniCutter, material is gripped by a pair of rollers and pushed through closely spaced bushings for precision cutting by a high-speed, razor-sharp knife.

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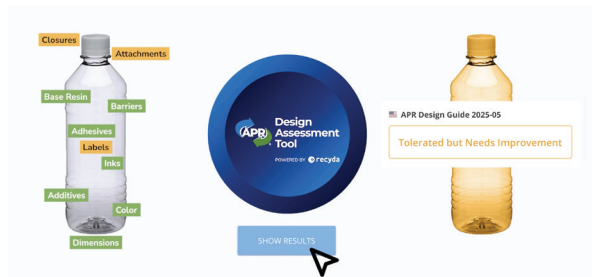
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RECYCLING

Digital Tool Streamlines Recyclability Assessment for Plastic Packaging

The Association of Plastic Recyclers (APR) has announced the launch of the APR Design Assessment Tool powered by Recyda, a new digital platform that helps companies quickly and accurately assess the technical recyclability of plastic packaging and packaging portfolios.

Built on the APR Design Guide for Plastics Recyclability, the APR Design Assessment Tool was developed in partnership with Recyda, a provider of sustainable packaging software solutions. The tool automates the design evaluation of complete plastic packages, guiding users through a series of steps to understand packaging makeup. It identifies missing information, highlights potential design incompat-



ibilities, recommends opportunities to improve recyclability and ultimately assigns an APR Design classification: Preferred Design for Recycling, Tolerated but Needs Improvement, Non-Recyclable or Requires Testing.

PROCESS COOLING

Chiller Adds Adaptive Technologies

Thermal Care has comprehensively redesigned its NQ Series chiller to automatically adjust to varying ambient and process conditions for greater energy efficiency, precision



and reliability in industrial cooling.

The new NQ Series chiller, ranging in cooling capacity from 4 to 40 tons, has added advanced software, electronically commutated (EC) fans, electronic expansion valves (EEVs) and dynamic lift technology.

Thermal Care says the cornerstone of the redesign is the new, enhanced software, which continuously monitors ambient temperature,

process requirements and system load to alter parameters like fan speed, valve positions and refrigerant pressure.

The adaptive algorithms can anticipate process fluctuations to seamlessly transition between operating modes while maintaining stability. The integration of EC fans in outdoor units and EEVs across all units enables the NQ Series to provide variable-speed operation.

The EEVs provide fine-tuned refrigerant control throughout the cooling circuit. Compared to previous thermostatically controlled or “spring-biased” valves, Thermal Care says EEVs can adjust in small increments, eliminating swings.

Dynamic lift technology dynamically adjusts the pressure differential, or “lift”, across the compressor based on real-time process demands and ambient conditions.



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COMPOUNDING

Mixer for Advanced Vacuum and High-Pressure Processing

The ROSS Model VM-80 VersaMix combines a three-wing anchor agitator and high-speed disperser for mixing, blending, dispersing, heating, cooling and vacuum processing of liquids, slurries, gels, creams and pastes. The pictured VersaMix has an 80-gallon working capacity with an 86-gallon full holding capacity.

The vessel is fabricated with Type 316L stainless steel product-contact surfaces with <25 Roughness average (Ra) finish, passivated and electropolished for sanitary operation and simplified cleaning. Designed for operation up to 29.5" Hg vacuum and 50 pounds per square inch gauge (psig) internal pressure, this multi-agitator system

features dry running non-contact dual gas seals and a Type 304 stainless steel heating/cooling jacket rated for 50 psig at 300°F.

The mix vessel and jacket, which are American Society of Mechanical Engineers (ASME) code stamped and board registered, include CRN registration in Canada. The 2" sanitary radial diaphragm bottom discharge valve meets bioprocessing, pharmaceutical and other aseptic application requirements.

The mixer features a three-wing anchor agitator powered by a 5-hp explosion-proof motor operating from 25-52 rpm. A skim breaker wing beneath the anchor hub eliminates dead zones, promoting material movement throughout mixing and discharge.

Complementing the anchor agitator is a high-speed disperser driven by a 15-hp explosion-proof motor. Equipped with a 9" Type 316 stainless steel sawtooth blade, the disperser operates at speeds up to 2,016 rpm, generating tip speeds up to 4,750 ft/minute. Sealed gas purge systems and debris wells are provided for the air/nitrogen-purged double mechanical seals.

