



BLOW MOLDING

QUARTERLY

A Journal of the Blow Molding Division
of the Society of Plastics Engineers

First Quarter 2017
Volume 01 | Number 01

Awards for Graham Packaging's PET ThermoSet® Technology

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Competition Winners

The First Forty Years of PET

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Cover photograph courtesy of Graham Packaging Co., Lancaster, Pennsylvania.

Cal Becker



2017 Year of Change

Who wouldn't say 2017 will be a year of changes? Of course every year brings change, but what matters most is how we as individuals or groups manage our ever-changing environment. This year change will also impact our SPE Blow Molding Division. After two years as our Chairman, Jamie Pace has stepped down and I have the privilege to assume the Chair for 2017. The good news for us is that Jamie and our diverse 29-member board, as well as many division members, have us well prepared for 2017 and beyond.

Deborah, my wife, always says my communication style is "open kimono" - so here goes! Two of my five strengths are being "restorative" and an "activator." The Activator in me looks at the current talent on our board and within the blow mold division and this keeps me motivated and excited about the wealth of knowledge these individuals have to share with us! Please take advantage and tap into this great wealth of education, experience and knowledge by getting to know our board and Blow Mold members!

I'm super excited about the prospects for 2017 as we have nominated board members for Honored Service, Fellow, and have submitted to be considered for the "Communication and Pinnacle" awards given at the 75th ANTEC in Anaheim, CA. I'd be remiss if I didn't commend one of our long-time honored service members Mark Heitker as he has plans to enjoy retiring this year.

Over the past year plus we as a board team have held several strategic planning sessions moderated by Ron Puvak to address organizational change and to develop a clear and agreed upon Blow Molding mission statement. Indeed, the strategy session were masterfully conducted with the desire to accomplish something we all agreed upon and now have the opportunity to deliver to our members in the short and longer time frames. Our process is predicated on our division mission statement:

Promote, communicate and disseminate knowledge relating to the art and science of blow molding technology.

This may sound simplistic, but as volunteers, how do we plan to deliver on our mission as we all have "day jobs"? We have three strategic initiatives that support our mission statement and three board groups supporting the initiatives. End of the day these volunteers and team members are key to the division success:

Knowledge & Technology (KTG) focuses on education and training

Industry Engagement (IEG) focuses on Blow Molding events/sponsorship support

Communication & Networking (CNG) drives our SPE Blow Molding website

Along with the blow molding division being more focused through our new mission statement tenants, we also are launching this inaugural issue of Blow Molding Quarterly. Please help support us with submitting good technical content for this journal. It doesn't need to be new news in 2017 to say it wasn't good sound technical work worth re-reporting. Please submit technical topics you want to share with the blow molding community!

And finally, with much excitement looking to 2017, we have a new Blow Mold division scholarship generously pledged from W. Müller USA, Inc. (the "W. Müller Blow Molding Scholarship"). Müller USA has pledged to support this scholarship with an annual \$3,000 contribution!

Let's face it, where would we be without our division members, sponsors and student scholarships? Thank you all for your efforts, and for volunteering your valuable time. Please take a bow for your efforts and lend support to our new mission statement! ■

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Toray Industries does research with 3D blow molding machine by Kautex Maschinenbau

Heat-resistant polyphenylene sulphide (PPS) air ducts for Japanese market / Test of new applications in Toray technical center

Kautex Maschinenbau provides the Japanese corporation Toray Industries an extrusion blow molding machine type KBS20 for research and development purposes. Toray's own technical center in the factory in Nagoya is using the new Kautex machine to test the production of different 3D pipes using the so-called suction blow process. The focus here lies on the development of especially heat-resistant air ducts made from polyphenylene sulphide PPS.

A development partnership

Jürgen Moitzheim, Sales Director at Kautex Maschinenbau, is looking forward to working with the Japanese resins manufacturer. "The latest developments in combustion engines are once again creating challenges for automotive industry suppliers. This is especially true for the interplay between materials and engine technology. For this reason we like to work very closely together with our customers on the development of new solutions." This also convinced Toshiteru Nishijama, Manager for Automotive Products Business, Resins Global Marketing Dept. at Toray: "We were looking for a provider who not only produces good machines, offers high process reliability and good service, but who will also support us with their know-how in the R&D field. It became clear quite quickly that we would use a Kautex suction blow molding machine."

PPS for turbocharger

A current development trend in the automotive industry is the downsizing of car engines while at the same time increasing performance. In order to achieve this, turbochargers are installed which need especially heat-resistant ducts. Toray achieved very good results here with polyphenylene sulphide PPS. This plastic distinguishes itself with especially high and durable heat-resistance up to 220 degrees Celsius. Kautex machines have been able to process this material without problems for many years.

Low-waste blow molding

Since 1999, it has been possible to produce 3D molded



Suction blow KBS20 molding machine by Kautex Maschinebau

parts on Kautex machine type KBS which have numerous applications for pipes and tubes in the car industry. They are used as fuel filling pipes, intake air ducts, or cooling air ducts in modern combustion engines. 3D blow molding is an especially low-waste production method. In contrast to the conventional method, the parisons are molded into functional components without welds. Numerous applications for pipes and tubes in the car industry. They are used as fuel filling pipes, intake air ducts, or cooling air ducts in modern combustion engines.

3D blow molding is an especially low-waste production method. In contrast to the conventional method, the parisons are molded into functional components without welds.

Further advantages arise in the manufacture of 3D ducts when using the *suction blow molding method*. Here, the parison is drawn into the elongated cavity of a blow mold before the actual blow molding of the part. This allows the use of significantly simpler and consequently cheaper blow molding tools.

(Information for this article was supplied by Kautex Maschinenbau GmbH.)



What's in a name? A heck of a lot

By Don Loepp, *Plastics News*

I don't think the Society of the Plastics Industry Inc. needed to change its name. But I understand why it did, and I think the new name makes sense.

I'm not exactly excited about it, but that's OK. It's good enough at this point to say I'm a fan.

The new name, the Plastics Industry Association, is on point. That's great. When you re-brand something, whether it's an association, a company or a product, you don't want to confuse people.

The old name, SPI, was a little confusing, and the new one is more specific. SPI sounds a bit like a club that people join to learn about plastics. PIA — and let's deal with that acronym in a minute — is more like what someone would call a modern plastics industry trade association. People in the plastics industry will have to get used to not calling it "SPI." But the new name isn't really aimed at them. They'll adapt.

President and CEO Bill Carteaux says on Capital Hill, he wants the group to be referred to as "plastics." That makes sense — congressional staffers just need to know that this group represents the plastics industry. Hopefully that means it's an important group — representing the third-largest U.S. manufacturing sector, behind automotive and chemicals. Maybe the new name can help reinforce that message.

This is an important time for manufacturing. I don't say that lightly. I'm skeptical when others make claims like "this is a critical time in the country's history," or "this is the most important election in our lifetime." But for manufacturing, it's really true.

We've been through decades of upheaval as a result of

globalization, automation and advanced manufacturing. A few decades ago, a lot of people in Washington had the attitude that America was becoming a service economy. We didn't need to make things anymore. It was fine if those jobs all went to lower-cost places. And our country's economic policy reflected that. There was no manufacturing policy. Because our leaders, and all the experts, thought it was inevitable that everything — plastics, cars, steel — would be made somewhere else. But coming out of the Great Recession, manufacturing companies have won new respect. They're job creators. They're worth fighting for. Donald Trump won blue-collar votes in part because he wants to cut taxes and regulations on businesses. It's an opportunity for trade associations like the Plastics Industry Association.

But plastics, in particular, still face big challenges. Don't forget, a majority of California voters just approved a ban on single-use plastic bags. What other products may be banned? What other states will follow California's lead? Bags were an easy target for a lot of reasons I've written about before. But the vote is still a symptom of the plastics industry's persistent image problem.

A new name won't make people love plastics. But if it was that easy, it would have happened a long time ago. The industry still has a lot of work to do to help solve issues like marine litter. And even though "fracking" hasn't been a major topic of debate in Washington — remember what I said about the country being more manufacturing-friendly since the Great Recession — it's still lurking in the shadows. The U.S. plastics industry may be on the verge of an era of unprecedented growth, thanks to plentiful shale-gas feedstocks. But I expect all the plastics trade groups, including PIA and the American Chemistry Council, will face a battle sometime down the road to keep that momentum.

OK, I wrote it again, PIA. I tried to avoid it, but I couldn't. So let's cover that.

Carteaux was very specific that the group won't use that acronym. He prefers PLASTICS, in all capital letters, or the full name, Plastics Industry Association.

That's a good idea. Washington is an alphabet soup of trade groups. There are dozens in the big shiny office buildings on and around K Street. PIA would be an

Blow Molding In The News

ineffective identity for the plastics industry in Washington, just like SPI has been.

But it won't mean that others won't write and say "PIA." People will use the acronym anyway. I couldn't have written this column without it. It would have become awkward (always spelling out Plastics Industry Association) or weird (having PLASTICS in all caps scattered throughout the column).

