By Bruce Meyer
Rubber & Plastics News Staff

GRANGER, Ind.—“Mutually beneficial” is often an overused phrase. But for QPoly L.L.C., establishing itself as its own company has provided a brand for Specialty Products as its best customers—who Shaul said identified Specialty Products as its best mixer—to try its hand at FKM compounds.

QPoly saw an opportunity to add in a product that uses carbon black room for its conductive applications is completely white, Shaul said, because of its focus on silicone. Its operation is completely white, Shaul said, adding in a product that uses carbon black didn’t fit its vision. However, when the customer came back, sat down and outlined its problem for Specialty, the firm agreed to take on the production.

Shaul said to keep the FKM business separate from the silicone side, the firm dedicated a portion of its carbon black room for its conductive products to mix the FKM compounds. “It was a combination of their support and input, plus the suppliers that we had,” Shaul said. “We reached out to some of the FKM suppliers, their technical services, to get the right product for them.”

The success led to some organic interest. “The biggest benefit has been in marketing. We now have a brand name in QPoly that is an FKM mixer. This is what we do day in and day out now. It’s our specialty.”

“Where we’re a dedicated polymer mixer with a real focus on customer service and helping the small and medium customers that aren’t necessarily buying truckload quantities.”

Shaul had worked at Specialty Products for about 11 years, starting as a process engineer. About the same time he started with the company, it was approached by one of its customers—who Shaul said identified Specialty Products as its best

Small mixers think big
Elite finds its niche in rubber industry

By Chris Sweeney
Rubber & Plastics News Staff

RIPLEY, Miss.—After spending more than 15 years in the rubber industry, Steve Glidewell came to a point in his life and career in the early 2000s where he got the entrepreneurial urge.

He had worked for Dana Inc. from 1986 to 2002 and he wanted to start his own company. “I like to tell people I reached that magic age of 39 where I was still stupid enough to start a company,” Glidewell said. “I feel if I had waited too much longer I probably wouldn’t have had the guts to do that.”

So he formed Elite Elastomers Inc. and things have grown from there. Fast forward to 2019, and Elite Elastomers boasts four buildings at its headquarters site in Ripley. That includes the main mixing facility, along with a warehouse for raw materials, as Elite’s main business is as a custom mixer focusing on higher-end compounds.

Adjacent to that is a standalone research and development center, and two separate plants (only one that currently is being used) for the Engineered Products business established in 2016.

In addition, last fall’s purchase of Wayne County Rubber brought Elite Elastomers a second mixing location in Wooster, Ohio. The operation was renamed Elite Elastomers of Ohio.

All told, Elite employs 50 in Ripley and another 20 in Ohio.

Coming home
It took Glidewell a bit of time deciding where to locate Elite after the company was incorporated. He had worked about a decade in Paragould, Ark., at what was then Dana’s Industrial Products Division. He liked the area and there were people wanting to help him get started, but there

Smooth spinoff leads to success for QPoly

By Kylie Brown
Rubber & Plastics News Staff

CUERNAVACA, Mexico—Bridgestone de Mexico S.A. de C.V. will be expanding manufacturing capabilities in Mexico with an investment up to $100 million during the next two years.

The investment will add manufacturing space to accommodate new tire assembly machines, material handling systems, curing presses and associated equipment at the company’s Cuernavaca car and light truck tire plant, according to a company spokesman.

The expansion will enable the 36-year-old plant to consolidate its installed capacity, in addition to increasing that capacity by 3,000 tires per day, serving original equipment manufacturers and local market clients as well as exports, the spokesman said.

The plant has an installed capacity of about 25,000 tires per day, Bridgestone said.

The project also will enable Cuernavaca to meet the growing demand for high value added tires, including run-flats, as well as further improve quality and productivity while developing and implementing new processes and technologies, he said.

“In addition to its critical and strategic role in the Bridgestone Americas manufacturing group, the Cuernavaca plant is one of the most important industrial employers in the state of Morelos, Mexico, employing more than 1,000 workers,” the spokesman said. The company did not comment on the expansion’s effect on employment.

Bridgestone operates two plants in Mexico, including its Monterey plant opened in 2007, which produces car and light truck tires, predominately for export.

In 2008-09, Bridgestone invested $90 million in the Cuernavaca plant to expand capacity for ultra-high-performance tires.
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AIRBOSS OF AMERICA CORP.
Tenneco names spinoff Driv Inc.

By Lindsay Chappell

LAKE FOREST, Ill.—The $6 billion-plus spinoff of last year’s merger of Tenneco Inc. and Federal-Mogul LLC will be called Driv Inc.

Known for the past few months as Spincos, the mashup of advanced suspension systems and storied aftermarket brand is preparing for a public stock offering in the second half of 2019.

Driv will be headquartered near Chicago in Lake Forest.

The new corporate name (those the brand name of one of the spinoff’s fastest growing products, the patented road-smoothing electronic suspension technology it market through its Monroe brand) and its trade symbol Driv.

But Driv Inc. will operate as a catalog of well-known brand names in markets around the world. Five of their brands are more than a century old. The lines include Cleve- ite Elastomers, Fel-Pro, Monroe, Champion, Oehlins, Moog, Walker, Wagner, Ferodo, Sealed Power and others.

Debby Brian Kesseler, formerly CEO of Tenneco, said the combined stable of brands and business lines represent annual sales of about $6.4 billion. He said the volume is 56 percent aftermarket business and 44 percent original equipment sales to auto makers.

Tenneco and Federal-Mogul announced their merger in April, with a plan to immediately divest five unrelated ac-
tivities into two companies: Tenneco would survive as a producer of chiefly powertrain and emissions products, with revenue of about $10.5 billion.

The bulk of the companies’ aftermarket operations, plus Tenneco’s ride-performance activities, would be spun off into a separate company with expected annual sales of about $6.4 billion.

Last month, the Spincos side of the merger closed on another deal to acquire the Swedish performance suspension supplier Oehlins Racing.

Smithers expands testing site in China

By Kyle Brown

SUZHOU, China.—Smithers Rapra is building on its presence in China with a new product testing facility opened in the same site as its tire and wheel testing lab in Suzhou.

The new 4,000-sq.-ft. facility is part of the company’s effort to grow and evolve with its clients in the changing local automotive market. The lab, vice president, global develop ment, Asia region. Financial details of the investment were not disclosed.

The laboratory provides for air leak and burst, cleanliness, material properties, salt spray, and pressure, vibration and temperature testing. Smithers said. It will work alongside the company’s existing product testin g labs in Akron; Lansing, Mich.; and Shrewsbury, England, for valida tion testing for original equipment manufacturer fluid transfer systems. It can test products such as brake lines and coolant hoses to international and OEM standards as well as custom benchmarking programs to support research and development. The lab, which employs 23 split about 70-30 across tire testing and product testing, is ISO 17025 accredited.

The product testing laboratory will share resources with the existing tire testing laboratory, including several senior engineers and some equipment, Read said.

“For example, our salt spray chamber is commonly used as part of our testing facilities to test coatings and materials in a variety of environments and on a variety of test fixtures,” he said. The development of the product testing laboratory makes the 22,000-sq.-ft. facility “nearly full.” About 2,000 square feet of the space is dedicated to offices, with the remain ing 16,000 square feet making up the tire and wheel lab. Smithers anticipates continued growth in test ing requirements over the next several years, and is looking into expansion. The company is looking to hire up to eight more employ ees at the location in 2019.

While Smithers isn’t announcing any other expansion in China or other parts of the world, Read said. The addition of the product testing laboratory makes the Suzhou site “a great location to grow and evolve with our clients,” he said. “We’re proud of what we have achieved. Smithers’ capabilities will continue to grow and expand with our clients.”
Toyoda Gosei opens fifth plant in India

By Chris Sweeney
Rubber & Plastics News Staff

DEKAVADA, India—Toyoda Gosei Co. Ltd. continues to strengthen its presence in India.

The firm, through its joint venture Toyoda Gosei Minda India Pvt. Ltd., celebrated the opening of its fifth manufacturing plant in India, located in Dekavada.

A company spokesman said in an email that the firm intends to invest about $27.2 million through fiscal year 2021, which includes securing the land, buildings and production equipment. The site spans about 194,000 square feet and sits on about 807,300 square feet of land.

Toyoda Gosei intends to employ about 310 by the end of March 2022.

The company said the site will help Toyoda Gosei capitalize on what is becoming an increasingly important region and to help better serve one of its largest customers, Suzuki Motor Gujarat Pvt. Ltd., which he said is expanding capacity in India.

“Production volume in India will grow from 4 million to 10 million units per year by 2020,” he said. “Especially Suzuki Motor Gujarat, which is one of the main customers of TG and has the largest share in the market.

India and China are two focus markets for Toyoda Gosei as part of its 2025 milestone, which has the goal of generating about $317 million in sales in India by 2025. While the firm will not disclose its current sales level in the region, it said its 2025 goal would be more than double its current business.

The spokesman said demand for air bags, TG’s primary product line, is driving growth forward, as well as increased automotive demand.

TG operates four other facilities in India: Toyoda Gosei South India Pvt. Ltd., located in Manaduparner, employs about 500 people; Minda TG Rubber Pvt. Ltd. is located in New Delhi and employs about 200; its Neemrana Plant, about 1,200; and its factory in Bawal employs about 400.

