



Sustainability—in Its Many Forms—Dominates K 2019

The plastics industry showcases numerous approaches to enabling recycling, reducing waste, and going more circular

By Robert Grace

Arne Schulle, chief executive officer of family-owned German additives maker Baerlocher Group, says the company has seen this all before. About 20 years ago, he recalled in an Oct. 17 interview at his company's K 2019 booth, the vinyl industry was under fire and realized it had to take proactive steps to become more sustainable or risk losing both business and public favor.

In 2000, the European PVC value chain united voluntarily behind an initiative dubbed Vinyl 2010, aimed at helping companies deliver a responsible product and improve waste management. That successful effort has since morphed into VinylPlus, a renewed 10-year voluntary commitment to build on those goals.

As a longtime additives supplier to the vinyl industry, Baerlocher recognized the need long ago to make PVC more environmentally responsible. "In Europe, some 740,000 tonnes were recycled in 2018 with a target of 1 million tonnes to be reached in 2025, and companies are allowing their resins to be audited and certified.

"I feel like the entire plastics industry is today going through this same transition," he continued. "If the industry does not embrace this, they will be told to do it."

Schulle's analogy seemed to ring true at the massive, triennial K 2019 trade show, held Oct. 16 to 23 in Düsseldorf, Germany. It was clear that a large number of the 3,300 exhibitors from 63 countries got the memo that the key issue to address today is sustainability, environmental responsibility, and the circular economy.

After the fair—which drew an estimated 225,000 visitors from 165 countries—wrapped up, Ulrich Reifenhäuser, chairman of the K 2019 Exhibitor Advisory Board, noted



The massive K trade show, which ran for eight days straight in Düsseldorf, drew an estimated 225,000 visitors to interact with 3,300 exhibitors from 63 countries. Courtesy of Messe Düsseldorf/ctillmann

how the industry is assuming responsibility along the entire value chain, and stated: “Never before has the industry addressed a topic so unanimously and worked so consistently on solutions as it has now done in the areas of environmental compatibility, resource conservation and avoiding waste. There is a real sense of optimism in the industry, the current dynamic is overwhelming.”

Following is a partial recap of some of the key developments related to materials and additives introduced at the show, which clearly underscore the point about sustainability being high on nearly everyone’s agenda.

Baerlocher Aims to Enable Recycling

Baerlocher at the show focused on how its additives can help to enhance and enable plastics recycling. “We want to become the trusted adviser in the polyolefins industry, regarding recycle,” Schulle said. “We already are that in the PVC sector.”

To that end, the company highlighted at the show various partnerships that are showing progress.

Tamaqua, Pa.-based custom packaging converter KNF Flexpak, for instance, can now run 100 percent recycled film using postindustrial polyethylene film by running resin modified using

Baerlocher’s proprietary Resin Stabilizer Technology (RST). Its Baeropol® T-Blend is said to have resolved issues of variable film quality by preventing gels, bubble instability and haze that previously prevented KNF from incorporating postindustrial film in certain applications.

In another successful trial, KNF and Baerlocher partnered with Erema Group, an Austrian maker of plastic recycling equipment. Erema successfully reprocessed film scrap stabilized with the Baeropol T-Blend technology during testing at its facility in Ipswich, Mass.

Recycling postconsumer film requires melt filtration to remove contaminants, which involves subjecting the material to high temperatures. To make the recycled product useful for new blown film applications, it must be stabilized during melt filtration.

At its Circonomic Centre demonstration center on the K fairgrounds, Erema teamed with Baerlocher and German recycling technologies company APK AG to show how the combined know-how of machine manufacturers, additive suppliers, and processors enables upcycling of low-value consumer film waste into a product again suitable for film blowing.

Erema used an Intarema® TVEplus® film recycling line, as installed at APK, to demonstrate how a small add-on, a Koch-Technic Feeder, can expand the number of business cases the machinery can take on even further. This feeder is used to introduce a one-pack additive of the Baeropol T-Blend family of products into the process. The pastille form of that material, Baerlocher says, is an important enabler to bring the additive dimension into recycling.

Baerlocher also is working with ExxonMobil Chemical to

develop a new grade of HDPE resin for extrusion blow molding and thermoforming bottles and containers that will allow converters to add 50 percent or more of postconsumer recycled material.

Although trials have not yet begun, the company indicated Baerlocher’s data on improvements in oxidation induction time (OIT)—a measure of degradation—are promising. “The synergies provided by the additives in Baerlocher’s RST can boost OIT to prevent embrittlement over time and extend packaging shelf life, while also improving color stability to retain consumer appeal,” according to Mark Canright, product development team leader at ExxonMobil Chemical.