No one asked me, but I think U.S. Plastics Industry Association would have been an even better name. Although the U.S. Private Investigators Association may have been unhappy with the plastics industry trying to hijack its acronym. And I suspect that we don't want a bunch of angry private investigators on our case. ■

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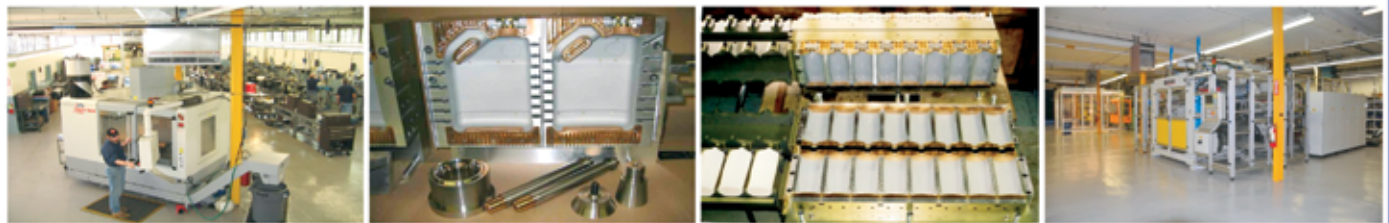
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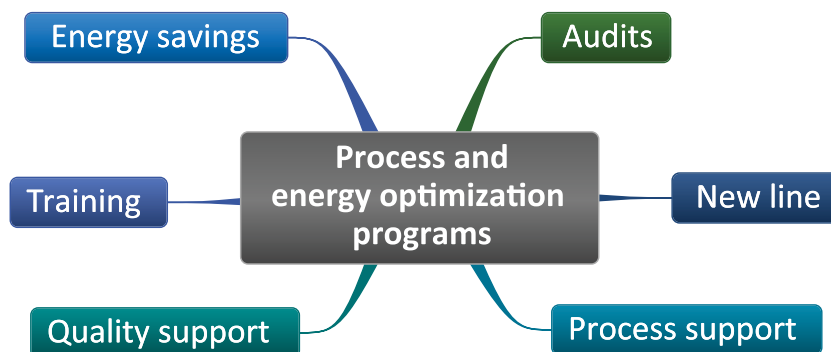
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S8/60-125 CoEx 6

The Importance of Your Scrap Reclamation System

"Reclaiming Blow Molder Scrap with Granulators" was originally presented at the 2014 Annual Blow Molding Conference in Chicago, IL. It has been edited for this publication.

Abstract:

Maximizing granulator performance can offer cost savings for virtually every processing application through greater energy efficiency, higher quality regrind and reduced maintenance. The need to maximize performance and efficiency is magnified in blow molding due to the relatively high percentage of scrap typical in blow molding applications. Granulators for the blow molding industry present unique challenges. Granulators must be able to process large, bulky, and relatively thin wall parts, as well as very hot and relatively thick flash. Critical design parameters that effect performance will be discussed. These parameters include the method of feeding including feed hopper design, cutting chamber and rotor design, drive design, and even regrind evacuation system design. Granulators beside blow molding machines tend to be large, loud and extremely inefficient. Sized to be able to accommodate the large parts, they have large feed openings which make them susceptible to greater noise levels and "fly-back" of regrind. Being able to reduce the size of the granulator and the rotor speed with newer technology can reduce capital costs, energy consumption, noise levels, footprint and more. A review of various applications will be examines with actual examples showing how granulator design affects efficiency. Integration of the granulator with the machine including feed conveyors and regrind evacuation systems will also be examined as part of a complete system to provide the most cost effective and efficient means of reclaiming valuable "scrap".

Scrap Recovery Challenges for Blow Molders

- High percentage of scrap per cycle plus a need for high quality regrind
- blending issues with non-uniform regrind
- Material not melting uniformly with non-uniform regrind
- Difficulty granulating both scrap parts and flash or preforms in the same unit

- Flash and preforms are thick and hot, requiring higher hp and cooling
- Scrap parts are thin wall and bulky, requiring a large cutting rotor
- Maintenance issues
- Large or older granulators may be difficult to change the knives
- Large or older granulators may be difficult to clean between material changes

What is High Quality Regrind?

- Bulk density of regrind, close to virgin material
- Clean cut edges; not ragged edges
- Consistency of regrind size
- Less fines



Figure 1. Virgin-actual part regrind

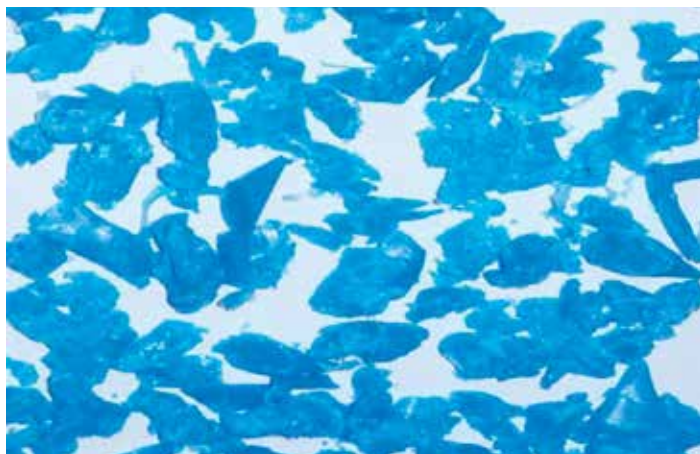


Figure 2. Good uniform quality regrind.

Quality Regrind depends on three parameters:

1. *Physical and mechanical properties of the material*
 - Brittle, energy impacting materials shatter upon knife impact and typically require less power
 - Soft, energy absorbing materials need to be cut and require higher power and sharp, minimally gapped knives.
2. *Operating conditions*
 - Material temperature – hot vs cold vs just right
 - Method of evacuation – gravity or suction by blower system
3. *Design of granulator*
 - Rotor design for minimal knife gape and airflow through cutting chamber
 - Drive design for high cutting force at lower rotor speeds
 - Cutting chamber design for processing bulky parts and quality regrind

Physical and mechanical properties of the material

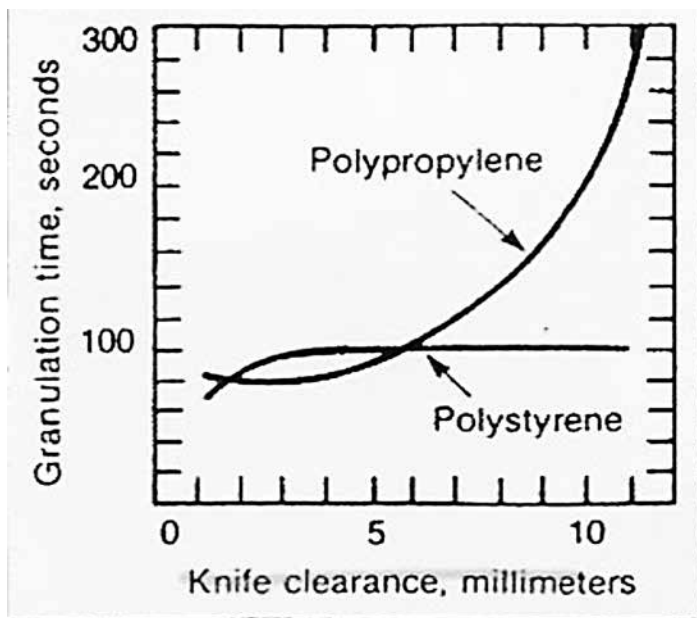


Figure 3. Time required for 75 percent granulation of 1 kilogram batches versus clearance of rotating and stationary knives, at 50 rpm and at 6.35 millimeter screen hole diameter. Source: *Plastics Engineering* Aug. 1984

Regrind test of brittle and soft materials

- Granulation time measured with increasing clearance between the rotating and the stationary knives.

- Small clearances critical for processing soft materials like PP which must be cut.

Rotor Design - Higher technology granulators feature adjustable rotating knives, as well as adjustable stationary knives

Advantages of Adjustable Rotating Knives:

1. Smallest gap possible between each and every knife, as each knife is set independently of the others.
2. Allows each knife to be sharpened individually with minimal material removed, providing longer knife life.
3. Constant cutting circle to the screen after sharpening, reducing screen hole plugging.

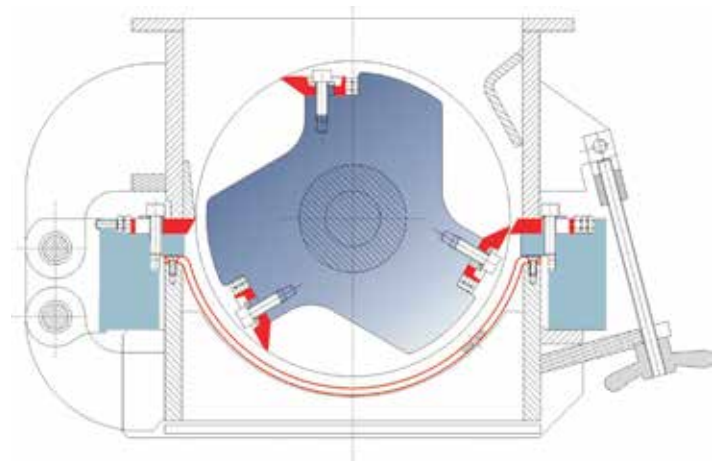


Figure 4. Rotor Design - Higher technology granulators feature adjustable rotating knives, as well as adjustable stationary knives.