Culture key to APS reaching 10-year milestone

By Kyle Brown
Rubber & Plastics News Staff

Romulus, Mich.—Alliance Polymer Services Elastomers, a distributor of thermoplastic elastomers including TPUs, rubber, silicones and other products, reached a business milestone in celebrating its 10th year.

The company’s culture and philosophy played a role in reaching that mark, but a major part of its ability to move more quickly and make decisions to meet customers’ needs, according to Stephane Morin, one of the company’s two owners and principals.

Morin and APS’s other principal, Roger Huarng, came together while working at BASF Corp.’s Wyandotte, Mich., location. Huarng, a chemical engineer, Morin said. Both worked for BASF’s thermoplastic urathanes business for about 15 years. Before going out on their own, Morin was a sales and project manager, and Huarng was a marketing and project manager.

“When (BASF) did not have, at that point, a distributor for their small and medium-size accounts, we made a proposal to the business to become their exclusive distributor of TPU, which they agreed to,” Morin said. “They eventually added another distributor, but we started the business by offering BASF’s TPU, and only a BASF elastomer distributor.”

Starting small

The company started with just the two of them, housed in a 500-square-foot storefront in Romulus. Right away, they realized how much more quickly the company could move as a lean organization to make decisions for customers, Morin said.

“The thing that really amazed me when Roger and I started this company was the amount of time that we did not have to spend in meetings,” he said.

Their accumulated knowledge of how corporations worked gave them insight into the best ways to develop and support sales. Eventually, APS grew into thermoplastic vulcanizates and thermoplastic elastomers to give customers one-stop-shop for elastomeric material, providing products, they realized that their customers needed education and recommendations about elastomers.

“Our biggest strength is to be technically knowledgeable enough to make very quickly the right assessment on the material that is needed,” Morin said. “We’ve become not only a supplier of material, but a technical resource for our customers.”

On top of some compounding and blending in-house, APS can do tool and part design, and has the ability to run trials for smaller parts in-house, as well as produce new samples. Morin said it amazes him how many design shops, engineering firms and new customers call because they can’t get that kind of information from OEMs.

“Elastomers is unique in itself, so it’s important to find the right people to solve problems, or keep people from falling into problems,” he said. “Roger and I, our background is technical, so we know what we’re talking about.”

In time, Morin and Huarng decided that the company should add more materials, alongside the others it distributed, he said. Working with producers under private labels, APS developed its own products, such as Viprene TPV, Zythane TPUs and Maxelex TPEs. With their industry knowledge, they’ve been able to recognize the strengths and weaknesses of suppliers in chemistry and processes. Volume in that business has grown to the point that APS is evaluating the potential of a supplier stake.

“Right now, we’re at the crossroad of having enough volume to start looking at a partnership in the U.S., or a manufacturing facility in the U.S., to start something over here, just to cut down on the long lead time on the supply-chain side,” Morin said.

Maintaining supply

APS’s margins aren’t there to support salespeople traveling across the country for a box of material, he said. But in the last two years, the market has started requesting larger orders as supply has tightened.

“There were a lot of issues in the last year with force majeure in the industry and people not being able to get their materials on time,” Morin said. “We operate in a very different manner, where we have the inventory on the floor at all times. A small customer that wants a few bags or even a box, if they call by noon, we can ship.”

Where distributors often don’t want to keep inventory, and have long lead times and credit processes, APS doesn’t operate that way, Morin said. If a customer is looking to buy a small, specific amount of a material because of a contract, he’ll sell them that quantity.

“I don’t have a problem with that, and I’m not going to gouge them because of it,” Morin said. “My previous life was as a molder, so I understand that when you have a contract, you have a job to do. You don’t kid when that job is going to repeat itself. You don’t want to sit on material for six months or a year because there was a minimum quantity of a box, and you only needed 100 pounds out of that box.”

Morin said APS has maintained its own supply levels during higher scarcity by working with more international suppliers that don’t already have a presence in the U.S.

“Believe me, we don’t put all our eggs in one basket,” he said. “We have multiple suppliers of materials, and we’re still looking at qualifying others, too.”

In the last year, APS came close to doubling its business because it had already qualified suppliers in other locations as supply lines tightened, Morin said.

“We’ve done this long enough that we’re not going to get caught with our pants down,” he said.

As the volume of business has increased, APS has started to scale along with it, Morin said. Looking for a partner in the U.S. for domestic compounding and synthesis of TPU is one step. The company is also potentially searching for a larger space to work with both its headquarters, though it does also have the option to expand for a third time in its current building.

While APS is putting its efforts toward future development, it isn’t doing anything special to mark the occasion of its 10th anniversary, Morin said. As some smaller companies struggle to make it through their second year, let alone their fifth, APS’s agility and philosophy have pushed it past 10 years with more to come.

“We celebrate every day,” he said. “We’re doing our 10th year and we’re profitable. We know what we’re doing, and we can do this for a long time.”
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AKRON—For several years Eastman Chemical Co. has been working on a new addition to its Crystex brand family of insoluble sulfur additives, and now the new product is up for an award at an upcoming industry event.

The firm’s Crystex Cure Pro is a nominee for the 2019 Tire Technology International Awards for Innovation & Excellence, with the winners being announced at the Tire Technology Expo March 5-7 in Hanover, Germany.

Eastman’s Cure Pro product builds on prior Crystex products, including Crystex HS and Crystex HD, yielding an even more dispersively thermally stable product than has been offered in the past, Fred Ignatz-Hoover, an Eastman technology fellow, said during a recent interview. “For this customer, this means improved handling, ease of material transfer, ease of weighing and less headaches in manufacturing products,” he said.

Decades of history

This year marks the 75th anniversary of the Crystex line of insoluble sulfur. The importance of insoluble sulfur in the rubber industry was first recognized in 1932 by a Goodyear chemist named Herbert Endres, according to Ignatz-Hoover.

Endres patented a blend of soluble sulfur with insoluble sulfur to prevent bloom during mixing. In that time period Stauffer Chemical Co. bought National Sulfur, he said, and the use of insoluble sulfur started to take off because of its beneficial features.

The insoluble sulfur allows tire companies and rubber manufacturers to compound materials to higher loadings of sulfur and have an opportunity to manufacture compounds with a lower cure temperature. “The goals of the product for 80-plus years now have been to improve the thermal stability and the dispersibility of insoluble sulfur,” Ignatz-Hoover said.

The Crystex brand itself has been through a number of ownership changes over the years. Ignatz-Hoover—who has been with Eastman and predecessor companies Monsanto, Flexsys and Solvay since 1986—said he believes it was Stauffer Chemical that first trademarked the brand.

And as tire manufacturing has evolved over the years, so have the Crystex offerings. In 1975, the high stability Crystex HS was introduced, followed by Crystex HD, a high dispersion version, in 1998.

Next step forward

Crystex Cure Pro is the next evolution of a brand that has endured over the years, Ignatz-Hoover said. Its dispersion characteristics are significantly faster than Crystex HD, allowing to optimize cycle times.

“We’ve also engineered into the product improved thermal stability characteristics,” he said. “We estimate that customers can see improvement in curing temperatures on the order of 4°C to 6°C. In some cases we’ve seen customers able to improve their process by as much as 10°C.”

Combining the thermal stability with the improved dispersion, he added customers can mix at higher RPM, which can cause higher heating in the mixing process but results in shorter mixing times and increased throughput. In addition, customers can run downward processes such as calendaring faster, with some reporting improvements of 10-15 percent in actual line speed rates—all without issues related to sulfur bloom.

“This allows for higher productivity and significant cost savings, while still producing very high quality products that are associated with the Crystex name,” Ignatz-Hoover said.

Another Cure Pro feature that benefits customers, he said, is that the additive is roughly 10 percent oil products, compared to other grades that can be 20 or 33 percent oil. That means the customer sees more sulfur in the compound, saving floor space and storage areas and resulting in operational savings.

The first public presentation on Curex Pro was in October 2017 at the ACS Rubber Division International Elastomer Conference in Cleveland. Ignatz-Hoover said Eastman has been working with its alpha partners in developing the new line for about a year in Europe, work he said was invaluable to the product’s development.

“For this customer, this means improved handling, ease of material transfer, ease of weighing and less headaches in manufacturing products,” he said.

Global NR platform establishes governance structure

By Miles Moore
Rubber & Plastics News Staff

SINGAPORE—Stakeholders have agreed to a governance structure for the Global Platform for Sustainable Natural Rubber and are ready to approve it, according to the organization.

More than 50 attendees, including founding members of the GPSNR and other natural rubber stakeholders, approved the framework that establishes the governance structure.

“The platform has set itself the target of defining criteria for smallholders’ representation,” said Savi. “A smallholders’ working group will work out the criteria for smallholders’ participation, and they will be represented within the Producers category, Savi said.

The GPSNR also will work on recruiting rubber processors, non-tire rubber product makers and non-government organizations specializing in social issues relevant to rubber production, according to the press release.

Details of the GPSNR’s outreach activities will be released soon, according to Savi.

The GPSNR will be based in Singapore, the release said. The TIP will support the GPSNR financially during its start-up and its first two years while the organization works out a long-term revenue model, it said.

For this reason, the platform has set itself the target of defining criteria for smallholders’ representation,” he said. “A smallholders’ working group will work out the criteria for smallholders’ participation, and they will be represented within the Producers category, Savi said.