“Our role is to educate the market,” said Roberto Nunez, director of speciality additives for Cincinnati-based Baerlocher USA LLC, stressing that “we need to be designing for sustainability.” About two years ago in the U.S., Nunez recounted, things began to change in the plastics sector. “Industry CEOs saw the need to embrace sustainability and change, or else lose their social license to operate.”

Now, Baerlocher is striving to be one of those change agents, helping to enable more people to use recycled resins.

SABIC Flies Its New TruCircle Banner

Saudi Basic Industries (SABIC) chose K 2019 to launch what it calls the industry’s first polycarbonate based on certified renewable feedstock. Abdulrahman Al-Fageeh, the Riyadh-based firm’s executive vice president for petrochemicals, said that SABIC is taking its offering “beyond polyolefins, where we already have our existing certified circular and certified renewable portfolios.” The move is part of what the company is calling its broader TruCircle™ initiative for circular solutions, which it also unveiled at K.

Al-Fageeh added that SABIC’s renewable PC can reduce carbon footprints by up to 50 percent, and fossil depletion impacts by up to 35 percent compared with fossil-based polycarbonate production. The firm initially will make the new material, which will incorporate wood pulp and paper waste products, at its plant in Bergen op Zoom, Netherlands. Only part of the feedstock is renewable, SABIC notes, but stresses that its resulting Lexan™-brand PC resin is unchanged and can be used as a drop-in product.

The company also touted Unilever’s use of its certified circular polyethylene and polypropylene resins created from chemically recycled mixed plastic waste. The consumer goods giant is using SABIC’s newly developed circular impact PP for frozen foods in its just-launched Magnum® ice cream tub, and SABIC’s circular Flowpack PP impact copolymer for Knorr® bouillon powder containers for professional kitchens. Among products also on display under the TruCircle banner was Tupperware Brands’ new reusable Eco Straw and drinking tumbler, made from SABIC’s certified circular PP polymer.

SABIC officials also announced the company opened a new technology and innovation center dedicated to the caps and closures segment in Geleen, Netherlands—just a year after establishing an industry segment devoted to that market.

The company showcased a number of new developments and applications at its large K show booth. During a booth tour, Lennard Markestein, director of SABIC's global engineering thermoplastic business, highlighted the firm's launch of Xenoy™ HTX resin, a polyester-based, high-heat technology it says can enable the production of light, impact-resistant, and high-performing structural automotive applications.



Unfilled Xenoy HTX resin can absorb significant energy and withstand plastic deformation in the event of a crash. SABIC is targeting the material for use as a lightweight metal replacement in new safety applications, such as side rockers designed to offer protection for battery modules mounted to the floor of electric vehicles. Courtesy of SABIC

Relevant applications include body-in-white components, structural reinforcements, and battery protection systems for electric vehicles (EVs), including those of e-coating lines operating above 180° C. Available in both unfilled and glass-filled grades, Xenoy HTX offers significant weight savings compared to steel and aluminum and SABIC says it can serve as a drop-in alternative for polyamide 66 (PA66) compounds and alloys, which has recently seen frequent supply shortages and price fluctuations.

Taking pride of place at the SABIC stand was a new 2020 Land Rover Defender sport utility vehicle—one of just seven such vehicles in existence at the time of the show, according to Stephan Eltink, director of automotive for Europe, Middle East and Africa (EMEA). Land Rover discontinued the model several years ago, but now is reviving it. He said the automaker has engaged with SABIC on this relaunched Defender model, which incorporates SABIC thermoplastic materials in more than 70 applications.

This premium screw-with-hinge design is one of three tethered cap concepts being developed by United Caps and LyondellBasell. This model is for all kind of beverages. Courtesy of United Caps

LyondellBasell, United Caps Unveil Tethered Closures

LyondellBasell is another resin maker working on innovative caps and closure solutions. At K 2019, the firm displayed the results of its collaboration with Luxembourg-based United Caps designed to address EU Directive 2019/904 on single-use plastics, which will require beverage bottles up to three liters in size to have closures tethered to the bottle for proper disposal.

Following publication of the proposed directive in May 2018, the United Caps spearheaded the Alliance for Closure Tethering (ACT) to bring together industry leaders to assess the best way to respond.

“Tethered closures are expected to be pivotal in changing public attitudes towards the use of single-use plastic as well as littering,” said United Caps CEO Benoit Henckes. “But they do present challenges for the industry, specifically around cost of closures and the ease with which they can be integrated into the production process, including the potential need for retooling bottling machines,” Henckes added. “That is why we initiated ACT—to support better integration into the supply chain with a united, rather than standalone, solution.”