Rotor Design - Open Versus Solid Staggered Rotors



Figure 5. Open rotors take bigger bites and allow for the most air flow through the cutting chamber.



Figure 6. A staggered style rotor is designed to nipple on thick cross-sectioned feedstock like flash, but restrict air flow.

Rotor Design – 3 and 5 blade rotors

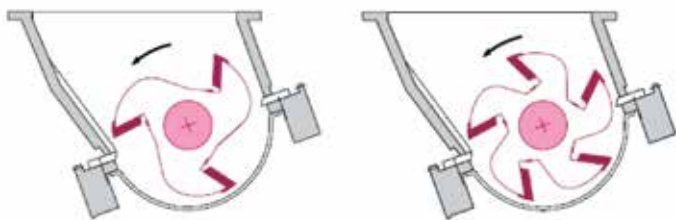


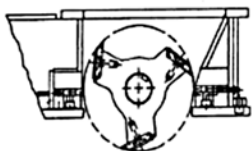
Figure 7. Three-blade rotor will take a larger bite – a five-blade rotor will nibble.

Rotor Design – open staggered rotors



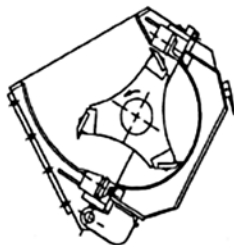
Figure 8. An open rotor with staggered knife design is most efficient for processing thick cross-sectioned and thermally hot feedstock.

Cutting Chamber Design – Straight drop vs Tangential



Straight Drop

Figure 9a. Straight Drop chamber takes smaller bites ideal for thick feedstock like flash, but bulky thin-walled scrap parts may “bounce” and not get ingested.



Tangential

Figure 9b. Tangential take bigger bites and are ideal for processing bulky, thin-wall parts, but may stall on thick flash without sufficient power.

Cutting Chamber Design – Position of the sizing screen

A screen positioned directly below the rotor will allow gravity to help draw regrind cut small enough through the screen.

Drive Design – Use of low rpm, high torque motors and extra flywheel

Use of low speed/high torque motors to reduce rotor speed without effecting tip force provides for:

- Higher quality regrind
- Lower sound levels
- Longer knife life
- Less flyback



Figure 10. Rotor shaft extended for additional flywheel for more inertia.

For more inertia a flywheel can be added:

- Greater inertia for energy absorbing materials and thick cross-sectioned parts like flash.
- Minimizes amperage spikes for energy efficiency and longer motor life.

Drive Design – Use of low rpm, high torque motors

Use of low speed/high torque motors to reduce rotor speed without effecting tip force.

- $T = (\text{hp} \times 5250) \text{ rpm}$

- Sample – 30hp, 1800 4-pole motor vs. 15hp, 900 rpm 8 –pole motor
- $T = (30 \times 5250)/1800 \rightarrow T = 87.5 \text{ Ft-Lbs.}$
- $T = (15 \times 5250)/900 \rightarrow T = 87.5 \text{ Ft-Lbs}$

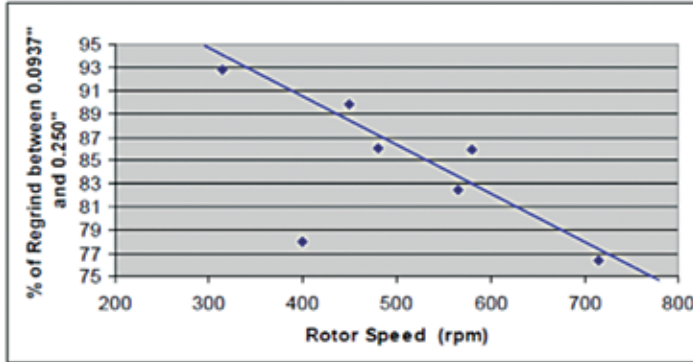


Figure 11. Plastics Product Review regrind test – uniformity of regrind vs. rotor speed.

- Sieve analysis - % of regrind captured by a 0.2500 and 0.1875 sieves
- Data from 7 different competitive models tested by Plastics Products Review
- Same approximate cutting circle (10") and chamber size (10" by 12")

Drive Design – Use of low rpm, high torque motors and extra flywheel

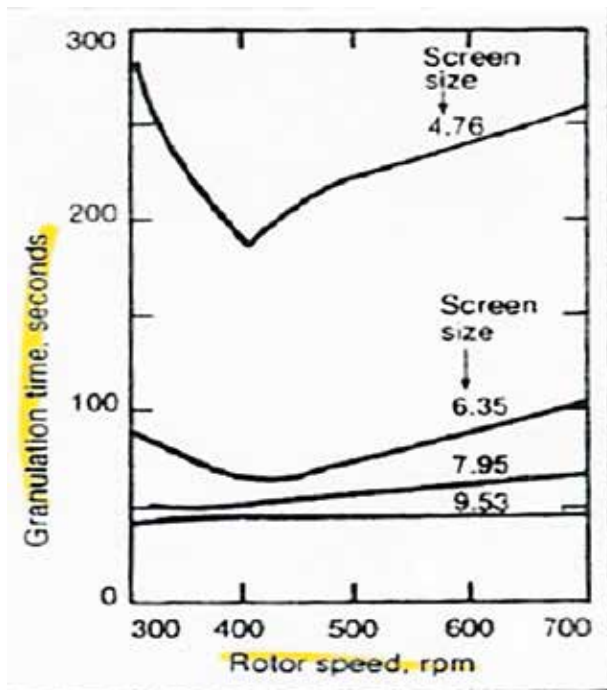


Figure 12. Time required for 75 percent granulation of 1 kilogram batches of polypropylene versus rotor speed.
Source: Plastics Engineering Aug. 1984

Regrind test of granulation time vs. rotor speed (see Figure 12). **NOTE: Rotor speeds higher than 400 rpm reduce throughput.**

Drive Design – Use of low rpm, high torque motors

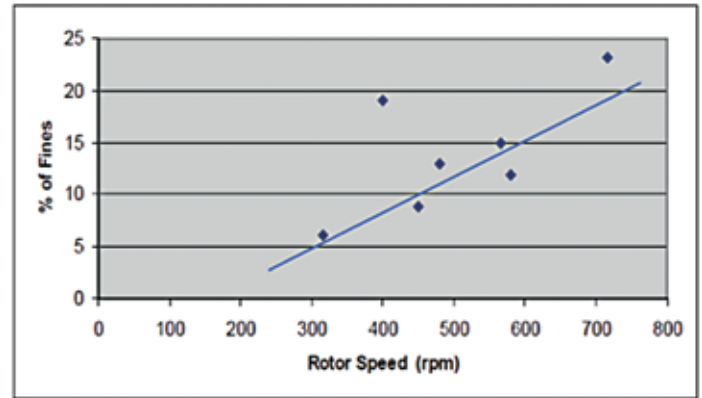


Figure 13. Plastics Product Review regrind test - % of fines vs. rotor speed.

- Sieve analysis - % of regrind that passed through a 0.0937" sieve
- Data from 7 different competitive models tested by Plastics Products Review
- Same approximate cutting circle (10") and chamber size (10" by 12")

Screen Design – for highest quality regrind

Screen with conical shaped holes to help minimize screen holes plugging with material.



Figure 14. Close-up view of conical hole design in screen.

Cutting Chamber/Knife Design – for fast, easy, accurate knife changes



Figure 15a. Checks to be sure that proper knife tip angle is maintained.



Figure 15b. Knife gap pre-adjustment fixture allows for knives to be gapped outside of the machine.

Pneumatic Evacuation and Fines Separation System



Figure 16. Fines separation system and electronic metal separation.

Granulator Options for Blow Molders – Auger Screw Ram System



Figure 17a. Large part pre-size reduction can be accomplished with augers.



Figure 17b. Large part pre-size reduction can be accomplished with augers.



Figure 17c. Large part pre-size reduction can be accomplished with augers.

Use of a feed conveyor provides for:

- Metered feeding with amperage control
- Scrap cooling
- Metal detection
- Conveyor with metal detector



Figure 20. A griding system with metered feeding with amperage control that allows for scrap cooling, metal detectors and metal detection.



Figure 18. Auger screw allows for smaller granulator with smaller cutting circle to be used.

Granulator options for Blow Molders – water cooling

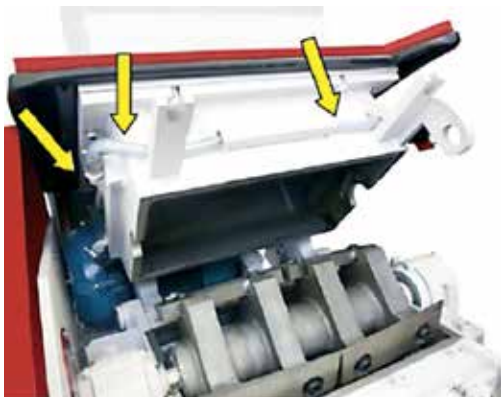


Figure 19. A water cooling jacket can help keep the cutting chamber cool when processing thermally hot feedstock.