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"How technology meets success."
Smaller mixers make big impact in rubber market

It's no secret that the rubber custom mixing business has a hard time retaining players at the top of the food chain, players that look for large volumes and can operate on a wide scale, sometimes globally.

At the same time, however, custom mixing also remains a business where the routes—fast-food restaurants, stores and motels, for instance—that can handle intellectual discourse are a key to success. Thousands of gasoline stations that dot our highways could face closure. And how would other businesses along these routes—fast-food restaurants, stores and motels, for instance—that can handle intellectual discourse be affected?

Both also are aiming to make their marks in the high end of the business, with Elite gaining a share of its business mixing fluoroelastomers and HNBRs for critical applications in the oil and gas market, and QPoly focusing exclusively on FKM.

Glidewell’s story itself has some “American Dream” qualities built into it. He had worked for conglomerate Dana Inc. for 16 years when the entrepreneurial urge hit him. He knew that he’d like to start his own business and that it was his hometown.

Glidewell and his wife, Ginger, Elite’s technical manager, also know where Elite falls in the business equation. “We’re not the star of this show, our customer is,” Steve Glidewell said. They know that Elite’s mission is to identify where a customer has a problem, and the mixer will lead them to the solution. That’s the company’s role, rather than being in the spotlight.

The Elite team also believes in the power of small groups. That’s evidenced by its acquisition last fall of Wayne County Rubber, a smaller mixer in Ohio. The two were put in contact with each other by an Ohio-based rubber goods maker, and Stehekin was the result. Stehekin is a perfect match with leaders who share the same value system. At QPoly, the story is similar to one you hear over and over. Michael Shawl had worked at Specialty Products, a mixer of silicones compounds, for about 11 years when a customer asked it to consider mixing its FKM goods. Specialty Products turned down the request, but the customer was persistent.

When that relationship became a success, Specialty Products realized some organic growth with its existing customers that needed both silicones and FKM.

The problem was the FKM business was always going to be in the shadow of the silicone mixing, and didn’t have its own identity.

So Shawl approached Specialty Products founder Rick Rey with a proposal to purchase the FKM business and start up a separate mixing firm. The process took about a year, but resulted in QPoly moving to its own facility with its own name and the ability to forge its own path.

These stories are reminders that companies don’t have to be large to have a big impact.

WEB POLL RESULTS

Q: Would you advise someone close to you to pursue a career in the tire and rubber industry?
  • Absolutely, I’ve had a rewarding career.
  • Yes, but go in with your eyes open.
  • I wouldn’t take a chance one way or the other.
  • No, there are better opportunities elsewhere.

Total Voters: 114  Poll Date: Feb. 2-21, 2019. Vote at www.rubbernews.com

Rubber & Plastics News • February 25, 2019
www.rubbernews.com

VIEWPOINT

Pondering EV fallout

By Keith Crain

A mid the euphoria surrounding electric vehicles, I have wondered what would happen to the huge economic infrastructure that has been built around our interstate highway system if EVs grow in popularity.

Thousands of gasoline stations that dot our highways could face closure. And how would other businesses along the roads—fast-food restaurants, stores and motels, for instance—forbe affected?

Certainly, we’ll have lots of businesses that not only would offer charging stations but many other amenities for EV users.

But would we also have to convert our highways to pay-as-you-go toll roads? Eaton, I suppose we could use a licensing setup not unlike the British have adopted to support their noncommercial TV system—consumers buy a license that allows them to install or use TV receiving equipment.

Already, many states, including ones that have zero-emission vehicle mandates, are recognizing this gap and imposing higher annual registration fees and surcharges on EVs and hybrids in lieu of gasoline taxes. But there’s still nothing similar in place at the federal level. At some point, policymakers will have to replace the tax on gasoline and diesel with a more equitable funding mechanism so we can continue to enjoy the infrastructure that we have today.

Most EV fans would be unhappy about losing the tax subsidy attached to the purchase of the vehicles. I also expect them to be unhappy when they face higher payments every year to support the highway system.

Crain is chairman of Crain Communications Inc., which publishes Rubber & Plastics News.

Crain Communications Inc

Opinion

QUOTE OF THE WEEK

“We’ve been identified as a group that can handle intellectual discussions and property in a fashion that is comfortable moving forward. … It’s very nice to have that reputation.”

— Ginger Glidewell, technical director of Elite Elastomers, on the company’s industry reputation.
Great products always get a customer’s attention. Great service is what keeps them coming back.

Since 1929, Akrochem has provided a comprehensive assortment of compounding materials and color concentrates. All of our products reflect the dedication of the industry’s top experts working in our labs and on our sales and technical support team.
AirBoss adds innovation lab

By Mike McNulty
Rubber & Plastics News Correspondent

NEW MARKET, Ontario—Continual innovation and expanded capabilities have been the driving forces within AirBoss of America Corp. for the last several years.

Now, as part of an extensive growth program, the company is taking both to a new level, according to officials within the firm.

On the innovation front, the Newmarket-based, multi-faceted company is in the process of adding a new state-of-the-art laboratory and development center in a building located adjacent to the firm’s main mixing facility, which spans a million square feet in Kitchener, Ontario. The building is connected by a corridor to the compounding facility.

At the same time, AirBoss is installing a new mixer at its mixing plant in Scotland Neck, N.C., to double the site’s capacity. The new line is expected to be operational in July.

It also is adding a new color and specialty polymer mixing line at the Kitchener facility—with the startup planned for February—that will allow the firm to focus on more specialty products, Chris Bitsakakis, the firm’s chief operating officer, said in a recent interview.

In addition, he said the company has plans in the works to install another large volume mixing line at its Kitchener complex. Currently, it estimates the line will be in place at the end of December, he said.

New development center

AirBoss launched a multimillion dollar project that involves gutting and renovating an existing building adjacent to the Kitchener facility that will house the laboratory and development center, according to Bitsakakis. The structure previously was used to house administration offices and a smaller research and development lab on the second floor and the maintenance department on the first floor, he added.

“We moved the maintenance department into the main building and freed up the first floor,” he said. “We are building a main entrance into the first floor with a reception area and lobby for customers and suppliers.

“Adjacent to the reception area there will be offices for our sales department and purchasing department. There also will be large conference rooms available for suppliers and customers to work with our staff on new business development on the main floor without needing to progress to the upper floor.”

From the first floor, a hole in the ceiling is being cut to allow for the construction of a staircase that connects both levels. “Upon arriving upstairs from the staircase there will be a technical library and seating area for the brainstorming of ideas.”

An artist’s rendering of the new lab and development center that AirBoss is putting adjacent to its mixing facility in Kitchener, Ontario.

SPECIAL REPORT
Custom Mixing

Rubber & Plastics News  •  February 25, 2019
www.rubbernews.com
CUYAHOGA FALLS, OH — In recent years tire industry professionals have started to observe a dramatic change happening in tire manufacturing. In 2013 Modern Tire Dealer Magazine ran an article detailing a nearly four-fold increase in the number of unique tire sizes fitted to U.S. vehicles, alone, since 1983. The number of SKUs had almost doubled in just the previous decade.

A year later Pelmar Engineering’s presentation at the 2014 Future Tire Conference, explored six challenges facing modern tire manufacturers: (1) Rising land costs, worldwide. (2) Global politics that often impede imports. (3) Increasingly expensive logistics costs to ship across vast distances. (4) Growth in specialty products. (5) Stricter environmental requirements. (6) Increasing labor costs. The sum of these challenges influenced many tire manufacturers to consider a different manufacturing model. Tires would be made local to the consuming market, utilizing smaller, more agile plants capable of producing multiple SKUs with minimum downtime.

In subsequent years, research studies by knowledgeable industry resources, including well-known market research firms, Black Donuts and others, came to similar conclusions about the future of tire manufacturing.

Meeting the challenges of the future
Around the same time the Steelastic team was carrying out a detailed market evaluation which included modeling of the entire component preparation process. They realized that a plant, with legacy calendering and offline processing equipment, had to produce upwards of 3.5 million tires per annum to make this type of equipment and space commitment have a viable return on investment. Steelastic also began to observe a large and growing desire in the market for plants capable of profitably manufacturing 1-3 million tires per annum in multiple SKUs. To service the needs of these smaller plants, calendering, and its associated offline processing, had to be replaced by extrusion-based component manufacturing machines similar to the Steelastic equipment already used to produce steel belt and cap strip. These new machines would also have to offer greater automation and unrivaled flexibility.

With this knowledge in hand, Steelastic pursued an aggressive product development-based strategy aimed at producing a new range of tire component preparation machines ideally suited to these smaller, more versatile plants. These machines were specifically designed to eliminate the requirement for large, inflexible calendering machines, and associated processes, in the tire manufacturing process.

In order to fully enable the switch from the calendering to the extruded process a solution for extruding, high quality, textile body ply material had to be found. This had long being the missing piece in the ‘calenderless’ tire plant puzzle. Significant development work was undertaken by Steelastic. Two leading industry partners were secured for the critical in tire validation testing required. Over a period of 18 months extrusion and splicing technology was optimized to achieve a fully viable alternative to producing textile body ply components for passenger car tires.

Rising costs and growing SKUs are shaping the smaller, more versatile tire plants of the future. Today our extruded steel belt, body ply and cap strip machines make it possible to manufacture 1-3 million tires per year profitably. New precision splicing and tooling technology, inspection system and closed loop control are eliminating the need for huge, expensive calendering machines. We have seen the future and it is significantly smaller, smarter and more versatile.