Multiple tri-clamp nozzles and an RTD temperature probe extend into the vessel for continuous temperature monitoring.



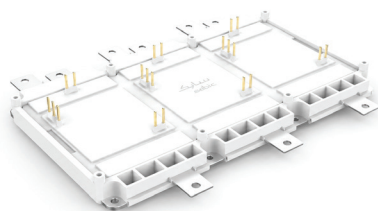
MATERIALS & ADDITIVES

PPS Compounds Enable High-Voltage Power Module Applications

SABIC has announced a new series of LNP Thermocomp compounds well suited for high-power, high-voltage electric drive and power module applications, such as insulated gate bipolar transistor (IGBT) power switching devices. The new LNP Thermocomp OFM76XXP and OFM76EXP compounds, based on polyphenylene sulfide (PPS) resin, provide impact strength, dimensional stability, comparative tracking index (CTI-PLC 0) and

resistance to thermal shock to address increasingly stringent requirements. They also feature high heat resistance, dielectric strength for effective electrical insulation and UL94 V0 flame retardancy (FR).

These materials have the potential to be used in power modules for high-voltage (800V and above) electric vehicle traction inverters and fast chargers, as well as renewable energy systems and industrial automation applications such as robotics.



MATERIALS & ADDITIVES

Plasticizing Flame Retardants Platform Reduces TPP Content

Lanxess has launched Disflamoll Advance, its next-generation platform for plasticizing flame retardants featuring low triphenyl phosphate (TPP) — less than 0.1%. It is designed to help manufacturers navigate evolving regulatory requirements while maintaining performance standards.

Beyond its low TPP content, Disflamoll Advance maintains flame retardancy and smoke suppression. Its properties are designed to help reduce or eliminate antimony trioxide (ATO) in formulations and improve processing efficiency.

The first product, Disflamoll Advance OT, is designed for use in polar polymer systems. Applications include flexible polyvinyl chloride (PVC) used in flooring, tarpaulins and synthetic leather, insulation foams, thermoplastic polyurethanes (TPU), synthetic rubbers and cellulose esters.

Disflamoll Advance OT combines low TPP content with the flame-retardant, plasticizing and smoke-suppressing traits associated with the Disflamoll brand.



Commodity Resin Prices Generally Trending Flat to Down

Trajectory fluctuations reflect continued uncertainty due to geopolitical and potential hurricane season risks.

By **Lilli Manolis Sherman**
Contributing Editor

By July's end prices had dropped for polyethylene (PE), polystyrene (PS) and polyethylene terephthalate (PET); moved up a bit for polypropylene (PP); and remained flat for polyvinyl chloride (PVC). The overall price trajectory was trending flat if not down, with the exception of PS, primarily due to feedstock pressure and major industry consolidation. The continued uncertainty of the U.S.-Iran East military conflict, followed by the threat of peak hurricane season, were contributing factors to the shift.

Below are the views of purchasing consultants from Resin Technology Inc. (RTi); David Barry, associate director of PE, PP and PS for Dow Jones Energy (rebranded from OPIS's PetroChemWire/PCW); Michael Greenberg, CEO of Resintel, the market intelligence service of The Plastics Exchange; Kevin Mekaru, RTi's procurement director for commodity resins; Scott Newell, executive VP polyolefins at distributor/compounder Spartan Polymers; and Mike Burns of Plastic Resin Market Advisors.

PE PRICES DROP, THEN SETTLE

PE prices were expected to drop in July, sinking by as much as 10¢/lb, after falling 15¢/lb in June, according to reports from Barry, Greenberg, Burns and Mekaru.

Several suppliers issued price hikes of between 5-10¢/lb for August. Mekaru speculates that there's zero chance of any increase going through. He and Barry note that spot prices had dropped by as much as 15¢/lb but were increasing as market participants reacted to higher crude oil prices due to the Middle East conflict. "Traders highlight the geopolitical uncertainty as a central dynamic in the PE market," Barry says. He anticipates an upsurge in demand for PE exports due to "earlier than usual" restocking ahead of the holiday season, particularly in Asia, with domestic plant operating rates up in the 90s, percentage wise.