Summary - Maximizing Scrap Recovery Efficiency with Granulators Having Higher Technology Features Can Save Money

Technology that provides for the highest quality of regrind:

Rotor design

- Adjustable rotating knives for tightest gap possible between each and every knife
- Open rotor for best airflow through the cutting chamber
- Knife gap pre-adjustment fixture to make it fast and easy to change the knives

Drive design for high cutting force at low speeds

- Low rpm/high torque motors
- Extra flywheel for greater inertia

Water cooling, conical shape holes for sizing screen

Cutting Chamber Design

- Tangential feed for processing bulky parts
- Positioning of the screen under the rotor ■

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The Total Package: Graham Packaging receives multiple awards for its PET jar technology

The ThermaSet® jars resolve multiple packaging challenges in one new product

Graham Packaging Company (Lancaster, PA) has received the industry's highest accolades for resolving multiple packaging challenges in one new product. The company's proprietary ThermaSet® Blow Molded PET Container for hot-fill, pasteurized food reduces breakage, downtime, shipping and waste throughout the supply chain, offering brand owners, fillers and retailers significant cost savings, while providing improved safety and handling to consumers. Graham Packaging has been awarded the DuPont Diamond Award for Packaging Innovation, as well as the 2016 AmeriStar award in the Shelf-Stable Food Category, for the comprehensive solution ThermaSet® provides to long-standing industry challenges. ThermaSet® also received 3 awards from the Society of Plastics Engineers during their 32nd Annual Blow Molding Conference parts competition in Atlanta, GA. for Excellence in Achievement for the Food Category and the People's Choice for Best Packaging Application Selection.

The substantial cost and energy savings potential starts with extreme light-weighting: 24oz ThermaSet® PET truck, and 28 percent fewer trucks on the road. Additionally, ThermaSet®'s shatter resistance means that breakage –



one of the largest sources of waste throughout the supply chain – is virtually eliminated. This ultra-lightweight, shatter resistant container is particularly well suited to the package and logistics requirements of club and drug stores, and the emerging E-commerce market.

A Simpler Way to the Shelf

The ThermaSet® blow molding process alters the molecular orientation of the PET resin, driving greatly enhanced performance into the blown container, including thermal stability above 300°F and 50 percent greater sidewall rigidity than standard PET, with a significant reduction in wall thickness from its glass equivalent. These improvements streamline the filler's manufacturing process. ThermaSet® allows the use of the traditional vacuum-sealed metal lug cap, instead of the more expensive composite closures and costly production line modifications normally required to use PET. In fact, ThermaSet® jars are typically compatible with existing manufacturing lines, eliminating the need for extensive capital investment or process changes which could impact product flavor. Since ThermaSet® is not at risk of thermal shock, there are potential benefits in manufacturing throughput, energy usage and product quality. ThermaSet® containers may be heated up and cooled down as quickly as possible in the filling and pasteurization process. "We are doing most of our work with ThermaSet® right now in hot fill & hold and pasteurized products," says Michael Reed, Business Director of ThermaSet® at Graham Packaging, "but the technology has been proven in retort as well and we intend to develop that market down the road." The logistics benefits are as clear as the jar itself: the lighter weight allows for more layers per pallet, and more pallets per truck when shipping; while the reduced wall thickness of the jar creates a narrower jar diameter,



allowing for more jars per layer. The exceptionally high clarity of ThermaSet® is a key factor in its ability to replace glass. "It's difficult to distinguish the plastic from the glass on the shelf," says Reed. The 24oz ThermaSet® jar employs a nanoscopic layer of silicon oxide, bonded to the polymer, to provide the extended shelf life required for pasta sauce.

The "Pop" Without the Mop

Retailers will also appreciate the new ThermaSet® technology. On the shelf, the reduced jar footprint of ThermaSet® translates into an additional facing every five feet, offering retailers more effective usage of valuable shelf space. The shatter resistant jar reduces safety risks, waste and cleanup time due to glass breakage. Lighter jars are more ergonomically friendly for stockers and shoppers alike. Most importantly, consumers will benefit. ThermaSet® PET jars are 100 percent recyclable, lightweight, easy to grip and safe for children. They open with the same satisfying, fresh "pop" that comes with a metal cap, and reduce waste throughout the supply chain. With these out-standing improvements in sustainability, consumers can feel confident in their food choices.

(Information for this article was supplied by Graham Packaging Company). ■

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Interferometric Measurements to measure Parison straws in process providing both cost and environmental benefits

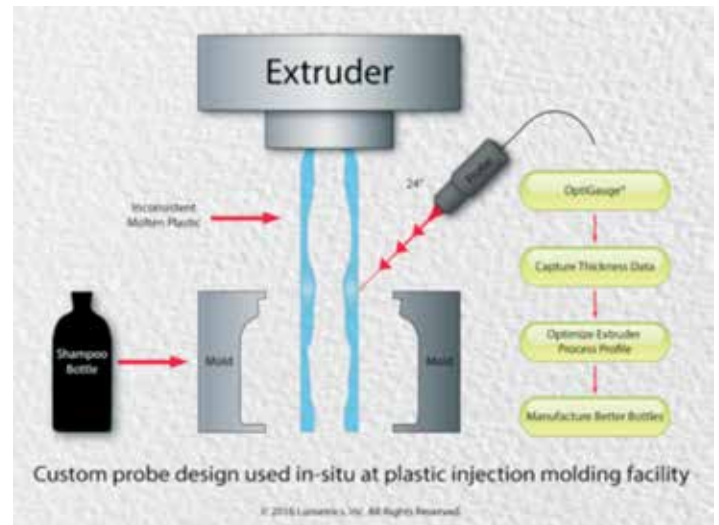
A large consumer products company, contacted Lumetrics and inquired whether the Lumetrics OptiGauge thickness measurement system may aid them in characterizing and quantifying certain physical parameters of extruded bottle blanks (parison). The parison to be measured in the molten state, just prior to blow molding HDPE in the range of 190°-210°C for extrusion blow molding and PET at ~90°-120°C for injection stretch blow molding.

Lumetrics designed a custom probe with a standoff distance of over two feet that could be mounted to allow in-situ wall thickness measurement of molten parison straw pre-formed plastic bottles just prior to the molding operation and the customer was able to obtain thickness data at discrete areas of the bottle and provide the needed thickness profile to generate their molding simulation to further understand the science behind their molding process and optimize their feed, pressure, and temperature profiles in their molding machine.

Customer benefits included:

- Cost & environmental benefits associated as a result of reduced use of plastic resins
- Reduction in problem resolution time for production and R&D issues through quantifiable, unambiguous and accurate measurements of critical parison dimensions.
- The ability to readily transport the entire system to various facilities to conduct on-line part analysis.

Lumetrics OptiGauge II is a non-contact, non-destructive thickness measurement system. The patented optical interferometric technology enables the measurement of absolute thickness of virtually any transparent or translucent materials that are of single or multi-layer configuration. The Lumetrics OptiGauge has been proven and implemented in R&D Labs, Quality departs, and in production environments. ■



Lumetrics Custom Probe



Lumetrics OptiGauge II

Sobieski premium brand Vodka converts from glass to a 'premiumized' PET bottle

Polish Vodka brand Sobieski is now marketing its 1.75-liter premium product in a lightweight polyethylene terephthalate (PET) bottle with engraving decoration and manufactured by Greiner Packaging GmbH via injection stretch blow molding.

The custom 1.75-L lightweight and shatterproof container delivers unique styling and consumer appeal and handling. Elegant, light, and reusable.

The Sobieski brand will also try to appeal to consumers with eye-catching plastic bottles made from PET in a sector where they have been rather uncommon so far.

Part of the Marie Brizard Wine & Spirits Group, Sobieski stands for first-class premium vodka. It enjoys great popularity, especially in North America, thanks to its purity and various flavors.

The bottle was especially conceived for the local market, where it should be a convincing alternative not just because of its highly valuable content, but also because of its look and practicality. As opposed to glass bottles,

the lightweight PET container delivers sustainability advantages, reduced shipping and transportation costs, and a reduced carbon footprint. In addition, the risk of breakage is reduced, consequently preventing potential product rejects. The containers are 1/10th the weight of glass bottles, unbreakable, and recyclable.

Günter Ausserwöger, sales director in Greiner's Kavo business, said: "The raw material and the modern production approach used ensure greater bottle transparency, thereby highlighting the engraving of the brand logo even better. The bottles now completely match our client's expectations to be a premium brand."



Information for this article was supplied by Greiner Packaging International GmbH ■

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P&G unveils first recyclable shampoo bottle made with 'beach plastic'

Beginning this summer, P&G will offer its Head & Shoulders shampoo in a limited-edition recyclable bottle made in part from material collected from plastic waste found on beaches.

By Anne Marie Mohan, Senior Editor, *Packaging World*

The Procter & Gamble Company has announced that its Head & Shoulders (H&S) shampoo brand will soon use the world's first recyclable shampoo bottle made from up to 25% recycled 'beach plastic.' In partnership with up-cycler TerraCycle and recycling and waste recovery company SUEZ, this innovation will come to France this summer as a limited-edition H&S bottle available to consumers

in Carrefour, one of the world's leading retailers. According to P&G, this will be the world's largest production run of recyclable bottles made with post-consumer recycled beach plastic, and a first major step in establishing a unique supply chain that involves the support of thousands of volunteers and hundreds of NGOs collecting plastic waste found on beaches.