LyondellBasell, based in Houston and Rotterdam, Netherlands, is using its Purell GC 7260G and Hostalen 5231H, both HDPE grades, in the new, tethered closures it developed with United Caps, according to Gianluca Brescia, the resin firm's director of polyethylene for Europe. It used its Polybatch color masterbatch to obtain the closure's bright red color.

Separately, LyondellBasell announced it is building a small-scale recycling pilot facility at its site in Ferrara, Italy, moving another step closer to converting postconsumer recycled (PCR) plastic waste into new plastics on a commercial scale. The company cited its proprietary molecular recycling technology.



known as MoReTec, which it notes has shown that use of a catalyst in the pyrolysis process, or the structural breakdown of plastic waste into molecules, is faster and more energy efficient than traditional chemical recycling.

LyondellBasell says the MoReTec technology aims to convert typically difficult-to-recycle plastic waste such as multilayer films by returning them to their molecular state to be used as feedstock to produce new plastic for all applications, including food-contact and healthcare items. While based on chemical recycling, the process also includes a proprietary catalyst-based approach.

Braskem Expanding PP Capacity, Bioresin Portfolio

Brazilian petrochemicals giant Braskem S.A. said at K that it intends to start up its sixth polypropylene resin plant in the United States, in La Porte, Texas, in the first half of next year. U.S. demand for PP grew 3.1 percent last year and this new facility—in which the company already has invested some \$675 million—will add just over 1 billion pounds of new capacity.

The São Paulo-based firm also has expanded its I'm green™ portfolio of sugarcane-based biopolymers by introducing postconsumer recycled resins to create a mixed bio-based material, Fabiana Quiroga Garbin said in an interview at the Braskem stand. Garbin, the company's circular economy leader in South America, highlighted a new, three-layer bottle it developed in conjunction with blow molding machinery maker Kautex Maschinenbau GmbH.



Fabiana Quiroga Garbin, Braskem's circular economy leader in South America, highlighted the Brazilian firm's collaboration with machinery makers Kautex and Erema to develop a lightweight bottle with a foamed middle layer. Photo by Robert Grace

Made with this mixed bioresin, this coextruded bottle includes inner and outer layers of virgin HDPE, with a foamed PCR middle layer that includes Braskem's mixed bioresin. The new bottle is 18 percent lighter than comparable containers, given the foamed layer, according to Kautex spokesman Christian Kirchbaumer. "We're the first to foam PCR," he said at the Kautex booth where they

were pumping out these stylish green bottles on a KBB60D machine. While they are not food contact-approved, the bottles use less material and are completely recyclable, he noted. The partners have been working jointly for more than a year on the product.

Separately, Braskem also introduced a new, multilayer stretch film at the show. The company said the launches of its metallocene-based Flexus 3600 grade of linear low-density polyethylene (LLDPE) and its PP RF70 polypropylene are used in the film that offers "superior processability and high yields during application," while also reducing both the amount of raw material needed for production and waste during transport.

And, Garbin said, Braskem also used K to launch a portfolio of phthalate-free, medical-grade PP resins called Medcol™.

Milliken, PureCycle Closing the Loop on PP

In addition to announcing the launch of new additives and colorants at K 2019, Milliken & Co. shone much of the spotlight on its new partnership with PureCycle Technologies, whose CEO, Mike Otworth, spoke along with Milliken's Allen Jacoby at a joint news conference Oct. 18.

Using a patented recycling process developed and licensed by Procter & Gamble Co., PureCycle separates color, odor, and other contaminants from plastic waste feedstock. The process uses heat, pressure, and solvents to turn used polypropylene into ultrapure, virgin-like, recycled resin.

PureCycle—a portfolio company of technology commercialization firm Innventure—is moving forward with plans to open its first commercial-scale plant, in Ironton, Ohio, that will recycle 119 million pounds of polypropylene and produce more than 105 million pounds per year starting in 2021. Otworth said the Ohio plant's output is "presold for 20 years" and noted that PureCycle aims eventually to establish at least 25 plants around the world, while acknowledging that even that capacity will hardly even scratch the surface of demand.

Milliken Chemical, a division of Milliken & Co., is providing both additives and technical support to advance the project. Nestlé S.A., the world's largest food and beverage company, also is a partner in the effort. It is working with PureCycle to develop new packaging materials that help avoid plastic waste, in line with the company's commitment to make 100 percent of its packaging recyclable or reusable by 2025.