Burns says that after a lower July price settlement, markets may well remain "historically quiet for the next 60-to-90 days pending weather events." He speculates that PE prices may remain relatively stable through the season and notes that record production, average domestic demand and below average exports will favor the resin

Market Effective Mid-August 2026

Resin Grade	¢/lb
POLYETHYLENE (railcar)	
LDPE, LINER	71-73
LLDPE BUTENE, FILM	67-69
HDPE, G-P INJECTION	71-73
HDPE, BLOW MOLDING	69-71
HDPE, HMW FILM	71-73
POLYPROPYLENE (railcar)	
G-P HOMOPOLYMER, INJECTION	64.5-66.5
IMPACT COPOLYMER	69.5-71.5
POLYSTYRENE (RAILCAR)	
G-P CRYSTAL	98-100
HIPS	104-106
PVC RESIN (railcar)	
G-P HOMOPOLYMER	54-56
PIPE GRADE	55-57
PET (truckload)	
U.S. BOTTLE-GRADE	73-75

processor heading into 2027 negotiations.

PP PRICES UP, THEN FLAT TO DOWN

After dropping a total of 15.5¢/lb in the May-to-June timeframe, tracking the movement of propylene grade monomer (PGP), July PP prices moved up 3¢/lb with the PGP contract rising to 46¢/lb. This is primarily due to scheduled and unscheduled disruptions at propane dehydrogenation (PDH) units, and to a lesser degree, higher crude oil prices related to the Middle East conflict, according to Barry, Greenberg, Newell and Mekaru.

Barry says that this is not going to be a sustainable price rally for PGP and PP. "PP demand has been pretty decent with PP operating rates in the low-to-mid 80s percentage wise," Barry explains. Mekaru and Newell both note that spot PGP prices were heading down going into August as the PDH units were beginning to return to full operations. Most sources contacted anticipate that with addi-

tional decreases suppliers' implementation of now a total of 33¢/lb increases will be eliminated.

Newell posits that while PP demand through June has been recorded at 6.8% higher than year-to-date 2025, this may reflect the strong activity of PP exports due to the Iran war, which now appears to have tapered off significantly. While he sees domestic demand as steady, he attributes this partially to prebuying and restocking as a

safety measure prior to the peak of hurricane season and owing to the lower cost of the resin. Barring any major production disruptions and a 'calming' of the Middle East conflict, he ventures PGP and PP prices could drop another 3-to-5¢/lb within the August-September timeframe.

Noting that spot PP prices had strengthened, supported by demand improvement, Greenberg says, "The PP market has therefore stabilized, but it has not fully broken higher. PGP has given producers (suppliers) cost support, limited prime availability has tightened the spot feel and the crude oil rally has helped sentiment. Still, buyers remain disciplined, exports are relatively limited and the next move will depend heavily on whether PGP holds its rebound after PDH supply improves."

purpose PS and 4¢/lb for high-impact PS — according to Barry and Brian Balboa, RTI's senior business unit leader for PS and PVC.

Meanwhile, spot benzene prices which had dropped to \$3.68/gal by June's end, rose to \$4.78/gal going into August. According to Barry, this would translate to a 10¢/lb price increase for PS resins, should the August benzene contract settle that high. Balboa ventures that suppliers will regain their July losses in August but says September's pricing trend is tough to project as the September-October time-frame is typically peak hurricane season.

Going into August, Barry reports the implied styrene price, based on a spot formula of 70% benzene and 30% ethylene, fell to 50.3¢/lb, but was up 8.4¢/lb going into July. Barry also anticipates that suppliers will have to increase PS plant operating rates to the high 60s, due to supply rationalization that is occurring from two permanent major production shutdowns.

Polyethylene Price Trends

HDPE Injection	
JUL	AUG
 10¢/lb	

HDPE Blow Molding	
JUL	AUG
 10¢/lb	

HDPE HMW	
JUL	AUG
 10¢/lb	

LDPE	
JUL	AUG
 1¢/lb	

LLDPE Butene	
JUL	AUG
 10¢/lb	

PS PRICES DOWN THEN UP

Prices of PS appeared to have moved up in June by another 4¢/lb, bringing the total increases since March to 33-34¢/lb, with all this movement driven by higher costs of feedstocks, primarily benzene, versus supply/demand fundamentals. However, July's decline of benzene costs resulted in lower resin prices — 6¢/lb for general-

PVC PRICES FLAT-TO-DOWN

Prices of PVC dropped 2¢/lb in June and were likely to be flat through the July-August time frame, with another slight decline in September, according to Balboa. Suppliers' significant inventory build was indicative of mild demand in the construction market sector during its normal June and July peak. Key feedstock costs were trending flat-to-down. Meanwhile, domestic suppliers still feel some pressure from China's continued aggressive global PVC exports spree.