"We felt that the leading shampoo brand in sales should lead in sustainability innovation and know that when we do this, it encourages the entire industry to do the same," says Lisa Jennings, Vice President, Head & Shoulders and Global Hair Care

Sustainability Leader, Procter & Gamble. "We've been



Photographer: Ferdi Rizkiyanto, 2011

fortunate to work with such great partners in TerraCycle and SUEZ to make this vision a reality."

Additionally, P&G announced that in Europe by the end of 2018, more than half a billion bottles per year will include up to 25% PCR plastic. This represents more than 90% of all the hair-care bottles sold in Europe across P&G's hair-care portfolio of flagship brands like Pantene and H&S.

The project will require a supply of 2,600 tons of recycled plastic every year—the same weight as eight fully loaded Boeing 747 jumbo jets. P&G has been using PCR plastic in packaging for more than 25 years, and P&G says the announcement of the new H&S bottle is an important step in the company's journey to meet their Corporate 2020 goal of doubling the tonnage of PCR plastic used in packaging.

According to the Ellen MacArthur Foundation (EMF), 95% of the value of plastic packaging material, worth \$80 billion to \$120 billion annually, is lost to the economy, and on the current track, there could be more plastics than fish in the ocean (by weight) by 2050 (The Ellen MacArthur Foundation, *The New Plastics Economy: Rethinking the future of Plastics* [2016]).

"At P&G, we believe that actions speak louder than words. The increased use of PCR plastic across our hair-care portfolio of brands demonstrates our continued commitment to driving real change," says Virginie Helias, Vice President of Global Sustainability, P&G. "The Head & Shoulders recyclable shampoo bottle made with beach plastic is a world's first in the hair-care category. Increasing the use of recycled plastic in the packaging of our flagship brands, like Pantene and Head & Shoulders, makes it



easier for consumers to choose more sustainable products, without any trade-offs. So while we're proud of what we've done and what we're doing, we know there is much more work ahead."

Notes Tom Szaky, CEO of TerraCycle, "This partnership represents an important step for TerraCycle. We are proud to be working with one of the world's largest brands to create a breakthrough product. Creating the world's first recyclable shampoo bottle with beach plastics is a start of an important journey. With the circular economy gaining more traction, we hope that other global brands will work with green suppliers and use their influence to drive change for the benefit of the environment."

Jean-Marc Boursier, Group Senior Executive VP in charge of Recycling & Recovery Europe for SUEZ, says, "This partnership between SUEZ, TerraCycle, and P&G represents an exciting step in the creation of a world first for consumers, a recyclable shampoo bottle made of beach plastics.

We hope that other organizations will continue to partner with different providers in order to deliver major environmental changes in this industry and hopefully across other industries too. With nine dedicated plastic facilities across Europe, Suez is already producing 170,000 tons of high-quality recycled polymers." ■

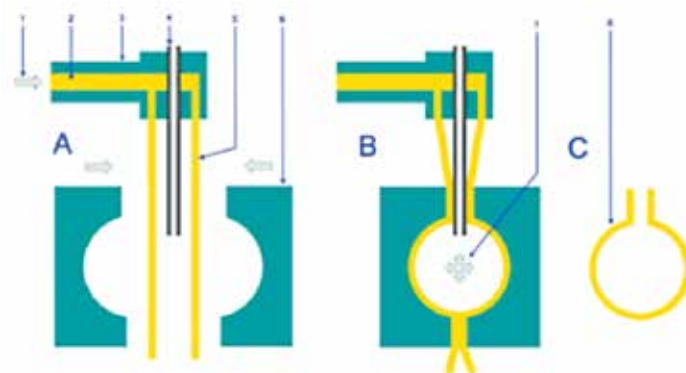
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BLOW MOLDING is a manufacturing process by which hollow plastic parts are formed. In general, there are four main types of blow molding: extrusion blow molding (EBM), injection blow molding (IBM), and injection reheat-stretch blow molding (RSBM) and an emerging technology is compression blow forming (CBF). The blow molding process begins with melting down the plastic and extruding or forming it into a parison (EBM) or in the case of IBM, (RSBM) and (CBF), a preform. The parison-preform is a tube-like piece of plastic with a hole in one end through which compressed air can pass.

The parison-preform is then clamped into a mold and high pressure air is blown into it. The air pressure then pushes/stretches the plastic out to match the cold molding surface and texture features. Once the plastic has cooled and hardened, the mold opens up and the hollow part is ejected.



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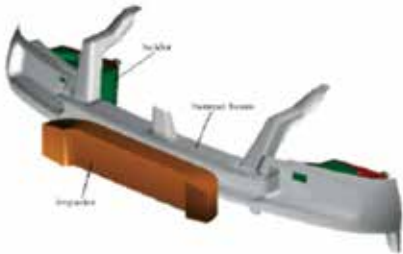
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ABC 2016 Student Design Competition Winners

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First Prize

Bumper with Tackoffs by Lindsey Gatesman



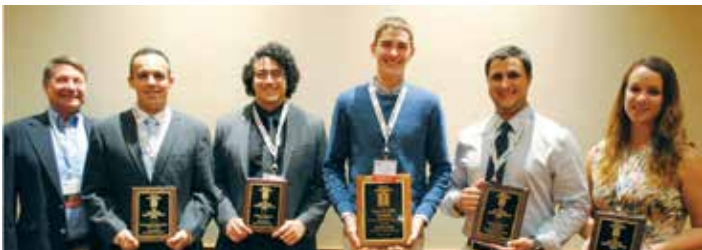
Second Prize

Cornhole Board by Casey Baran



Third Prize

Customizable Trophies by Bryce Reeves and Charles Buckley



Left to right: Mark Heitker, SPE Education Committee; Charles Buckley and Bryce Reeves, University of Florida - 3rd place 2016 Student Design Competition; Seth Cook, Pennsylvania College of Technology – 2016 Carrie Fox Solin Memorial Scholarship recipient; Casey Baran, Penn State Erie, The Behrend College - 2nd place 2016 Student Design Competition; Lindsey Gatesman, Penn State Erie, The Behrend College - 1st place 2016 Student Design Competition.

2016 Carrie Fox Solin Memorial Scholarship Awarded

Seth Cook has been awarded the SPE Blow Molding Division's 2016 Carrie Fox Solin Memorial Scholarship in the amount of \$3000. He was chosen for this award by the division's scholarship selection committee based on his outstanding record of academic and extracurricular achievements.

Seth is a senior at the Pennsylvania College of Technology in Williamsport, PA, where he has a 4.0 grade point average. He expects to graduate in May 2017 with a Bachelor of Science in Plastics and Polymers Engineering Technology and a minor in Mathematics. He previously earned an Associate Degree in Plastics and Polymers Technology at Penn College.

During the past two summers, he interned at Key Plastics and York Imperial Plastics. Seth also serves as mentor for freshmen in the plastics program at Penn College. Upon graduation, Seth plans to obtain a job in the plastics field where he can improve upon processing methods and, therefore, produce higher levels of automation. Upon notification of his scholarship award, he replied, "My success is a product of my own hard work combined with the help of my family, friends, teachers, co-workers, and those who so generously have supported me at SPE. I sincerely thank these parties for their continued support and, hopefully, one day I will be in a position to return the favors that I have received."

The Society of Plastics Engineers is an organization dedicated to promoting the scientific and educational aspects of the plastics engineering profession, and the Blow Molding Division provides a forum for the promotion and dissemination of information relating to blow molding technology.

The Blow Molding Division of the Society of Plastics Engineers awards its annual Memorial Scholarship(s) to selected students enrolled in plastics engineering programs. Since inception of the scholarship program, the SPE Blow Molding Division has awarded \$263,500 to 40 students enrolled in programs that include curriculum pertaining to blow molding. Seth is the fourth Penn College of Technology student to receive a SPE Blow Molding Division scholarship.



2016 Carrie Fox Solin Memorial Scholarship winner Seth Cook with advisor Mark Heitker.

The Blow Molding Division's scholarships and other educational support programs are funded with the income from a \$216,000 Grand Fund endowment that has grown over time with the support of the division's sponsors.

The value of the division's scholarships is up to \$6000. Funds are distributed in two disbursements over a two-year period, usually during the junior and senior terms. If the recipient is a senior, a \$3000 award is made. The award recipients are recognized at the SPE Annual Blow Molding Conference (ABC). A travel allowance is provided.

Qualifications for the scholarship are as follows:

1. The student must be enrolled full-time in a degreed undergraduate plastics engineering program.
2. The student should be completing the second year of a four-year program.
3. The student will have at least a 2.5 overall grade point average (4.0 scale).
4. The student must be a member of a SPE Student Chapter.
5. The applicant will submit a brief essay with their application describing the importance of blow molding to the technical parts and packaging industry.

We seek students who plan to make a career in plastics engineering (a sincere interest in the Blow Molding industry is a plus). We request that qualifying students submit an application by following the instructions and completing the appropriate forms for the Blow Molding Division Memorial Scholarships at blowmoldingdivision.org/scholarships. ■

New scholarship award available

The SPE Blow Molding Division announces a new annual scholarship for 2017, named the W. Müller Blow Molding Scholarship. W. MÜLLER USA, Inc. has pledged to support this scholarship with an annual \$3000 contribution.