Why tire plants of the future require Thinking Small

See Extruded Body Ply and Next Generation Steel Belt Systems at TireTech 2019
Last year Steelastic introduced its next generation of Extruded Steel Belt Machine featuring full closed loop control. At Tire Technology Expo 2019, Steelastic is rolling out a new Extruded Textile Body Ply System, the missing piece in a “calenderless” manufacturing environment of the future. As with all Steelastic equipment, the Extruded Textile Body Ply System offers unparalleled versatility and rapid changeover between SKU’s. Advanced extrusion and splicing technology reliably produces uniform material for quality tire manufacturing at a fraction of the capital outlay and ongoing running cost of large, inflexible, calendering and offline processing equipment.

By Ian Dennis
President, Steelastic, Inc.

Stop by Booth 8014 at Tire Technology Expo 2019 to see how the future of tire manufacturing is changing forever.
AirBoss

Continued from page 10 in a casual setting,” Bitsakakis said. “Besides the library we are building a new, much larger state-of-the-art laboratory for research and development.”

All of the firm’s chemists and technical staff will be located in offices directly around the new technical center and will be separated into two groups, he said.

Part of the group will focus on segment customers and the development of products required to solve day-to-day problems.

“The other part will be dedicated in a broader sense to the pure research of new technologies—such as nano technologies—that could affect rubber applications or rubber processing,” he said. “We are creating stronger relationships with local universities and looking toward collaborating with customers, suppliers and university research departments to bring the level of innovation in rubber compounding to another level.

“We feel that by focusing on this path we will be able to better differentiate ourselves from competitors and provide advanced solutions to our customers, making us the compounder of choice.” Bitsakakis said the firm, which also operates a compounding plant in Acton, Quebec, hopes to complete the project and have everything up and running by June. He added that parts of the operation likely will move in by March or April.

Broadingen capabilities

AirBoss’ Kitchener complex added and has been preparing to use a new color and specialty mixing line in February. That addition aligns with the company’s greater emphasis on R&D, according to Bitsakakis. “We are replacing an old large volume mixer that we were using for high volume, less critical formulations in Kitchener,” he said.

He said that by replacing it “with a new state-of-the-art large scale mixer, we will be able to focus our growth on large volume customers but do it with a super efficient mixing line. This will allow us to scale up in volume while improving quality and efficiency.” Meanwhile, work is underway in preparation for the addition of a new mixing line in Scotland Neck.

“Last year we filled the North Carolina plant with work on all three shifts and we had more opportunities available to continue growing in that region,” Bitsakakis said. He anticipates the line will be operational in July.

By the end of December, he said the company will have installed three new mixing lines, a new laboratory and development center at the Kitchener site, and a reception and meeting area for customers in Kitchener.

“I do think that all these investments will help us grow by broadening our capabilities in a way that we can address a larger part of the market we serve,” Bitsakakis said.

Listing of North American custom mixers

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www.aceelastomer.com

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www.britanniarubber.com

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By Mike McNulty
Rubber & Plastics News Correspondent

COPLEY, Ohio—After a short hiatus, Preferred Compounding Corp. is back on the acquisition trail.

The company has purchased the assets of Valley Rubber Mixing, some machinery and its proprietary mold cleaning technology and products, sold under the trade name Glo-Mold, from a private owner, said Marc Pignataro, the company’s vice president of sales and business development.

Terms of the transaction, which closed Jan. 14, were not disclosed.

Preferred also is relaunching Glo-Mold’s line of mold cleaning products as GloMoldPlus. The firm said in a Feb. 20 news release that the rebranding effort is to highlight recent product improvements and Glo-Mold’s positioning under the Preferred umbrella.

It is Preferred’s third acquisition in a little more than three years. During that span, the Copley-headquartered firm also added a warehousing and production facility in Mexico.

A custom rubber compounder with mixing and calendaring capabilities, Valley Rubber Mixing is based in Akron. Preferred did not acquire the firm’s production plant, which was leased and also was located in Akron, according to Pignataro.

He said many employees at Valley Rubber Mixing will be retained, but the exact number was not released. Equipment acquired will be moved to some of Preferred’s compounding facilities, but a determination has not been made as to which locations will get which machinery, he said.

However, Pignataro said the company plans to move the GloMoldPlus product production operation to its plant in Barberton, Ohio.

“Valley Rubber Mixing is a nice bolt-on acquisition,” Ken Bloom, CEO and president of Copley-based Preferred, said in a statement.

He said the purchase will broaden the company’s customer base and give it new markets for potential growth. The addition of the GloMoldPlus proprietary mold cleaning technology also adds to the firm’s product portfolio.

“We feel our commercial channels will help grow the Glo-Mold business significantly,” Bloom said.

He added that the firm plans to work closely with Valley Rubber Mixing customers to assure a smooth transition. Preferred has been successful with the acquisitions and additions it has made in the last three years, Pignataro said, while at the same time it has continued to experience solid organic growth.

Currently, the company, which is owned by members of the firm’s management team and Audax Private Equity, operates production facilities in Barberton and Wadsworth, Ohio, along with sites in Wisconsin, Georgia, Tennessee and Mexico.

Preferred added the Whitewater, Wis., plant when it acquired rubber compounder Trostel Ltd. in 2016, and the Wadsworth factory became part of its fold in 2017 when Preferred bought Kleen Polymers Inc., a custom rubber compounding operation, specializing in non-black elastomeric compounds.

Both acquisitions expanded Preferred’s mixing capabilities, the company said.

In addition to buying Trostel’s compounding business, Preferred also purchased the firm’s parts molding operation. In December 2017 it sold the molded products business, based in Lake Geneva, Wis., to ParkOhio but retained the mixing operation. The latter is now called Preferred Compounding Whitewater.

Included in the sale of the molded products operation were manufacturing plants in Reynosa, Mexico, and McAllen, Texas, along with the facility in Lake Geneva, which serves as the technical center for the business.

Pignataro said Preferred sold the molded products business “because our focus is on elastomer compounding. It may have been perceived that we were potentially competing with some of our molding customers if we would have continued to operate that business.”

Other key moves made in 2016 included adding another compounding and warehousing facility that spans 57,000 square feet adjacent to the company’s mixing plant in San Luis Potosi, Mexico; purchasing a new F-270 mixer for its mixing facility in Huntington, Tenn.; and leasing a new headquarters in Copley, freeing up space at its Barberton compounding plant, where it was previously based.

Preferred added the building in San Luis Potosi because additional space was needed to handle the company’s continuing growth, Bloom said at the time. The firm’s original plant had been expanded three times since Preferred purchased it in 2012.

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With all these new challenges, it's easy to see why HEXPOL's looking up to the future.
MOGADORE, Ohio—In a little more than four years, compounding giant Hexpol A.B. has built quite a sizable foothold in the global silicone mixing business.

It started in 2014 with its $13.2 million purchase of Portage Precision Polymers Inc., a deal that brought it a dedicated silicone plant in Mogadore. That was followed in 2016 with the $36 million acquisition of the United Kingdom-based Berwin Group Ltd.

Those were followed last fall by two deals in quick succession, when Hexpol bought Kirkhill Rubber of Long Beach, Calif., for $49 million, and then 80 percent of Italy’s Mesgo Group for $193 million.

The reason for the focus on acquiring silicone mixing assets was simple: Sweden’s Hexpol is always trying to keep its eye on the ball in terms of technology, according to Donald Picard, vice president of sales and marketing for Hexpol Compounding North America.

“Silicone is part of that because it’s a material that’s going to be used a lot in the future,” he said. “It’s a little higher tech than some of the general purpose elastomers.

“We’re always trying to stay abreast of the state of the art in rubber compounding. We don’t want to be complacent. We always want to be looking at the next material and what our customers will need next."

Over the years, a number of customers had asked the firm if they compounded silicone. And Hexpol also saw some trends that might lend some applications to silicone, Picard said.

One such example is the transition over to non-fossil fuel cars, which won’t need gasoline-resistant hoses, or some of the heat-resistant polymers. There will be heat, however, but generated in a different way, where the need may be to cool an electric motor that gets hot in a hurry if the vehicle stops suddenly. He said silicone may well be the polymer to solve such a problem.

“The industry is still moving forward, it’s changing all the time,” Picard said. “It’s not static by any means, and all of these new applications are going to mean new challenges for all of us. That was one of the catalysts that kind of made us take a look at silicone.”

Having the Portage Precision purchase serve as the base, Hexpol saw the opportunity to expand upon it with the follow-up deals, and thus far they are happy with the results.

“I think all the parties will benefit because now we have a more collaborative approach to the market in terms of processes and recipes and markets,” Picard said. “It’s been good for us. If we didn’t already have a jump start on that, it would have been a bit more difficult.”

Added capabilities

Besides bringing in silicone mixing capacity—and some other polymers, including FFKM fluoroelastomers—Kirkhill brought Hexpol expanded opportunities in the aerospace business. Picard said that industry still is largely focused on the West Coast, with sub-contractors making components that go into various types of aircraft, and a lot of that is made with silicone elastomers.

“It would have been more difficult for us to penetrate that from our Ohio campus, just because of geography and getting to know that market well,” he said. “You sort of have to be there. The acquisition of Kirkhill helped us almost to leapfrog into that technology, because (Kirkhill officials) have an awful lot of contacts in aerospace and semiconductors.