Milliken, whose additives play a critical role in reinvigorating recycled polypropylene, has formed an exclusive supply relationship with PureCycle, according to Jacoby, who is senior vice president of Milliken's plastics additives business.

Meanwhile, Milliken also rolled out several new products at the fair, including:

- » KeyPlast Resist™, a spectrum of bright colorants for engineering thermoplastics (ETPs), which can be dif-

difficult to color due to their high processing temperatures. This range is specially designed for use with ETPs such as polyamides, polyimides, PBT polysulfones, PEEK, PPO, and other high-heat resins and alloys.

Milliken's new KeyPlast Resist range of colorants are designed for use with difficult-to-color ETP resins. Courtesy of Milliken Chemical



- » DeltaMax™ 5000a, its latest addition to an existing reactive extrusion portfolio of performance modifiers for polypropylene. This new grade is designed to expand use of the additive into all market segments, including food packaging. It will be commercially available by year's end.
- » Millad® NX® 8000 ECO, a new grade in its Millad NX 8000 range of clarifying additives that are used to produce the fully transparent material known as NX UltraClear™ PP, which yields durable end products with glass-like clarity. The new ECO grade is said to offer faster production rates, average energy savings of 10 percent for the production of clarified polypropylene parts certified by the Underwriters Laboratories (UL) label, tunable clarity to meet specific market needs, and the low risk of defects such as white specs, streaks, and voids.

Oman Oil and Orpic Group Strives for Global Status

Stressing its agility as a “boutique supplier,” the Oman Oil and Orpic Group said at K 2019 it plans to spend billions of dollars to expand its polypropylene resin capabilities and to enter the polyethylene arena. Earlier this year, the firm announced it would invest \$28 billion in nine core assets over the next 10 years. These assets include OXEA, a 1,400-employee, Monheim, Germany-based maker and distributor of oxo chemicals that the group has fully owned since 2013.

Orpic's ventures also include a \$6.7 billion investment in the Liwa Plastics Industries Complex (LPIC) in Liwa, Oman, to boost polyolefins production to 1.4 million tons by mid-2020. The LPIC steam cracker project will allow PE to be produced in Oman for the first time, notes Chief Commercial Officer Talal al Awfi, while also strengthening the firm's polypropylene capabilities. The product portfolio at LPIC will include PP, LLDPE, and high-density PE (HDPE), he said.

“We want to play a major role in shaping the mega trends impacting our industry with our PP and PE solutions. This is why we want to be involved with every stakeholder along the value chain,” added al Awfi. The firm currently serves customers in the consumer packaging, industrial packaging, automotive, infrastructure, and household and appliance sectors.

Oman Oil and Orpic Group has been selling its Luban-brand of PP for more than a decade, and at K 2019 launched a new homopolymer grade—Luban HP1102LC—that is suitable for high-speed tape (raffia) production, which provides high tenacity and improved production throughput.

Gilles Rochas, general manager for polymer marketing, who previously was an executive at Borealis and Borouge, noted the rapid growth of the group, which in the past 18 months has opened offices in China, Singapore, India, and Turkey. It now employs close to 90 people in polymer sales and marketing—up from just eight some five years ago.

“We're moving from being a regional player in the EMEA to a global player,” he said. The company currently serves its PP customers in the United States directly from Oman. Orpic partnered with Milliken Chemical to develop a thermoforming grade of PP and plans to continue working closely with the Spartanburg, S.C.-based additives maker as it develops its new PE grades.

Rochas stressed his company's efforts to collaborate with various other institutions, such as with the German University of Technology in Oman (GUtech) on pyrolysis-focused sustainability research; with the Italian Embassy and the Scientific College of Design in Oman on product design issues; and with various parties, including the Gulf Petrochemicals & Chemicals Association, on academia-related outreach. Rochas says Orpic also has put forward the idea of establishing a plastics technology center in Oman to help link industry and academia, and that “we have buy-in” from key potential parties.

With its ambitious expansion plans, Rochas suggests that Oman Oil and Orpic Group “will be a very different company” in three years' time.

An Evolving Clariant Unveils Eco Initiatives

While in the midst of several major organizational changes, Swiss specialty chemicals producer Clariant AG used the K fair to project its strong, ongoing commitment to sustainability, continued investment, and innovative product development.

New CEO Ernesto Occhiello stepped down abruptly in July,

just as Clariant shelved, at least temporarily, the plan to merge its additive and masterbatch business with part of SABIC's engineering resins business (after SABIC had purchased nearly 25 percent of Clariant in September 2018). Clariant Chief Operating Officer Hans Bohnen kicked off the firm's K news conference by saying the company still is in the process of negotiating the sale of its entire masterbatches business unit and expects to complete it next year.