PET PRICES DOWN

Prices of PET dropped 1-2¢/lb in July, canceling out the June increase of the same amount, according to Mekaru, who attributes this trajectory to lower raw material cost formulations. He speculates that prices in the August-September timeframe are likely to be flat-to-down, as domestic demand continued to soften. Despite new tariffs that were likely to emerge with a bit of constraint on imported PET from some regions due to higher freight and transport costs, Mekaru sees well-priced imports continuing to be key to this market. **PT**

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Plastics Processing Index Contracts Again in July While Production Rises

The GBI Processing Index contracted by 1.8 points in July, but at 53.7 remains in growth territory.

FIG 1 Plastics Processing Index



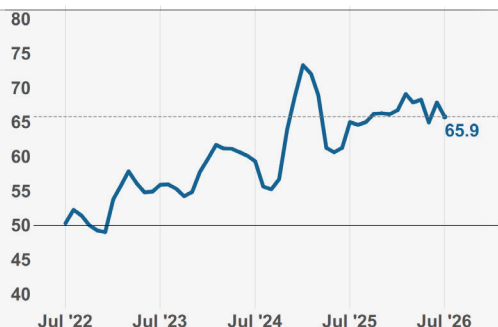
The GBI is an indicator of the current state of plastics processing. Over 50 is expansion. Under 50 is contraction.

FIG 2 Components Scorecard

	Change vs	
	Month Ago	Year Ago
Supplier Deliveries	▼	▲
New Orders	▼	▲
Production	▼	▲
Employment	▲	▲
Backlog	▼	▲
Exports	▼	▲

Shade = distance from 50 (darker shades are further from 50)
Direction = change (Pointing up is better)

FIG 3 Future Business Index



Numbers in Perspective

While the GBI Processing Index edged down for the second consecutive month to 53.7 in July, its production component rose 3.9 points to 57.6 from 53.7 in June, indicating that plastic products manufacturing has maintained its growth momentum. Recent macro-economic data support this trajectory.



By Perc Pineda

The U.S. economy continued expanding in the second quarter, although the first estimate of gross domestic product (GDP)

shows growth moderating from 2.1% in Q1 to 1.5% in Q2. Still, the positive figure confirms continued economic expansion in the first half of the year, consistent with stable demand for plastics.

The pullback in other GBI components, particularly new orders and employment, appears to reflect continued business caution rather than a meaningful correction in typically volatile monthly data. Industry data also support this cautious sentiment, as some plastics end markets continue to face challenges.

Nonresidential construction spending rose a modest 0.1% in June from May but has declined 2.1% year over year. Despite announced commitments to reshore manufacturing in the U.S., these commitments have yet to translate into increased manufacturing construction spending, which fell 1.2% in June and 21.4% year over year. Residential construction spending also weakened, declining 0.3% from May and 4.7% year over year. Higher interest rates remain a key constraint on both segments. The Federal Reserve has maintained the federal funds target range at 3.50% to 3.75% since December 2025, while limited policy guidance has pushed the 10-year Treasury yield higher. As a result, mortgage rates are unlikely to decline significantly in the near future. Taken together, these conditions suggest that growth in plastics building and construction end markets will remain modest in the months ahead. [PT](https://plasticsindustry.org)

ABOUT THE AUTHOR: Perc Pineda, Ph.D., chief economist of the Plastics Industry Association (PLASTICS), is an industry thought leader and PLASTICS' primary expert and spokesperson on the U.S. and global economy, industry research, statistics, trends and forecasts. He produces PLASTICS' two annual flagship publications — *Size & Impact* and *Global Trends* — and trademarked the Global Plastics Ranking. Read his views and insights on the economy and the plastics industry at plasticsindustry.org.