“We’ve been able to put our knowledge bases, IP and chemists together, and we’re already starting to see some positive results from that.”

The Kirkhill acquisition also brought with it some other capabilities, such as pre-forming, calendering and platinum-cure systems. This gives Hexpol added flexibility.
“Now we can put manufacturing where it belongs based on equipment requirements,” Picard said. “If a customer needs pre-forms, we can send them to Kirkhill. Typically the order volumes in silicone are not so large, so geography is not as big a problem as it might be with some organic elastomers. If you’re buying just a few thousand pounds, the freight difference isn’t that big.”

But the experience of the people that came to Hexpol in these acquisitions is the most important asset the mixing company received.

“You just need a checklist and you can buy all that equipment,” Picard said. “But without the expertise to use it and to formulate it properly, and to get it to market, you just have a bunch of machinery. To apply that to help the customers you have to have the whole package, and we think we have it.”

Positive reception

Thus far, customer reaction to Hexpol’s silicone offerings has been positive, he said. Hexpol has been able to build on its relationships with its organic rubber customers that also fabricate with silicone, many of those that had been pestering the mixer over the years to add silicone to its repertoire.

In other cases, though, they’ve helped customers get into silicone fabrication that previously had been reluctant to do so. Picard said some had thought it was a difficult material to process, but Hexpol has been able to walk them through it and show them it may be easier than they thought.

“You know what you know and sometimes something is a little scary, but there’s no need for it to be,” the Hexpol executive said. “They already know us, so the service and support is established. Now that we tell them we have the capability, all of the sudden they’re paying attention, and say, ‘Send me a sample and send me in somebody who can show us how to do it.’”

Job shops, particularly, are curious to learn, he added, as it’s another chemistry they can use to help them be successful. “Job shops like to be able to be a full-service supplier to their customers,” Picard said. “They don’t want to tell their customers we can make all your organic rubber parts, but if it’s silicone you have to go somewhere else. They don’t like doing that, and frankly we didn’t like doing that. We like to be able to supply whatever the customer needs.”

In North America, Hexpol’s silicone rubber business focuses on HCR materials, though Mesgo does have some liquid silicone rubber capability in Europe. In terms of volume, Picard said Hexpol realizes the HCR silicone market is smaller than organic rubbers, so it expects its business to break down in similar proportions.

But Picard said one advantage Hexpol has is that it’s recognized as an independent silicone compounder, meaning it’s not also producing the feedstocks, like some of the silicone compounders do.

“And being independent, we have the ability to select whatever polymer base or gum is appropriate for the application in terms of performance and cost,” he said. “We aren’t mandated to use our company’s polymer. So that helps us not only to gain business but also to continue to supply during any of the supply issues seen over the last 12 to 18 months. We’ve been able to give customers options.”

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<td>931-645-6413</td>
</tr>
<tr>
<td>West American Rubber Co. L.L.C.</td>
<td>2530 S.E. Main St. Orange, CA 92868</td>
<td>714-532-7335</td>
</tr>
<tr>
<td>Whitford Corp.</td>
<td>47 Park Ave. Everson, PA 19520</td>
<td>610-286-3500</td>
</tr>
</tbody>
</table>
New ASTM tests to measure carbon black, silica dispersion

By John S. Dick, Edward Norton and Andres Gil

Alpha Technologies

During the mixing process for a rubber compound, the base elastomer is modified by the other ingredients, such as carbon black and/or silica, to begin to wet and incorporate. As this process continues, the carbon black and/or silica agglomerates are deagglomerated and dispersed as aggregates while the base raw elastomers are simultaneously masticated and “broken down,” usually through some degree of depolymerization. 1,2

This study constructed simple model recipes of these selected raw elastomers with N330 carbon black and VN3 precipitated silicas and studied the rheological effects of these experimental compounds from controlled amounts of applied work history during BR Banbury mixing in the laboratory.

Experimental

Table 1 shows the seven different raw elastomers which were selected for this study. The selected polymers include a wide selection of mostly tire rubbers (except for NBR) that are commonly used. This selection of mostly tire rubbers (except for NBR) that are commonly used. This selection of mostly tire rubbers (except for NBR) that are commonly used. This selection of mostly tire rubbers (except for NBR) that are commonly used. This selection of mostly tire rubbers (except for NBR) that are commonly used. This selection of mostly tire rubbers (except for NBR) that are commonly used. This selection of mostly tire rubbers (except for NBR) that are commonly used. This selection of mostly tire rubbers (except for NBR) that are commonly used. This selection of mostly tire rubbers (except for NBR) that are commonly used. This selection of mostly tire rubbers (except for NBR) that are commonly used.

On the other hand, the silica comparisons were all made by equal weight (phr) of 60 phr VN3 Silica. One silica series was performed with TESPT at 1.38 phr and 1.38 N330 carbon black (from X50, which is a 50:50 blend of TESPT and N330 carbon black). The other silica series was performed without TESPT; however, 2.8 phr N330 carbon black was added to allow these compounds to absorb light (for possible further ASTM D7723 reflective microscopy work). These mixed samples were tested for “state of mix” with the Alpha Technologies Premier RPA Rubber Process Analyzer shown in Fig. 1 in accordance with ASTM D8059. Also, the Alpha Technologies Alpha View Disperser-Grader-branched special light reflected microscope (ASTM D7723) was used in these studies as shown in Fig. 2.

Table 1: Elastomers used in this study.

<table>
<thead>
<tr>
<th>Name of Rubber</th>
<th>ASTM Abbreviation</th>
<th>Trade Name</th>
<th>Specific Gravity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Styrene Butadiene Rubber</td>
<td>SBR</td>
<td>SBR 1500</td>
<td>0.94</td>
</tr>
<tr>
<td>Natural Rubber</td>
<td>NR</td>
<td>SIR 20</td>
<td>0.82</td>
</tr>
<tr>
<td>1,4 cis Polybutadiene Rubber</td>
<td>BR</td>
<td>Rudene 220</td>
<td>0.52</td>
</tr>
<tr>
<td>Natsyn 2200</td>
<td>IR</td>
<td>Natsyn 2200</td>
<td>0.91</td>
</tr>
<tr>
<td>Bromobutyl Rubber</td>
<td>BIIR</td>
<td>Bromobutyl 2244</td>
<td>0.93</td>
</tr>
<tr>
<td>Butyl Rubber</td>
<td>IBR</td>
<td>Butyl 268</td>
<td>0.92</td>
</tr>
<tr>
<td>Acrylonitrile Butadiene Rubber</td>
<td>NBR</td>
<td>NBR DN 2850</td>
<td>0.97</td>
</tr>
</tbody>
</table>

This light reflecting microscope works off the principle of quantitatively measuring the reflecting light from the undispersed carbon black or silica agglomerates (white area) vs. the light which is not reflected into the microscope lens as illustrated in Fig. 3.

John Dick has more than 45 years of experience in the rubber industry. He was with B.F. Goodrich and later Uniroyal Goodrich Tire Co. as a section manager and development scientist in research and development until 1991, when he joined Monsanto’s Rubber Instruments Group (now Alpha Technologies) as a senior scientist, applications, until 2016. Dick is now the technical editor of Rubber & Plastics News and a consultant for Alpha Technologies. He also currently teaches 15 rubber technology courses each year for the University of Akron, University of Wisconsin in Milwaukee and ASTM International.

He has authored more than 80 journal and magazine publications including five books on rubber technology. He has consulted and given technical papers and seminars in more than 40 countries.

Ed Norton received his bachelor’s degree in chemical engineering at Rose-Hulman Institute of Technology in Terre Haute, Ind. After graduating, he spent seven years working for Alpha Technologies as an applications specialist, providing technical support and solving rheologically the effects of carbon black or silica incorporation and deagglomeration (dispersion) at different states of mix during the Banbury mixing process.

In the carbon black design of experiment, each raw elastomer compound was mixed with exactly 35 percent by volume of N330 carbon black.

During the BR Banbury mixing process, 20 gram aliquots were taken from the mixer after 3, 3.5, 4.5, 5.5, 6.5 and 7.5 minutes, as sampling intervals. Each of these samples was tested on the RPA by the new ASTM D8059 Standard for the Payne Effect. For this study, a time test was applied at ±0.07 percent strain, 1 Hz and 100°C for 2 minutes before the Payne Effect Stress Sweep was applied (for the carbon black study) and 70°C for 2 minutes before the Payne Effect Stress Sweep was applied (for the silica study). This strain sweep was applied at 1 Hz and 100°C (for carbon black studies) and 1 Hz and 70°C (for all silica studies), starting with ±0.07 percent strain, followed by ±0.1, 0.14, 0.2, 0.25, 0.35, 0.5, 0.7, 1.0.

See ASTM, page 20
The Payne Effect is an effective way of studying deagglomeration of fully reinforcing carbon black during the rubber compound mixing process. It should be an effective way of relating to carbon black aggregate—aggregate attraction vs. the carbon black aggregate attraction to the specific rubber hydrocarbon medium.

Different rubber hydrocarbon mediums have different affinities for the carbon black filler. For example, it is well known that in various blends of different types of rubber polymers, one domain of rubber (at the microscopic level), will have a greater attraction (or affinity) for the available carbon black than the other rubber present in the blend. Usually different rubbers in a compound blend are not perfectly soluble with each other so they will commonly establish continuous and discontinuous phases. Therefore, typically the available carbon black is attracted more to either the continuous or the discontinuous rubber phase.