At the show, Clariant focused on new products and technologies it has developed under the banner of a "Symphony of Collaboration." The firm introduced four designators it says customers and markets are often looking for when it comes sustainability.

The four suffixes will be applied to the end of product names to make it easy for customers to identify products with key advantages: Aqua (water-saving products); Terra (products with a high renewable content); Circle (products with the primary purpose to reduce, reuse, or recycle plastic products); and Vita (products from natural origin with at least 98 percent Renewable Carbon Index, or RCI, based on mass balance certification or real renewable content).

Bernd Hoegemann, head of Clariant's masterbatches business (and newly appointed member of the company's executive committee), told the gathering that the firm will build a "mini-recycling plant" in Pogliano, Italy, masterbatch site near Milan, by next summer, to aid in its efforts to develop recycling-enhancing technologies. The demonstration plant will encompass the entire process, "all the way to the extrusion of PET bottles," he said. That site will be the first Center of Excellence under Clariant's new EcoCircle initiative, which addresses the circular plastics value chain from end to end.

The company announced a slew of new additives based on renewable feedstock, new recycling-enhancing additives, and a number of partnerships. One of those involves Britain's Polymateria, which is working to advance its Biotransformation technology that aims to set a new standard in the biodegradation of plastics. The two firms said they intend to focus their initial efforts on Southeast Asia, as this is the main source of "fugitive" plastic globally.

Domo, Covestro Partner on Blockchain Project

With its €300 million deal to buy Solvay's specialty polyamides business in Europe due to close by year's end, Belgium-based Domo Chemicals is positioning itself as a much larger player in the nylon resin business. Domo highlighted its sustainability-focused materials at K 2019, while also announcing a new collaborative project for circularity in the plastics industry through the use of blockchain technology.

For starters, Domo said the August acquisition of Solvay's PA 66 business "will significantly strengthen its downstream nylon-based engineering plastics business--and create a European leader with scale, entering the market with a top position in PA6 and 66 in Europe." The deal will boost the company's annual sales from €900 million to €1.6 billion

and more than double Domo's number of employees worldwide from 1,050 to about 2,150, Ludovic Tonnerre, vice president of the firm's engineering plastics business, said in an interview at his booth.

The deal will create a backward-integrated business with novel technology capabilities and a secured supply of key raw materials, allowing Domo to join Germany's BASF SE as the only fully integrated suppliers for both of those types of nylon resins. Domo already offers a complete portfolio of integrated nylon 6 products, including intermediates, resins, engineering plastics, and packaging film.



Ludovic Tonnerre

At K, the company focused on the sustainability of its products, including its Econamid Air range of carbon fiber-reinforced PA6, PA66 and PA66/6 compounds. Their proprietary technology combines 100 percent upcycled polyamide feedstock from nylon fiber yarn and film production waste with high-quality recycled carbon fibers. The resulting materials enable a significant reduction in carbon dioxide emissions without compromising mechanical properties.

With a carbon fiber content of up to 50 percent, Econamid Air is said to combine outstanding stiffness with low density for a wide range of cost-effective and lightweighting designs in demanding application areas, such as automotive, industrial, and sports. The carbon fibers also provide reduced surface and volume resistivity for various levels of electrical conductivity, from antistatic and static-dissipation properties to high electrical conductivity.

Separately, Domo joined with leading polycarbonates and



Domo, Circularise, and Covestro are partnering on a blockchain-based approach to provide full plastic resin traceability. Courtesy of Covestro

polyurethanes producer Covestro and with Circularise, a Netherlands-based tech innovator, in a new collaborative project for circularity in the plastics industry through the use of blockchain technology. Known as the Circularise Plastics project, it aims to set up an open standard for sustainability and transparency within this field.

Domo CEO Alex Segers said: “Registries and tracking systems are key to assessing progress towards global circularity goals. Blockchain can bring transparency where it’s most needed, especially when it comes to supply chain traceability in our industry.” He notes that the project has three main objectives:

- » Choose Circular: Make it easier for suppliers, processors, manufacturers, molders, and brand owners to choose traceable, sustainable, and circular materials.
- » Produce Circular: Create incentives for suppliers and manufacturers to produce traceable, sustainable and circular materials and products.
- » Make Circular: Provide critical information for reversed logistics and take back of products, materials and components.

A key value of blockchain, the group suggests, is that it avoids the use of a powerful central authority and thereby gives equal rights to all participants, and confidentiality and competitive advantage are always maintained.