The Blow Molding Division of the Society of Plastics Engineers awards two annual scholarships to selected students enrolled in Plastics Engineering programs. The SPE is an organization dedicated to promoting the scientific and educational aspects of the plastics engineering profession. The Blow Molding Division provides a forum to promote, communicate and disseminate knowledge relating to the Art and Science of Blow Molding technology.

The value of the scholarships is \$3,000. The award recipient will be recognized at the SPE Annual Blow Molding Conference. A travel allowance for the recipient to attend the conference is available.

Qualifications for the scholarship are as follows:

1. The student must be enrolled full-time in a degreed undergraduate plastics engineering or plastic engineering technology program.
2. The student will have at least a 2.5 overall grade-point average (4.0 scale).
3. The student must be a member of an SPE Student Chapter.
4. The applicant will submit a brief essay with their application describing the importance of blow molding to the technical parts and packaging industry.

We seek students who plan to make a career in plastics engineering (a sincere interest in the Blow Molding industry is a plus). We request that qualifying students submit an application by following the instructions and completing the appropriate forms for the Blow Molding Division Memorial Scholarships at the SPE Foundation website blowmoldingdivision.org/scholarships. ■

Need help with your technical school or college expenses?

If you or someone you know is working towards a career in the plastics industry, let the Blow Molding Division help support those education goals. So far, this Division has awarded more than \$260,000 in scholarships for 40 deserving students while pursuing undergraduate degrees in the plastics program.

Here is a partial list of schools and colleges whose students have benefited from the Blow Molding Division Scholarship Program:

- Ferris State University
- Penn College of Technology
- Pittsburg State
- Penn State Erie
- Shawnee State University
- University of Massachusetts Lowell
- Western Washington University

Two scholarships worth \$3,000 awarded annually to the deserving student(s).

Start by completing
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Student Design Contest Encouragement

To promote interest in Blow Molding applications, SPE Blow Molding Division encourages students to think outside the box and work on a project which deserves accolades.

Each year, 3 winning design entries will be offered a prize worth up to \$1,000 as well as travel/hotel expenses to participate at the Annual SPE Blow Molding Conference.

Students are given a chance to promote their project work as a poster demonstration to the attendees!

For further details, visit:
www.blowmoldingdivision.org

Educational Grants

The SPE Blow Molding Division continues to support all educational institutions seeking funding for the purchase of blow molding machinery, equipment, tooling, controls or educational training resources to benefit students.

For further details, visit:
www.blowmoldingdivision.org

Not so serious Corner



I went fishing this morning, but after a short time I ran out of worms. Then I saw a cottonmouth snake with a frog in its mouth. Frogs are good bass bait.

Knowing the snake couldn't bite me with the frog in its mouth, I grabbed the snake right behind the head, took the frog out of his mouth and put it in my bait basket.

Now the dilemma was how to release the snake without getting bit. So, I grabbed my bottle of whiskey and poured a little in its mouth. Its eyes rolled back and it went limp. I released the snake into the lake without incident and carried on fishing using the frog as bait.

Not long after, I felt a nudge on my foot. It was that darn snake . . . with two more frogs! LIFE IS GOOD. ■

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The First Forty Years

It might be celebrating its ruby anniversary, but PET has only just begun. Dan Weissmann looks back at the history of the versatile polymer.

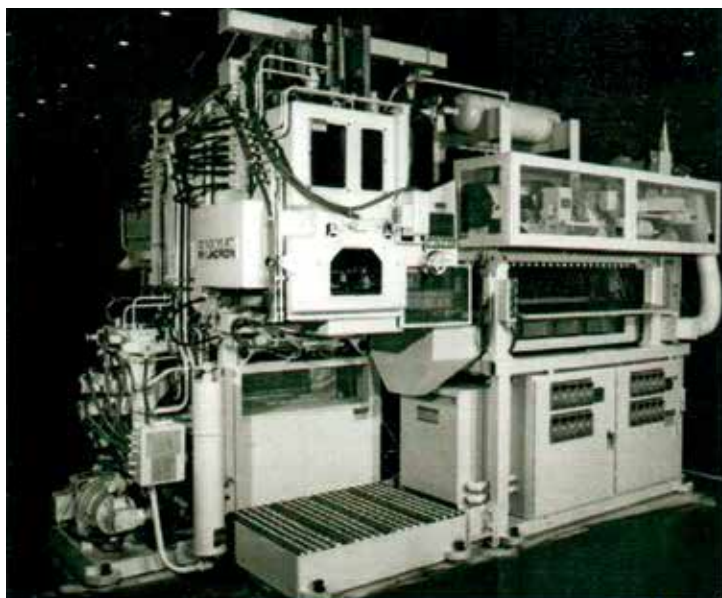
This article reproduced here with the kind permission of Plastics in Packaging magazine.

More than 500 billion PET containers of every size and shape made yearly; 24 million tons of resin production; from 30% (US) up to 85% (China) collection rates for recycling; bottle to bottle recycling streams; thermoformed

containers from both virgin and PCR; bio-based PET development; enhanced barrier; It is hard to imagine that just 40 years ago none of this existed.

The fact that PET bottles were not the first commercial plastic beverage bottle does not diminish their success in changing the landscape of the entire packaging world. Being first belongs to the Coca Cola "Easy Goer" bottles. Those "Cycle Safe" bottles, made of ANS, and manufactured by Monsanto, are now relegated to just a footnote in history.

First PET production bottles came off the Amoco line in the Seymour Indiana plant in 1976. Right on the heels of Amoco were Continental Can (CCC), Hoover Universal and O-I. By the middle of 1977 all were in commercial operation



Above: Cincinnati Milacron's first offering was RMB-V. Above right: The BAB4 by Glidemeister Corpoplast was installed by Owens-Illinois in the U.S. in 1977.

Below: A present-day KH InnoPET Biomax Series IV stretch blow moulder reached outputs of more than 60,000 bottles per hour.



and rushing to build new plants as fast as possible.

PET blow molding becoming a reality started with DuPont's Nathaniel Wyeth and Ronald Reseveare work culminating in the patents issued in 1973. Pepsi buying into the PET bottle and the successful molding of a heavy wall preform at Broadway Mold were critical junctures leading to the creation of commercial scale manufacturing.

Cincinnati Milacron in the US and Gildemeister Corpoplast in Germany embarked on developing reheat blow molding machines. C-M first offering was the RHB-V while Corpoplast was the RAB4. All except O-I, which was working with Corpoplast, were using the C-M machines. C-M and Corpoplast eventually also offered preform injection molding systems.

Being able to mold heavy wall, about 4 mm, preforms was a major turning point in processing PET and establishing the process the way it is known today. Luckily, Goodyear identified a resin grade which provided molding window wide enough without the material crystallizing, which would have precluded blowing. Previous attempts at preforms were through the use of extruded tube pinched at one end and a compression molded finish on the other, all in the effort to avoid crystallization.

When preforms are produced in 192 cavities molds at sub 10 second cycle, yielding more than 1.5 million preforms per day off a single machine, it may be hard to believe that back in 1976/77 the "work horse" was the Broadway P-8, eight cavities mold, running at 30+ second cycle, molding 67 grams preforms for the only commercial bottle - 64 oz. Pepsi Cola. Broadway and its' sister company Encon became the main supplier of preforms. It took some years before the 16 cavities mold started to emerge.

Achievements and growth of the industry are as striking in blow molding. From 2400 and 2500 bottles per hour of the first models, RHB-V and RAB4, today's machine output

reaches more than 60,000 per hour.

Both machines had four cavities, running at 6 seconds cycle, unbelievably long in comparison with today's 1.5 second. While it took almost 3 minutes to heat the preforms, today's ovens do it in less than 15 seconds. All accomplished through continuing development in all aspect of the technology and advances in engineering and design methods. An interesting aside is that some RHB-Vs operated into the 21st century.

All bottles other than those produced by CCC had an added base cup. CCC produced, from the start, what came to be known as the one piece bottle. Those were not received well by customers forcing CCC to revert base cup design. Those were eventually eliminated from all bottles.

In all cases the PET weight was 67 grams, about one tenth of the weight of the glass bottle. Offering the same clarity as glass, bottles were shatterproof making them safer – in the hand of the customers as well as while in the filling and distribution systems.



PET bottles through the ages, including the iconic Coca-Cola 'Easy Goer' bottles of the early 70s.

Although new capacity in those early days was dedicated to CSD directed to Pepsi, other companies followed, especially Coca Cola which lost the supply of the Monsanto bottles, when their production stopped at the end of 1976. Hence the growth of the new PET bottles was assured.

Recognizing that the beverage world is more than just CSD, developments were underway by the early 1980's to make PET bottles which withstand hot filling conditions typical of juice. This technology came from the Japanese company Yoshino.

While the use of PET bottles were not permitted in Japan early on, Yoshino set up shop in the US, first to master PET technology and secondly seeding commercial relations with eventual customers. Yoshino and Monsanto enjoyed

a relationship which started when Yoshino became a licensee of Plax, the pioneering blow molding company, later owned by Monsanto. Both were experimenting, independently, with raising PET bottles filling temperature through heat setting. The Yoshino technology of using a single mold prevailed. Yoshino started to supply hot fillable bottles in 1982. Monsanto commercialized the technology in the US, using a Yoshino built line in early 1985 making bottles for Ocean Spray. Yoshino also developed the crystallized neck technology to achieve thermal stability of the finish and later the Double Blow technology, which farther raised thermal and physical stability through a relaxation step between two blowing sequences.