The typical carbon black affinity for different elastomers is shown: BR > SBR > CR > NBR > NR > EPDM > IIR.

So, carbon black is much more attractive to the BR phase (polybutadiene rubber) than the HR (butyl rubber) phase. On the other hand, silica is actually rubber phobic compared to carbon black. Silica is not really that rubber friendly. When initially mixing silica with organic based elastomers, the silica particles prefer to agglomerate and associate with each other rather than disperse throughout the rubber hydrocarbon medium.

Carbon black, by contrast, is much more “rubber philic” and is known to disperse much more rapidly than precipitated hydrated silica. So carbon black is known to have a much better wetting time and black incorporation data in the SBR medium because of this attraction to the specific rubber hydrocarbon phase.3 Usually different rubbers in a compound blend are not perfectly soluble with each other so they will commonly establish continuous and discontinuous phases. In the rubber compound mixing process, one passes through a “wetting phase,” an “incorporation phase,” and a “dispersion phase” in order to achieve good macro and micro dispersion.

Certainly, TESPT (organosilane) addition to a silica mix will improve this situation somewhat; however still precipitated hydrated silica. So carbon black is known to have a much better wetting time and black incorporation time than a typical precipitated hydrated silica. The data in Fig. 4 show the typical black wetting time and black incorporation time from a Brabender mixing study. Carbon blacks, because they are relatively “rubber phobic,” typically show significantly shorter BWT and BIT values than what silica display. So in any mixing process, one passes through a “wetting phase,” an “incorporation phase,” and a “dispersion phase” in order to achieve good macro and micro dispersion.

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the G’ elastic modulus value measured at the low initial applied strain of only 0.07 percent.

However, as the mixing time and resulting work history increase, the measured G’ value decreases from the destruction of the agglomerate-agglomerate filler network and the corresponding increase in the macro-dispersion of the N330 carbon black.

Fig. 6 shows how well the G’ Elastic Modulus for the Payne Effect at 0.07 percent strain predicts the state of mix and degree of deagglomeration for the dispersing of N330 carbon black in the SBR1500 rubber.

The Payne Effect G’ inversely correlates very well to the state of mix and inversely to the aggregate-aggregate network density. Fig. 7 shows the very good correlation of the percent Z Dispersion as performed by ASTM D7723 with the state of mix.

The shape of this curve represents the “law of diminishing returns,” which was reported in 1992 using the older, slower, optical microscopy method ASTM D2663, which gave close to the same profile.14

For each marginal addition in work history, there was a smaller increase in percent dispersion of carbon black. By using the Alpha View DisperGrader (ASTM D7723), one produces a very similar curve, but much faster and perhaps more accurate. ASTM D7723 also was quite effective at measuring the “state of mix” when using SBR as the raw elastomer in this mixing experiment.

SBR/silica

On the other hand, this same experiment was carried out under similar mixing conditions except that VN3 precipitated hydrated silica (180 m²/g) was used in place of N330 carbon black as described in the experimental section. Fig. 8 shows the distinctions in the Payne Effect curves based on the time intervals being applied during the mixing of SBR 1500 and VN3 precipitated hydrated silica.

These Payne Effect curves are well formed, just as with the carbon black before. However, the order of their occurrence for these silica Payne Effect curves vs. mixing time is very different vs. what was seen for carbon black as shown in Fig. 9.

Because of silica’s natural incompatibility with SBR, it is more variable in its dispersion. See ASTM, page 22.
As noted from earlier studies, the TESPT does effectively reduce the elastic modulus ($G'$) by improving the attraction of the silica particles to the rubber hydrocarbon medium.

Fig. 10 shows the effects of using 1.38 phr TESPT on the Payne Effect curves from the SBR-silica interaction.

As can be seen with the addition of a small amount of TESPT, a very good correlation with mixing time (and probably dispersion) is achieved. The $R^2$ shows a correlation with 95 percent of the variation explained.

**TSR 20 natural rubber/carbon black**

TSR 20 natural rubber also was studied for its carbon black dispersion characteristics. Fig. 12 shows the effects of different amounts of work history on the Payne Effect profiles with N330 carbon black.

Just using the $G'$ at 0.07 percent applied strain from the RPA measurements, one can use this parameter to predict state of mix for the carbon black as shown in Fig. 13.

In addition, the ASTM D7723 percent dispersion profiles with N330 carbon black.

**Fig. 12:** Effect of increasing mixing time on measured Payne Effect curves for Banbury mixing of natural rubber TSR20 and N330 carbon black.

**Fig. 13:** $G'$ Payne Effect at 0.07 percent strain vs. work history for mixing of TSR 20 natural rubber.

**Fig. 14:** ASTM D7723 dispersion vs. work history of mixing TSR 20 natural rubber with N330.

**Fig. 15:** $G'$ Payne Effect at 0.07 percent strain vs. work history for mixing of natural rubber and VN3 silica without TESPT.
Z value for carbon black dispersion is a good predictor of state of mix for a natural rubber based system.

In this experiment, unlike the SBR, which readily accepted the N330 carbon black during the early stages of mixing, the TSR 20 natural rubber was more resistant in accepting the carbon black initially, but readily accepted the N330 in the later stages of mixing.

Normally the TSR 20 grades of natural rubber contain as high as 0.20 percent dirt, which usually is defined as impurities which have a particle size greater than 44 μm. This level of contaminant can appear as contributors to the “white area” in the percent Z calculation and can be seen as contributors to the “white noise” in the dispersion phase of the mixing; but possesses a much higher polynomial regression coefficient than the SBR.

Fig. 19 shows both the incorporation as well as the dispersion phase of the mixing; but possesses a much higher polynomial regression coefficient than the SBR.

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However, the regular IIR (without the benefit of bromination) shows a more pronounced separation of the Payne Effect curves from applying different mixing times.

Fig. 20 shows the effectiveness of using the Payne Effect G’ at 0.07 percent strain to predict the state or quality of mix of the subject compound.

As can be seen from the brominated butyl rubber compound, the G’ Payne Effect at 0.07 % curve is very effective at predicting the state or quality of mix with carbon black.

From Fig. 22, the ASTM D7723 DisperGrader test also was able to achieve an equally effective prediction of state of mix for the BR with the N330 carbon black.

The direct correlation between ASTM D7723 percent Z Dispersion vs. the ASTM D6859 G’ Payne Effect at 0.07 percent strain using the RPA with EDRL all with BR, is shown in Fig. 23. As can be seen, the R square shows 98 percent of this correlation is explained. The bromination of butyl rubber has a profound effect on the mixing quality of BIIR and N330 carbon black.

Polybutadiene/carbon black

Polybutadiene (BR) was included in this study, even though it is almost never used by itself in a tire compound. However, it is commonly used in tire technology in blends with other raw elastomers such as SBR or NR.

This BR compound did not break down in the same manner that the SBR did. In fact, using the G’ at 0.07 percent strain gave only a fair prediction of state of mix as shown in Fig. 16. However, Fig. 17 shows that the ASTM D7723 (DisperGrader) did somewhat better in measuring the progression of the state of mix than the G’ Payne Effect.

Because of these particular problems with 100 phr BIIR (which is rarely used by itself), the ASTM D7723 Percent Z Dispersion was somewhat better.

Polybutadiene/silica

If there is sometimes a problem in measuring the state of mix for carbon black in "all" polybutadiene/a rather "artificial" situation, there can be even more of a problem when measuring "state of mix" of BR and silica.

Fig. 18 shows a significant amount of noise associated with trying to achieve good dispersion of silica without any TESPT. There is quite a bit of scatter, probably the cause of problems with silica "wetting" and "incorporation" in BR.

The correlation here is quite poor at only 55 percent explained. The addition of 1.38 phr of TESPT did lower the Payne Effect curves somewhat by increasing the attraction of the silica particles for the BR medium and somewhat reducing the silica particle-particle interaction.

Fig. 19 shows both the incorporation as well as the dispersion phase of the mixing; but possesses a much higher polynomial regression coefficient than the SBR.

Fig. 21 shows the effects of using brominated butyl rubber, there is very significant separation of the Payne Effect curves from applying different mixing times.

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However, the regular IIR (without the benefit of bromination) shows a very little change from variations in mixing work history. Fig. 27 shows the resulting poor correlation between G’ at 0.07 percent and mixing time.

As can be seen, because of the closeness of the G’ Payne Effect curves for regular butyl rubber, the correlation between G’ at 0.07 percent strain with mixing time is very poor and “noisy.” The butyl rubber is relatively less compatible in the dispersion of the N330 carbon black compared with the BIIR discussed in the subject compound.

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Continued from page 23 earlier.

On the other hand, Fig. 28 shows some correlation of measured percent Z Dispersion for N330 with mixing time for this regular butyl rubber experiment. ASTM D7723 may have some advantage here over the ASTM D8059 Payne Effect method for measuring the carbon black state of mix for compounds based solely on IIR.

IIR/silica

With silica in place of carbon black, it is a very different situation. Where carbon black showed a relatively poor compatibility with regular butyl rubber (as noted above), precipitated hydrated silica has a significantly different attraction to the butyl rubber medium as shown in Fig. 29. The fact that the silica without any TESPT gives an incorporation/dispersion plot with the polynomial model statistical regression of 99.6 percent is very interesting and contrasts greatly with the “noise” shown in Fig. 27 with carbon black (which actually showed no correlation). Only the DisperGrader could show a good correlation to the state of mix for regular butyl and carbon black. However, with regular butyl and silica, the situation is different.