Covestro Showcases a Bevy of Innovative Applications

At its expansive K show booth, Covestro highlighted scores of material samples, product advances, and case studies. Featured was an eye-catching prototype demonstrating how the interiors of future autonomous vehicles will evolve into a multifunctional mobile living and working space (but more on that in a future issue).

In order to promote the circular economy, Covestro CEO Dr. Markus Steilemann said the company has taken a first step in establishing a global strategic program to establish circularity throughout all areas of the company. In particular, it aims to use raw materials from sustainable sources such as waste, plants, and CO₂ as much as possible in production.

At K, Covestro presented a new concept for using postconsumer recycled polycarbonate waste in the electronics industries. The firm cited U.N. Sustainability Development Targets (U.N. SDGs)—in particular, Number 11 for sustainable cities and settlements, and Number 12 for sustainable consumption and production—as market drivers for material recycling.

The closed-material cycle presented at the fair begins



Working with Chinese shoe designer Axis Liu, Covestro is developing various concepts, including a recyclable, all-TPU sneaker. Courtesy of Messe Düsseldorf/ctillmann

with the production of new, transparent polycarbonate at Covestro and its supply to a manufacturer of five-gallon water bottles. This customer delivers the bottles to a water producer, which provides the filled containers to consumers. They can be reused up to approximately 50 times. At the end-of-life, they are being returned to the bottle manufacturer via the water producer through the same value chain. Then the bottles are shredded, cleaned, and sorted.

After that, the quality of the postconsumer recycle is checked and PC granulates produced. Covestro then processes this recycled granulate—to form a PC blend that is then used by OEMs to produce new laptops, copiers, printers, mobile chargers for smartphones and other electronic devices.

In another project, Covestro is working with partners on the recycling of PET bottles together with polycarbonate. Both plastics are processed into a PC-PET blend from which new, high-quality products can be manufactured.

Elsewhere at the booth, the company was showcasing how it can make trendy, functional sneakers entirely from thermoplastic polyurethane (TPU). Created by Chinese shoe designer Axis Liu, the monomaterial shoes are fully recyclable. Additionally, they contain TPUs from Covestro's Desmopan eco range, the carbon content of which partly originates from biomass. Other types being used are based on polyethercarbonate polyols, which Covestro produces from CO² using an innovative technology and sells under the name Cardyon.

The materials giant and Liu partnered on another shoe project involving the creation of customized running and basketball shoes and employing a number of Covestro material technologies, including its Insqin®-brand water-based PU textile coatings and adhesives, urethane foams, TPU textile fibers and films, and Maezio™-brand continuous fiber-reinforced thermoplastic composites (CFRTP). "For me, new materials are one of the most powerful driving forces for creative shoe design and for exploring new possibilities," Liu said.

Covestro displayed publicly for the first time the proprietary, patented SmartTrack material it developed for Align Technology Inc. to use in its Invisalign clear aligner system for straightening teeth. The aligners are thermoformed from biocompatible polycarbonate film Covestro makes in Germany. While it has been supplying the material to Align for seven years, it only recently gained approval to show it in public.

DSM Promising Bio-Based Alternatives for ETPs

Shruti Singhal assumed his post as president of Royal DSM's DSM Engineering Plastics subsidiary Oct. 1, and just days later announced an ambitious goal at K 2019. By 2030, his firm intends to offer a full, alternative range of its existing portfolio that contain at least 25 percent recycled and/or bio-based content by weight in the final product. In doing so, he says DSM aims to enable its customers to meet growing demand for more sustainable products.

This portfolio of alternatives, DSM notes, will leverage a toolbox of different technologies and approaches such as fermentation, mechanical recycling, and mass balance accounting of bio-based and/or chemically recycled feedstock.

"As an immediate step, today," Singhal said at an Oct. 17 news conference, "DSM Engineering Plastics is launching bio-based grades of its Arnitel® and Stanyl® product portfolio manufactured via a mass-balancing approach of bio-based feedstock.

The Stanyl bio-based grades are already available with the globally recognized sustainability certification ISCC Plus."

Joost d'Hooghe, vice president for polyamides for the Singapore-headquartered DSM Engineering Plastics, added: "Our Arnitel and Stanyl bio-based alternatives will deliver the same functional performance as our conventional portfolio. This will enable our customers to easily shift to a more sustainable solution without having to requalify materials."

Arnitel is DSM's line of high-performance, copolyester thermoplastic elastomers, and Stanyl is its range of high-temperature, aliphatic nylon 46 products.