From the humble rate of 2000 bottle per hour, off the six cavity blow system, back in 1985, today's production rate for hot fill bottles is in the tens of thousands per hour. Designs evolved from the familiar six sided vacuum panels to bottles without any visible vacuum features. Plastic caps which successfully handle the vacuum replaced the metal caps used initially.

The breath of performance developed made PET adoptable for almost any application in ever more demanding shapes and appearance. Barrier enhancing through co-injection and scavengers started to emerge in the mid 1980's, and followed up by barrier coatings, farther extending PET performance reach. Today PET containers can be found anywhere liquids are packaged as well as in many solids packaging in food, beverages, household, beauty and health, and industrial chemicals and pharmaceuticals. Preform wall thickness limitation were overcome so bottles as large as 25 liter can be blown. Optimization of design, materials and processes made

it possible to reduce material content so that the 64 oz. bottles of 1976 is now a 2 liter bottle weighing less than 50 grams. In other applications material use dropped by more than 50% so 0.5 liter water bottle weighs in at about 10 grams. Recycling technologies reconstitute PCR to property level of virgin resins.

The phenomenal growth of PET is a testimonial not only to marketing but more importantly to technology. It's future is limited only by the readiness of companies and their people to dream and try.

About the author

Dan Weissmann joined Monsanto in 1973 and was there during the period that the company supplied Coca-Cola with the Easy Goer bottle. Following the end of production in 1976, Weissmann joined CCC (Continental Can Co.) and started production of the company's first plant in Pine Brook, New Jersey (which later became Apple Container, owned by Coca-Cola New York and eventually by JCI, which eventually became Schmalbach-Lubeca and then Amcor).

JCI bought Hoover Universal, which included the PET bottle business and the Uniloy machine business.

Back at Monsanto in 1984, Weissmann was involved with the production of the heat-set bottle for Ocean Spray in 1985 and collaborated with White Cap during the development of the VHS cap for hot-fill bottles. The heat-set business was sold to JCI in 1988.

Weissmann was at JCI (Schmalbach-Lubeca) from 1994 to 1998 and again from 2004 to 2006 (Amcor). ■

Have an idea for an article?

Submission Guidelines

- We are a technical journal. We strive for objective, technical articles that help advance our readers' understanding of thermoforming (process, tooling, machinery, ancillary services); in other words, no commercials.

- Article length:1,000 - 2,000 words. Look to past articles for guidance.
 - Format: .doc or .docx Artwork: hi-res images are encouraged (300 dpi) with appropriate credits.
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Awards and Recognition

The SPE Blow Molding Division is proud to announce the

2016 Lifetime Achievement Award Recipient

Robert Jackson

President of Jackson Machinery, Inc.

The Blow Molding Division's Lifetime Achievement Award, the Division's highest award, is bestowed upon an individual who has demonstrated outstanding achievements and contributions to the business, science and technical engineering aspects in the field of blow molding.

The honoree is selected by the Blow Molding Division's Board of Directors from nominees sponsored by the members of the Society of Plastics Engineers.

In 1968, Bob began working for Peninsular Machinery in Detroit, MI. Peninsular sold metal working tools and plastic processing equipment in the outstate region of Michigan.

Bob joined the society of Plastic Engineers, (which by the way was founded in Detroit, MI) and in 1970 began going through the chairs of the mid Michigan Chapter of the SPE and later became president.

Bob attended General Motors Institute for plastic processing and subsequently went to work for the Beloit Corp., Plastic Machinery division, as the Product Manager for structural foam. He later became lead salesman for their injection molding group and managed to garner the largest single order for Beloit from Fisher Body.

Bob then moved on to become the youngest sales manager in the US for Farrel Injection molding machines. Two of his men were competing for the number one position in 1978. One of the men was covering GM the other Ford. The GM guy was going to win for sure. He had booked 14 million dollars. The other fellow who was normally number 1 or 2 stopped in Bob's office and said not to worry, I got it in the bag. Two weeks later he booked Farrels largest single order for 15.1 million dollars.

Shortly thereafter Bob decided to become an entrepreneur and get out of the plastic industry. This adventure lasted about one year and Bob returned to Hayssen Manufacturing as the Plastic Machinery Blow Molding

Manager. At this point he joined the Blow Molding Division of the SPE and went through the chairs and became president.

In 1986 Bob started Jackson Machinery, Inc. (JMI) in Port Washington, Wisconsin and for the next 30 years JMI manufactured new blow molding machinery, building large accumulator head machines called Fleximatics, and smaller bottle machines called versa-matics. As well as refurbishing used blow molding machines. They build special designs for thermo set blow molders and specialty products as necessary, including one of the first electric machines in the industry.

JMI continues to innovate and recently has designed and built an 11-foot tall, extremely large platen machine for kayaks. JMI continues to grow and has become the exclusive North American agent for Hesta Blow Molding Machines, including both electric and hydraulic blow molding machines to complete in today's market.

Bob is a member of: the Society of Plastic Engineers (received the SPE Honored Service Award); Society of the Plastics Industry and Plastic Pioneers Association. ■



Chairman Jamie Pace presenting the Lifetime Achievement Award to Bob and Sharon Jackson at the Blow Molding Division's 2016 Annual Blow Molding Conference..

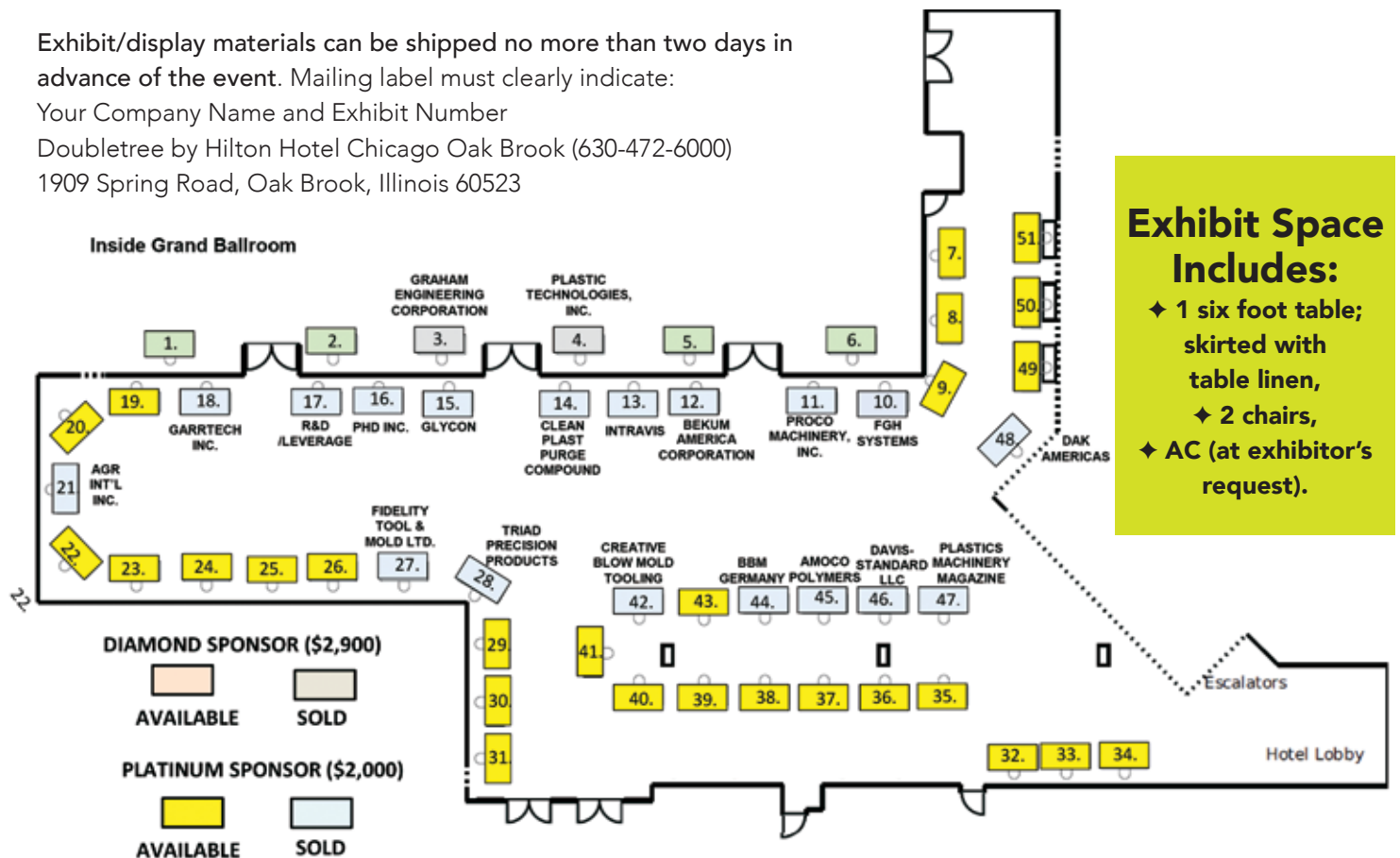
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2016 Blow Molding Conference 4th Annual Parts Competition

ThermaSet® PET Pasta Sauce Jars

Food Category – First Place

Packaging Division – First Place

People's Choice Packaging

Submitted by Mark Schneider, David Brooks

Company: Graham Packaging Company



Windigo Sign Base and Frame

Industrial Other Category – First Place

Industrial Division – Second Place

People's Choice Industrial

Submitted by Geoff Ward

Company: Agri-Industrial Plastics Company



WD-40 Trigger 24oz

Packaging Other – First Place

Packaging Division – Third Place

Submitted by: Rusty Heise

Company: Heise Industries, Inc.