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PT SALES CONTACTS

NATIONAL SALES REPS

■ Todd Luciano

Market Vice President,
Advanced Materials
& Processes
513-527-8809
tluciano@gardner.media

■ Jackie Dalzell

Regional Vice President
513-338-2185
jdalzell@gardner.media

■ Ken Hine

Regional Manager
513-527-8947, ext. 7702
630-803-7426 (mobile)
khine@gardner.media

■ Madeline Kline Peters

Regional Manager
513-527-8950
mkline@gardner.media

INTERNATIONAL OFFICES/SALES REPS

■ Claude Mas

Executive Director of International Business
513-338-2186
cmass@gardner.media

■ SPAIN/PORTUGAL

Guillermo Fernández
Gardner Business Media
+1 305-308-7096
gfernandez@gardner.media

■ EUROPE

Simone Mas
Gardner Business Media
+33 749-645-567
smass@gardner.media

■ ITALY

Roberto Puccetti
Globe Trotter SAS (Italia)
+39 320 7447807
roberto.puccetti@gtrotter.it

■ JAPAN/KOREA/CHINA

Erica Cheng
Gedy Ltd.
+86 132-183-1378
erica@gedyinc.com

■ TAIWAN

May Hsiao
J&M Media (Taiwan)
+886-4-2296-5959
may@jandm.com.tw



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BALCAN INNOVATIONS — PLEASANT PRAIRIE, WISCONSIN

Big Bubble, Wide Film Highlight Balcan's Latest Buy

Five-layer Bandera line produces films at a 50-foot web width, among the largest formats available for industrial packaging.

The film bubble you see in the photo is not the result of AI chicanery or Photoshop. Instead, it reflects the latest investment made by Balcan Innovations at its Pleasant Prairie, Wisconsin film production and converting plant to ramp up its manufacturing capacity for industrial shrink films and tarps.

In July 2026, Balcan commissioned a five-layer Bandera

AgriFuture line that will allow it to produce films at web width of 50 feet, a full 10-feet wider than what Balcan was able to produce previously. The line consists of five extruders and is equipped with internal bubble cooling and automatic gauge control. Balcan noted the system will produce films up to 12-mils thick.

By Jim Callari
Editorial Director



Balcan Innovations recently installed a five-layer Bandera blown film line to produce webs up to 50-feet wide for boat wraps, shrink tarps and other industrial applications. Pictured (l-r): Derek Lennox, chief commercial officer; Ron Cauchi, CEO; and Andre Desroches, COO. Source: Balcan Innovations

The new line is Balcan's second five-layer system from Bandera; it commissioned a five-layer Bandera Technoflex system in April 2026. These two lines join a number of multilayer blown film extrusion lines from Windmüller & Hölscher (W&H), as well as W&H printing and tubing equipment, and bagmaking machines from Lemo. The new equipment will be housed in Balcan's new 15,250-square-

feet plant expansion in Pleasant Prairie, which increased the overall footprint of the facility to 185,250 square feet.

significantly boost its U.S. capacity to support growth across its line of shrink films, shipping sacks and protective packaging for industries spanning chemical, building and construction, lawn and garden and beverage and chemical. "For Balcan Innovations, the industrial packaging segment is not an afterthought — it's our singular focus," notes Ron Cauchi, CEO.

Where the newest line is concerned, Balcan says the 50-foot wide web is among the largest film formats available for industrial packaging, and it allows the company to serve as a one-stop shop with a complete range of shrink film sizes for the market. The five-layer AgriFuture line also gives access to what Balcan describes as "advanced capabilities that strengthen the company's ability to incorporate flame-retardant and UV stabilizers seamlessly, as well as post-consumer recycled (PCR) resins, with tight process controls."

Notes Derek Lennox, Balcan Innovations' chief commercial officer: "Our boat wrap and shrink tarps have long been recognized in the building and construction and boating industries for their consistent quality and performance. This investment allows us to build on that success, further solidifying what's already widely regarded as an industry-leading solution."

This addition enhances production for a comprehensive range of XXL shrink films primarily used to wrap boats, scaffolding, modular homes and other major construction containment projects. "The boost in capacity, size parameters and technical capabilities will help us better support the growing demand for large format shrink wrapping," continues Lennox. "This truly positions Balcan as a single-source manufacturing partner capable of supporting our customers across all film sizes."

Balcan Innovations is a leading North American manufacturer of high-performance PE films, flexible packaging and reflective insulation with five brands at its core: Balcan Packaging, Plastixx FFS Technologies, NELMAR Security Packaging Systems, rFoil and Reflectix. Balcan Packaging was established nearly 60 years ago and from the outset has focused on high-performance polyethylene-based films and flexible packaging products for a wide range of industrial products.

Balcan Innovations has plants in Indiana (Markleville), Quebec (Montreal, Laval, Terrebonne, Drummondville), and Ontario (Etobicoke). 

foot plant expansion in Pleasant Prairie, which increased the overall footprint of the facility to 185,250 square feet.

Balcan Innovations' three-year, \$200 million investment will



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