By 2030, said Netherlands-based Singhal, some 15 percent of the engineering plastics market is projected to be based on bio- or recycle-based technologies. He noted that his firm also aims to boost its purchased share of renewable energy by then to 75 percent, from its current 63 percent.

Ascend Unveils New Nylon Grades

Houston-based Ascend Performance Materials—the largest fully integrated producer of polyamide 66 resin—used the show to roll out several new material grades, targeting cable ties and fasteners, films, and electronic and electrical applications.

Its introductions included Vydyne® XHT, a new portfolio of heat-stabilized PA 66 and copolymers capable of withstanding prolonged exposure to temperatures up to 230° C, along with new long-chain polyamides and other high-temperature grades, according to Dr. Steve Manning, the firm's Pensacola, Fla.-based senior director of business development and technology. The previous top-end range was typically 160-180° C, he said.

XHT products use a combination of polymer chemistries and a multistage heat-stabilization technology to



Shruti Singhal

With a high weld strength and long-term temperature resistance up to 230° C, Vydyne XHT performs well in under-hood parts such as integrated air intake manifolds.
Courtesy of Ascend Performance Materials

push the boundaries of temperature resistance without sacrificing the processability, durability and mechanical properties for which PA66 is known. The Vydyne XHT portfolio currently includes four glass-filled grades said to be ideal for use in demanding automotive applications, such as charge air coolers, integrated air intake manifolds, exhaust gas recirculators, and resonators. Manning said the company is looking to apply the same technology to its non-reinforced line of resins, with a rollout planned next year.

Ascend also introduced a new portfolio of PA610 and PA612 long-chain polyamides. With low moisture absorption and high chemical and UV resistance, Ascend's LCPA grades are engineered for a variety of applications, including monofilaments, battery seals, cable ties, automotive cooling, and fuel connectors, and sporting goods. "In [the] future, we will apply high-temperature stability to our long-chain grades, as well," Manning noted.

The company said its new Vydyne ThermaPlus™ is a heat-stabilized PA66 for cable ties and fasteners. And a new series of PA66 copolymer resins for films. Vydyne PTR films are 40 percent more puncture resistant than PA6 films, exhibit high clarity, and can be processed on existing blown, cast, and biaxially oriented film equipment.

On the textile front, Ascend launched Acteev™, a resin with a non-silver antimicrobial additive to provide odor-fighting performance for the life of a garment. Since it is embedded in the matrix of the polymer, Acteev is easily dyeable and does not discolor or wash away after laundering like topical fabric treatments, Manning said.

Nova Chemicals Gets Its Resins Recycle-Ready

Polyethylene producer Nova Chemicals Corp. introduced a suite of resins designed to pair with recycled content without diminishing quality, and that also retain their physical properties after mechanical recycling. It is targeting these six octene and one butene LLDPE resins for packaging applications.

Additionally, Calgary, Alberta-based Nova—which shared a presence at K 2019 in a booth with sister companies Borouge and Borealis Group—launched a new, high-performance sealant resin at the show. Called VPs412, it is the fourth in an existing family of sealants that debuted at PackExpo 2017, Owen Lightbody, technical service leader for flexible packaging, said in an interview on the stand. He noted that its high caulability and seal-through contamination performance enables fast sealing and fast setting.

Nova's new VPs412 sealant offers high caulability and seal-through contamination performance in food packaging and other applications. Courtesy of Nova Chemicals Corp.

For film converters that run blown and multilayer cast film, VPs412 offers a variety of benefits such as excellent optical properties, low seal initiation temperature, low gels, and very good tear properties. It is also claimed to provide a low leaker rate and better processability than metallocene LLDPE sealant resins currently in the market.

As for the recycle-ready resins, Lightbody said, when used in their virgin state, they compensate for often degraded physical performance of recycled content in film structures, suppressing odor by up to 80 percent and improving optics by up to 15 percent. When repurposed multiple times through mechanical recycling, the resins retain or improve their key physical performance properties, enabling reuse in applications such as stretch film, stand up pouches, multipack collation shrink, and heavy-duty sacks.

Nova also officially launched version 4 of its Bonfire® film development platform, which enables film designers to "virtually" build complex multilayer film structures, then predicts their performance properties. The platform allows users to narrow their options when developing new structures and applications before they are manufactured, reducing the number of physical trials and interruptions to commercial production required.

It can be used to design films with up to 11 layers, Lightbody said. In one case, he noted, a customer came to them believing he needed an 11-layer film for his application, only to learn by using Bonfire he needed just six layers. This latest generation adds three new modules to the Bonfire platform—a rheology module, a blends calculator, and an interactive library of educational materials called Bonfire Academy. The program can help users determine how to downgauge a film, or how to add recyclate to it, and other such steps that can help improve overall sustainability.