The Payne Effect can also be useful with butyl rubber when silica and TESPT are used as well, as seen with Fig. 30. This figure also shows the addition of TESPT causes the mix to be further along and entering the dispersion phase from the incorporation phase much faster than without the TESPT (Fig. 29). The Payne Effect can also be useful with butyl rubber when silica and TESPT are used as well, as seen with Fig. 30. This figure also shows the addition of TESPT causes the mix to be further along and entering the dispersion phase from the incorporation phase much faster than without the TESPT (Fig. 29).

Summary

Carbon black mixing

In summary regarding these experiments, both the RPA Payne Effect method (ASTM D8059) and the percent Z Dispersion DisperGrader Method (ASTM D7723) using Alpha View software worked very well for measuring state-of-mix for N330 carbon black with the general purpose elastomers such as SBR, NR and BR.

However, the Payne Effect method worked somewhat better for the SBR. On the other hand, if BR is being mixed by itself and not in a blend, then the percent Z Dispersion method has an advantage over the Payne Effect method in this particular study.

Since the butyl rubber does not have very good affinity for N330 carbon black, G’ values did not spread out very much with increasing work history and this method was a poor predictor of state of mix for an all-butyl rubber compound. On the other hand, the percent Z Dispersion test did work effectively with N330 dispersion in butyl rubber.

Even though there were problems with regular butyl in using the Payne Effect method with carbon black, the opposite is true with bromobutyl rubber where the Payne Effect method worked well for...
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Rubber black dispersion prediction.
NBR with carbon black showed a lot of similarity to SBR in that the RPA Payne Effect test gave good predictions regarding carbon black state-of-mix where the percent Z Dispersion method also worked.

Silica mixing
As the data suggests, silica is obviously more difficult to effectively disperse in the general-purpose elastomers used in this study compared to carbon black, just discussed.

Precipitated hydrated silica is more “rubber phobic” in the mixing experiments conducted here compared to carbon black, which is more “rubber philic” and disperses faster.

As a result, the carbon black G’ Payne Effect measurements at very low strain were mostly lowered by the increasing work history (mixing time) in the experiments just summarized because the carbon black wetted, incorporated, and established an agglomerate network relatively fast compared to silica. So the increased applied work history from longer mixing times destroyed more of the established carbon black network and caused the Payne Effect G’ values to usually decrease.

However, with the silica mixing experiments, the silica has a more difficult time being “wetted” and “incorporated” into the rubber matrix before it can start to disperse. So the Payne Effect G’ values for silica mixing may actually increase, instead of decrease, because the silica is still in the “incorporation” phase and has not reached the “dispersion phase” yet.

So low-strain Payne Effect modulus G’ for silica mixing in different raw rubbers can give one of the following profiles depending on the silica’s or silica/TESPT’s compatibility with the subject elastomer.

Fig. 31 represents four mixing situations that one can experience in mixing precipitated hydrated silica (with or without TESPT) with different types of raw elastomers. In the incorporation/dispersion model, it was found that statistical correlations worked best using the polynomial statistical regression model as performed earlier.

In the summary table for Silica Mixing Results (Table 3), comparisons are made for 60 phr silica mixing with each of the raw elastomers with and without 1.38 phr TESPT. This table shows which of the four models are most applicable and what is the R² (whether it is a linear regression or a polynomial regression).

Conclusions
The RPA ASTM D8059 Payne Effect Method and the ASTM D7723 percent Z Dispersion Method (with the Dispergrader) are both quite effective at measuring state of mix (work history) and degree of dispersion for rubber compounds based on general purpose elastomers and fully reinforcing carbon black. The ASTM D8059 Payne Effect Method is sometimes compromised by comparing Fig. 20: Effects of increased mixing time on measured Payne Effect curves for Banbury mixing of bromobutyl 2244 rubber (BIIR) and N330 carbon black.

G (kPa)

% Strain

Fig. 21: G’ Payne Effect at 0.07 percent strain vs. work history for mixing bromobutyl 2244 with N330.

G (kPa) at 0.07% Strain

Mixing Time (Minutes)

Fig. 22: ASTM D7723 percent Z Dispersion vs. work history of mixing BIIR vs. N330.

% Z Dispersion

Mixing Time (Minutes)

Fig. 22: ASTM D7723 percent Z Dispersion vs. work history of mixing BIIR vs. N330.
Custom Mixing

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Continued from page 25

pounds based solely on regular butyl rubber because this polymer possesses poor affinity for carbon black compared to other elastomers. Silica mixing in various general-purpose elastomers is significantly more variable than comparable carbon black mixing. Especially for silica mixing, the RPA ASTM D8059 is quite effective at measuring the quality of mix not only in the dispersion phase, but also in the earlier incorporation phases as well, for mixing with the different general-purpose raw elastomers.

Also, the RPA ASTM D8059 is effective at measuring the rheological improvements of the addition of TESPT to silica mixing with the various general purpose elastomers.

More studies need to be performed on testing silica loaded compounds by the new ASTM D8059 RPA procedure at higher test temperatures and with higher loadings of TESPT.

Fig. 23: ASTM D8059 G’ at 0.07 percent strain vs. ASTM D7723 percent Z Dispersion for BIIR and N330.

Fig. 24: G’ Payne Effect at 0.07 percent strain vs. work history for mixing of bromobutyl rubber and VN3 without TESPT.

Fig. 25: G’ Payne Effect at 0.07 percent strain vs. work history for mixing of bromobutyl rubber and VN3 silica with TESPT.

Fig. 26: Effects of increased mixing time on measured Payne Effect curves for Banbury mixing of butyl 268 (IIR) and N330 carbon black.

Fig. 27: G’ Payne Effect at 0.07 percent strain vs. work history for mixing of regular butyl rubber (butyl 268) and N330.

Fig. 28: ASTM D7723 percent Z Dispersion vs. work history of mixing butyl 268 rubber with N330.

Fig. 29: G’ Payne Effect at 0.07 percent strain vs. work history for mixing of regular butyl rubber and VN3 silica without TESPT.

Fig. 30: G’ Payne Effect at 0.07 percent strain vs. work history for mixing of regular butyl rubber and VN3 silica with TESPT.
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Table 2: Summary of carbon black mixing results.

<table>
<thead>
<tr>
<th>Base Elastomer Used in Mixing Study</th>
<th>Statistical Correlation $R^2$ Between the Payne Effect $G'$ @ 0.07% (ASTM D8059) and Mixing Time (State-of-Mix)</th>
<th>Statistical Correlation $R^2$ Between the % Z Dispersion (ASTM D7723) and Mixing Time (State-of-Mix)</th>
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<td>SBR</td>
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<td>0.9601</td>
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<td>BR</td>
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<td>0.8376</td>
</tr>
<tr>
<td>BIR</td>
<td>0.6576</td>
<td>0.9723</td>
</tr>
<tr>
<td>IIR</td>
<td>0.0335</td>
<td>0.727</td>
</tr>
<tr>
<td>NBR</td>
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<td>0.8631</td>
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Table 3: Summary of silica mixing results.

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<thead>
<tr>
<th>Base Rubber Used in Mixing Study (with or without TESPT)</th>
<th>Type of Profile</th>
<th>Statistical Correlation $R^2$ Between the Payne Effect $G'$ @ 0.07% (ASTM D8059) and Mixing Time (State-of-Mix)</th>
</tr>
</thead>
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<tr>
<td>SBR without TESPT</td>
<td>Incorporation-Dispersion</td>
<td>0.6885</td>
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<td>SBR with TESPT</td>
<td>Dispersion</td>
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<tr>
<td>NR without TESPT</td>
<td>Incorporation-Dispersion</td>
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<tr>
<td>NR with TESPT</td>
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<tr>
<td>BR with TESPT</td>
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</tr>
<tr>
<td>IR without TESPT</td>
<td>Poor Wetting-Incorporation</td>
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<td>BIR without TESPT</td>
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<tr>
<td>NBR with TESPT</td>
<td>Incorporation-Dispersion</td>
<td>0.8112</td>
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References

Synergy Series Intelligent Valves are non-pneumatic, servomotor-actuated industrial valves that provide improved speed, accuracy and reliability when compared to historical/vintage valve performance. The Synergy Series also provides closed-loop feedback, which can be monitored, evaluated and utilized to improve process efficiencies or effectively diagnose valve health and performance.

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ended up being a financial decision for us because they helped us quite a bit. Elite broke ground in December 2001 on a greenfield operation. “We didn’t buy a building,” he said. “We poured the concrete, put up the buildings and ordered the equipment.” It was late 2002 before the mixing operation was production capable. As the team tried to build up a business, Elite first got caught up in the economic downturn that followed the 9/11 attacks in 2001.

But the slowdown actually worked to the firm’s advantage a bit, according to Glidewell. “I was always on the opposite side of that in technical,” he said. “When things were running really fast and furious in the plant, you were rarely given any production time to run trials.”

With the business of potential customers slow, Elite was given some opportunities as the new kid on the block. “Some we knew from past relationships,” he said, “and we were fortunate enough to start building our business.”

Elite started with one mixing line, added a second in 2004 and a third two years after that. It primarily deals with higher-end compounds such as HNBR.