Clasper™ Bottle

Beverage Category – First Place

Packaging Division – Second Place

Submitted by: Scott Steele/Alex Gardner, Zenith

Beverages, LLC

Company: Plastics Technologies., Inc.



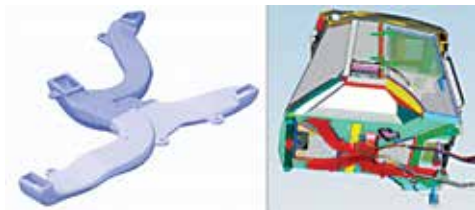
1000ml leurX Drainage Bottle

Pharmaceutical Category – First Place

Packaging Division – Second Place

Submitted by: Eric Hohmann, FGH Systems

Company: FGH Systems



Under Floor Insulated HVAC Duct

Industrial Automotive/Trans Category – First Place

Industrial Division – First Place

Submitted by: Kenneth Carter, John Deere

Company: Gemini Group, Regency Plastics



200ml IBM Bottle

Food Category – Second Place

Submitted by: Surendra Agarwal LLC

Company: Creative Group of Industries



Dura-Lite Dairy Gallon

Beverage Category – Second Place

Submitted by: Jon Manderfield

Company: Consolidated Container Company



325/11oz Pop & Bottle Cold Brew Coffee

Beverage Category – Third Place

Submitted by: Heidi Amsler, Amsler Equipment, Inc.

Company: Salbro Bottle



25oz Seventh Generation PET Dish Liquid

Packaging Other Category – Second Place

Submitted by: Jon Manderfield, Studio oPKG

Company: Consolidated Container Company



500gm White Star Colonial Whiskey Distilling Yeast

Packaging Other Category – Third Place

Submitted by: Heidi Amsler, Amsler Equipment, Inc.

Company: Salbro Bottles ■

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Greetings

The financial results for 2016 for the society were negative as expected. There has been a good amount of investment last year for the website, internet tools, and staff. You probably also noticed an increase in the membership dues which is needed to help close the gaps.

It was announced during our December conference call that the Executive Director, Wim DeVos would be stepping down. Wim has committed to stay on and assist with the search for the new director. It is hoped to have this resolved by the time of ANTEC. The search team is looking for viable candidates. If you know someone that you think would be interested, now is the time to get them to push their name forward. You can contact me for more information.

There was a very good upgrade on the membership database last year. Our division report now shows where all of the members are and who is renewing. Hopefully we can use this to keep in better touch with you.

Scott Steele



You may have also heard about the rewrite of the bylaws that took place in 2016. I was one of the proponents to simplify the volunteer side of the organization. While Council has ultimate control on who is elected, a smaller group of 9 volunteers are able to make most decisions to run the society. We believe this will improve our operations and faced with a shrinking volunteer base, it was necessary to make some change to streamline.

There is a renewed effort to rework ANTEC. We have seen a fall off of attendance and papers over the years and the quality of the event is not what it once was. A group of concerned councilors are pushing to change this. We have committed our division to support the effort. Likewise there is another overhaul of the Pinnacle Award taking place – this is the standard used by divisions to gauge our performance. We have been at the highest level most years that I have been on the board – and we intend to stay there. ■

Scott Steele



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SPE Journal of Blow Molding Quarterly is published four times annually as an informational and educational bulletin to the members of the Society of Plastics Engineers, Blow Molding Division, and the blow molding industry.

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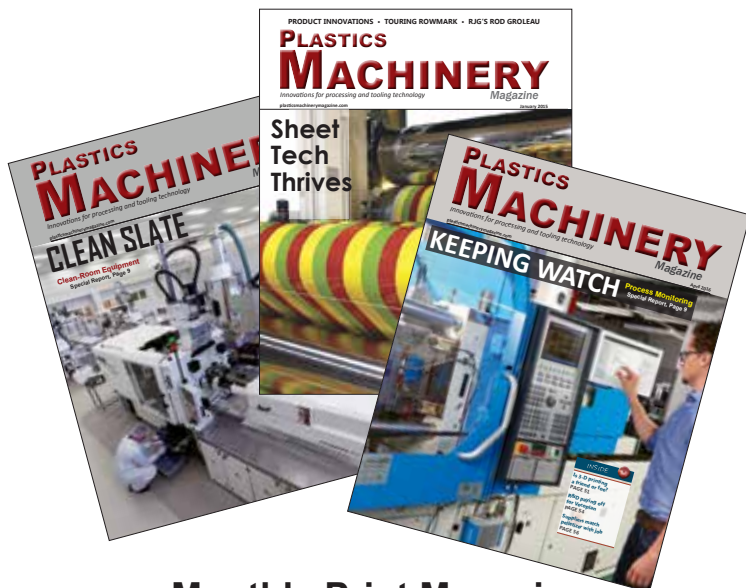
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Where do our polymers come from?

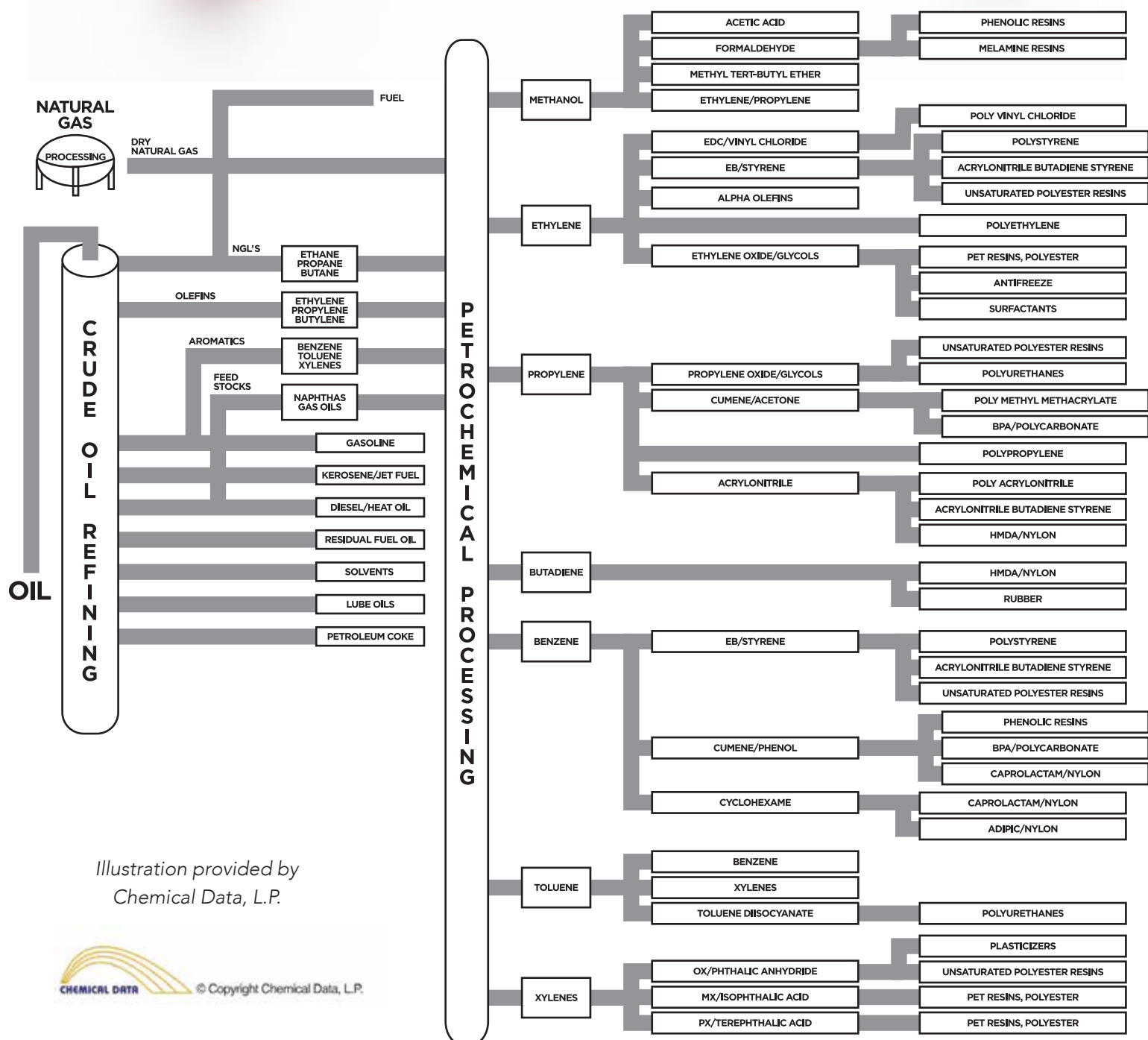


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