Songwon Stresses Fire-Retardant Solutions

South Korea's Songwon Industrial Co. Ltd., the second-largest polymer stabilizer maker in the world, pulled back the curtain at K on a new family of flame-retardant synergists it had previously only hinted about.

The company says it designed its new Songflame family of flame-retardant (FR) products to provide high performance and competitive advantages in a broad range of applications. They also are meant to fuel the growth of halogen-free solutions for materials ranging from foams to various polymers such as polyolefins, acrylonitrile butadiene styrene (ABS), and thermoplastic polyurethanes (TPUs). In addition to thermoplastics, Songflame technology can also be used with thermosets, and in wood, coating, and adhesive applications.

The additives—which feature a fine, easy-to-disperse particle size—act synergistically with most available phosphorus flame retardants and are effective at loadings as low as 0.5 to 0.2 percent. Such synergist products, the firm notes, allow users to increase efficiencies, lower cost-in-use, and “do more with less.”

Board member Dieter Morath, speaking at the firm's K news conference, said the company intends to establish itself as a driving force for fire retardants in halogen-free formulations. In a separate interview, Philippe Schlaepfer, the firm's leader of performance chemicals, said, “We've developed an entire technology platform” in this space, and the new FR additives “are just the first three products.”

Beyond plastics, Songwon is demonstrating its FR commitment by partnering with Nordtreat, Europe's leading manufacturer of non-toxic FRs for wood. Songwon's stand at the trade fair was constructed with natural wood beams that all were coated with Nordtreat's transparent products.

Meanwhile, for blow molding applications, the company introduced Songxtend® 1105, a new blend based on a phenolic antioxidant and a high-performance phosphite that addresses the requirements of resin producers in chromium HDPE blow-molding resin stabilization. The product is said to offer color improvement while ensuring excellent hydrolytic stability compared to some other high-performance phosphites used alone or in blends.

Vertellus's New Copolymer Targets Composites

Indianapolis-based specialty chemicals supplier Vertellus Holdings LLC chose K 2019 to introduce a developmental product—ZeMac™ E10 copolymer—designed to significantly upgrade fiber reinforcements used to produce plastic compounds and composites. The new, low-viscosity epoxy grade is a first for the company, said Prasad Taranekar, marketing manager for plastics.

Demand for enhancing strength-to-weight ratio in the composites industry is increasing for many applications, such as wind blades for energy, printed circuit boards for electronics, and various products in the transportation sector. For most such uses—whether the reinforcement



Vertellus designed its ZeMac E10 copolymer to upgrade fiber reinforcements used to produce plastic compounds and composites, including in demanding applications such as wind turbine blades and printed circuit boards. Courtesy of Vertellus

is glass fiber, carbon fiber or liquid-crystal polymer (LCP) fibers—epoxy sizing (the coating of the fiber to ensure it interacts with the resin) is typically used. Traditional surface sizing agents provide insufficient benefits in thermoplastics and thermosets to meet increasing requirements.

The company, which went through a capital restructuring in 2016 and brought new CEO John Van Hulle on board from PolyOne Corp. just over a year ago, also rolled out new grades of Polycin™ polyols and Vorite™ prepolymers which, when combined, become high-performance adhesive and sealant systems.

Vertellus says its two-component polyurethane (PU) systems, such as its D-Encapsulant, are fast becoming the materials of choice in deep-sea cable applications due to key features, such as them being hydrophobic, which keeps moisture from penetrating the sensitive electrical and fiber optic system—a critical factor in a high water/high pressure environment.

Its single-component Sealrite™ sealant systems, meanwhile, offer device and component manufacturers the moisture-blocking and self-sealing properties needed in applications such as industrial batteries.

The nine-plant, 900-employee Vertellus has reorganized into four divisions—one of which is plastics. Taranekar said about 20 percent of the company's business is currently in plastics, but that it sees that as the most attractive sector, and intends to increase its plastics share.

ABOUT THE AUTHOR

Robert Grace is a writer, editor and marketing communications professional who has been active in B2B journalism since 1980. He was founding editor of and worked for 25 years at *Plastics News*, serving as editorial director, associate publisher and conference director. He was managing editor of *Plastics Engineering* from July 2016 through October 2017, and is now both editor of SPE's *Journal of Blow Molding* and directing content strategy for SPE. He runs his own firm, RC Grace LLC, in Daytona Beach, FL., and can be contacted at bob@rcgrace.com.