“But it’s like any other business,” Glidewell said. “You have to keep the lights on and you have to pay the bills, so you have to take some more commercial-like business. We ran quite a few FDA-approved ingredient types with EPDM and SBRs. It was a little bit less margins, but it was business. We managed to start filling up our mixers.”

**Defining its business model**

In 2009, Glidewell wanted Elite Elastomers to focus on growing its business in the oil and gas sector, mixing some FRM and HNBR compounds. But he found it tough to get past the buyers, until one day he came to a realization.

“If you’re not one of the boys, you’ve got to hire one,” he said. So Glidewell hired the now-retired Paul Guess, who had a track record with Colonial Rubber and was known to customers in the oil and gas sector.

“It wasn’t anytime at all that we had opportunities to submit samples,” the Elite president said. “We really have made a concerted effort to get in the right segment the one we spend a lot of our time in and really a lot of our innovation capital to develop new products for those grades.”

After that—sometime between 2009 and 2010—Glidewell said Elite wanted to define its identity and business model in the market. He knew the mixer wasn’t a big player in terms of volume, so that wasn’t the right path. But where it excelled was in developing material compounds.

“We understand that, and our approach is application-oriented,” he said. “I’m a chemical engineer, so I look at things from an engineer’s perspective as well as a chemistry perspective when we design.”

So Elite made a concerted effort to make that part of its sales process. “If you want something that’s an optimal material for you, you need to talk to someone who understands how you’re going to be using your product,” Glidewell said.

Ginger Glidewell, technical director of Elite Elastomers and Steve’s wife, said the compounder excels in the development of intellectual property that is unique to the market.

“We like to ask the customers what it is they want to do in the marketplace that maybe they’re not doing at this point,” she said. “And if you want to be No. 1 in a particular application, we would love to partner with you. We push customers to the forefront of the application so they’re No. 1 and we’re the support bank.”

Another opportunity is where customers may have technical talent retiring. Elite can serve as an extension of the technical units inside some of these groups. “We sit in on engineering, design and development meetings jointly, which when I first started in this career, that was unheard of,” she said.

With many of the projects the firm has been involved in, it has been on a “by invitation” basis, Ginger Glidewell said.

“We’ve been identified as a group that can handle intellectual discussions and property in a fashion that is comfortable moving forward being an outsider to the company we’re talking with,” she said. “It’s very nice to have that reputation with our customer base.”

Steve Glidewell said Elite is all about building things, from how it designs materials that don’t exist to building businesses. “That’s part of that American experience in doing something constructive, and leaving where you’ve been a little better off,” he said.

In 2006, Glidewell wanted Elite Engineered Products L.L.C., which the firm said allows it to “couple its cutting edge ability to develop non-metallic materials with its extensive knowledge of the manufacture of the products made from those materials.”

It has 50,000 total square feet of space in two plants in Ripley, though Steve Glidewell said currently only the 35,000-sq.-ft. plant is being utilized. He said EEP was set up to manufacture completion tools for the fracturing process in the oil exploration market along with sub-sea insulation and infrastructure products.

Elite has a portfolio of swellable elastomers that are used in the completion of fracturing wells. It boasts both water and oil swell packers.

The company tries carefully to make sure EEP doesn’t compete with customers it’s supplying material to. There is one mixing and calendering customer, however, that makes a similar product with its own compound, and Steve Glidewell said they met and made full disclosure with the customer.

“They’ve been in and visited us, and they trust us completely,” he said. “That’s the level we want to work with from an integrity standpoint, that they’re willing to know that we have another product that we provide in general to the industry. ... It actually competes with them, but they still want to buy from us and do business with us.”

For that customer, he said the bottom line was this: “You provide good product. You’re focused on us as a customer. If you’re not putting my compound on your packer, it doesn’t bother me.”

Elite started EEP just as the oil and gas market was entering its recent downturn, but the market is coming back and Steve Glidewell said his firm has seen more activity for the packers.

The goods are sold through distributors, and he said EEP has plenty of capacity to ramp up production as sales grow.

**Future plans**

Ginger Glidewell said Elite is in a strong position to control the rate at which it moves forward based on what we are responding to a market request for another choice or option, and logistically we need it to be possible as well.”

The firm deploys what it calls an “improvement footprint,” aimed at targeting projects to move operations forward in existing facilities. It will execute that program at the former Wayne County Rubber facility in Ohio.

Steve Glidewell said a dedicated color line will be added to the Ripley mixing facility in the near-term. Ginger Glidewell added that some customers now purchase non-critical color compounds from Elite, but these same customers also have a need for materials to fill color-critical applications.

“It will certainly serve our existing customer base, and then provide opportunity to those who have reached out to us that we’re unable to offer in that line right now.”

The two said also on the wish list is new products in the sustainable markets. There has been active lab work on a new generation of compounds in this area, Ginger Glidewell said.

“It’s a giant kitchen, but we just call it a lab,” she said. “Our group has a good time. Being small, we have an advantage as far as our turnaround time from development to prototype to commercialization. We can get there pretty quickly with that dedicated facility."
QPoly
Continued from page 1

For Specialty Products as Shaul said the company then turned to its existing customers who were working with FKMs and found more business opportunities organically.

But silicone remained the main marketing focus. Shaul, who was the primary face of the FKM business, sat down with Specialty Products founder Rick Rey and outlined his vision. The conversation eventually led to Shaul purchasing the FKM business.

“They’re very much a dedicated silicone mixer,” Shaul said. “Although we did well with the FKM product, it wasn’t something Specialty marketed or went after. It wasn’t their primary business.

They are a silicone mixer and that’s what they do.”

After Shaul officially started QPoly, he stayed on with Specialty Polymers for another six months to ensure a smooth transition. The firm handled the mixing for QPoly during that process, allowing QPoly to set up and eventually move production into its current facility in Granger, just 10 miles away.

The process took about one year from May 2017 until April 2018. QPoly invested in a full set of dedicated equipment and Shaul said it continues to have a strong relationship with Specialty Products. Despite being separate production and legal entities, the two refer customers to one another regularly.

“Overall it went very smooth,” Shaul said. “Given that I had been with Specialty Products for so long, I knew their business inside and Rick was more than willing to support me in this venture. We had time to do a gradual transition.”

He added that the transition for customers also went smoothly.

“I was the primary interface for the FKM customers at Specialty Products,” Shaul said. “The transition was really easy. All of our customers were really open to it. We didn’t have anybody leave us. Anybody who was working with us at that time is now a customer of QPoly. I think everyone was comfortable knowing that I was running it before and am still running it now.”

Most of the firm’s businesses come from the automotive market, but Shaul said it also serves the aerospace, military-defense and general purpose industries.

One of the main sources of growth for the firm has been new oil applications in engines. Shaul said automotive manufacturers are trying to achieve longer cycle times on oil and other fluid changes. A result of that push is that the fluids are becoming more synthetic and aggressive, which in turn is leading to these customers looking at FKM compounds as a solution to provide better chemical resistance.

The trend is not limited to automotive. Shaul said emission standards for small engines like lawnmowers and weed eater engines are causing the fuels and oils to become more aggressive there, too, leading to increased demand for FKMs in the commercial and consumer markets.

“FKM has been big in that market to keep up with those changes,” Shaul said. “You need the higher performance to keep up with current requirements. It’s continuing to grow. We’re seeing a lot of interest in the peroxide technology with a higher chemical resistance in the FKM product line. There’s a lot of development in that now for us.”

QPoly follows the same business model as Specialty Products, which Shaul said is a focus on small- to medium-sized rubber product manufacturers looking for a supplier who can respond quickly to business opportunities.

“There are a lot of people that want that personal touch, who they can call up and talk directly to us with development projects, concerns or whatever it may be.” Shaul said. “We try to be very quick and turn around quotes within hours or at least a day. For so many of the small businesses that are trying to make it’s about timeliness and service. It’s about being available when they need us. That’s the biggest advantage we have, we’re nimble and we’re quick.”

He said that, combined with a deep knowledge of its customer base, has helped QPoly find success as it establishes its brand within the market.

“Our team here cares,” Shaul said. “We enjoy the rubber industry, a lot of these people we consider our friends. When they need something, we want to help. You’re not going to talk to a customer service representative who doesn’t know who you are and what you do. We know our customers really well and we’re happy to help.”

Singer Equities acquires belting distributor group

HOUSTON—Singer Equities Inc. has purchased Quality Conveyor Solutions L.L.C., which provides conveyor belt, accessories and field services, including installation and mobile maintenance. Terms of the deal were not disclosed.

QCS is based in Roanoke, Va., and has other locations in Covington and Richmond, Va.; Baltimore; Rocky Mount, N.C.; and Kingsport, Tenn. It serves such markets as aggregate, pulp and paper, power generation and cement.

The business was founded in 2016 and will continue operating under the QCS name. Singer said owners Aaron Atwell, Bill Bettridge, Junior Purdue, Doug Stanley and Geoff Emery will continue in their management roles.

Atwell will serve as vice president and general manager of QCS, which will merge operations with Virginia Carolina Belting, a division of Singer Equities based in Salem, Va.

Singer Equities President Sam Petillo said the owners and their 37 employees have significantly grown the business in a short period of time. “We are excited to add their knowledge base and conveyor service experience to the Singer family,” he said in a statement.

Singer Equities, along with Bishop Lifting Products and Dakota Fluid Power, are wholly owned subsidiaries of Houston-based SFP Holdings.
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