

Stretching the limits of elastomers



Having rubber-like properties make elastomers an interesting category of plastics materials. From a time when TPEs are most visible on a toothbrush handle or non-slip cup, this material and other elastomers can now be found in more complex situations

TPE is a safe material for baby products like the Ortho-Gibby pacifier

Sucking is a baby's natural reflex – they suck for food and also for comfort. Some parents are concerned about giving their babies pacifiers because conventional ones tend to distort the development of jaws and teeth in children and can lead to speech development problems later on in the child's life.

In comes the Ortho-Gibby orthodontic pacifier designed to encourage normal swallowing and tongue thrusting. The patented design allows the child to suck normally and lets new teeth align properly as they grow.

The Ortho-Gibby's maker Branam Oral Health Technologies (BOHTI) chose PolyOne GLS's Versaflex TPE material because it fulfils a lengthy list of criteria. First of all, the US Food and Drug Administration (FDA) has some tough regulations for materials used in the mouth, which Versaflex complies with. Further, Versaflex has a soft texture for gnawing, is durable, and can withstand high temperatures such as in a dishwasher. Most importantly from a marketing point of view – the material can be coloured to appeal to shoppers.

Rick Noller, director of global marketing, PolyOne GLS Thermoplastic Elastomers, said: "Versaflex and our other FDA-compliant materials offer manufacturers new options for creating the next generation of devices. These high-performance products have broad appeal for consumers, such as softness, attractive surface finish, colourability and easy maintenance, all of which can

drive sales for our customers."

The Versaflex TPE material BOHTI chose also does not attract lint or dust and retains its shape well despite long periods of chewing. Since TPE can be injection moulded, the unusual curvature of the pacifier can be produced easily.

TPE's versatility and safety makes it an ideal candidate to replace some existing materials now used in the medical industry, one of which is PVC.

Explained Roger Young, vice president Asia Pacific of plastics and rubber consultancy Robert Eller Associates: "PVC is coming under increasing pressure in the medical market due mainly to phthalate plasticisers. Non-DEHP plasticizers have met most of the needs, but the green movement is putting pressure to replace PVC and not just change the plasticiser. This is beginning to increase substitution pressure toward styrenic block copolymers (SBCs)."

He went on: "The industry has been anticipating this movement since the 1980's. The increased sensitivity of society towards migration of trace amounts of residuals and additives in plastics is attracting a lot of attention, led by BPA in PC and DEHP plasticisers in PVC. North American and European consumers are raising these issues about accumulation of these trace components in the human body as analytical science has brought our ability to measure these compounds to the forefront."

Just as we see more polycarbonate bottles being removed from shelves and substi-

tutes like PP moving in, Young predicts: "If this green movement momentum continues, it could lead to large volumes of SBCs replacing PVC and the TPE industry is poised, ready to take advantage of the opportunity."

TPEs can be found in a wide variety of applications. The main reasons for using TPEs are advantages in the production process, e.g. co-injection moulding and differentiation from the competition, said Lars Goldmann, head of corporate marketing at German TPE producer Kraiburg. TPEs also offer haptical, visual, olfactorical and even functional advantages for designing products.

Kraiburg has a dedicated medical division to develop products for the medical and pharmaceutical market. Its Thermolast M product line slides well with other plastics materials and a new MT series shows very low coefficients of friction, which are advantageous for use in insulin pens or protective covers for minimally invasive operating instruments.

Kraiburg has another range of TPE for automotive and industrial applications. The Hiprex line has a high melting point of 170°C, resistant to polar fluids and has good adhesion properties. Kraiburg has improved on the tensile strength of the Hiprex compounds and their flow and surface characteristics, which helps to reduce production time and costs, whether for single- or double-component injection moulding. With low swelling rates, these high-performance compounds tend to suffer less from side effects of

changes in volume, mass or hardness under extreme conditions.

The sector of cables and wires is starting to use more elastomeric materials. Young said: "PVC replacement, particularly in the wire and cable sector, is particularly competitive with TPV, SBC compounds and Flexible Noryl battling it out for market share."

"Demand in this sector is expected to continue to increase as MNC electronics companies have globalised their PVC replacement programs and this spreads to other manufacturers, particularly ones that have not been under pressure to meet the European RoHS requirements (the exporters to Europe have already converted)."

Sabic Innovative Plastics recently announced that its customer Chianguy Electric, a leading Chinese cable and wire manufacturer, has chosen its Flexible Noryl resin to produce ultra-white or custom-coloured cables for high-end consumers. Besides being able to fulfil aesthetic trends, Flexible Noryl is a PVC- and halogen-free, flame retardant alternative which is viewed positively by environmental advocates (see Regional News Page 7 for more details).

Besides TPE, other kinds of elastomers are finding new fit in existing applications. Topas Advanced Polymers introduced a cyclic olefin copolymer (COC) elastomer targeted to be a high-performance alternative to traditional ones like TPE. Topas reports the new material's tensile modulus to be 6400 psi and elongation at break point to be greater than 450%. It has low dielectric properties comparable to some fluoroelastomers (useful for electrical insulation uses) and can maintain ductility at -80°C.

This new type of elastomer combines transparency with toughness and flexibility and opens up new possibilities for applications like medical devices and drug delivery, food and pharmaceutical packaging, optics and electronics. Topas said the initial grade meets USP Class VI requirements for use in medical devices while approval for FDA food contact is pending. Early tests show that this material withstands gamma and e-beam sterilisation.



Thanks to TPEs, double-shot moulding brightens up daily necessities like toothpastes



Quelle/Source: BMW AG

TPE, such as the Thermolast K range from Kraiburg, is a choice material for the windshield gasket of the BMW car

As a whole, TPEs are affected little by the "green" movement. Some players are, nevertheless, more forward-thinking, said Robert Eller Associates' Young.

"There has been only minimal movement of thermoplastic elastomers in response to the bio-sustainability requirement. Specifically, the COPA suppliers, Arkema and Evonik, are both using bio-based feedstocks to produce their products which the footwear manufacturers have taken advantage of. Merquinsa has also been develop-

ing a series of TPUs with a bio-based feedstock. This has yet to be met by the major competitors Lubrizol, Bayer and Basf."

Young concluded: "As PP begins to be produced from sugar-based ethanol feedstocks by companies like Dow and Braskem, expect PP-based thermoplastic elastomers like TPVs and SBCs to begin using those feedstock to meet the responses of OEMs and end use consumers to manufacture green compounds."

Teknor Apex takes over DSM's Sarlink TPU business

Pawtucket, RI-headquartered Teknor Apex will purchase Royal DSM's Sarlink thermoplastic vulcanizate (TPV) elastomer business. The deal covers capital assets including Sarlink compounding facilities in Leominster, MA in the US and Genk in Belgium, engineering and laboratory resources for application development, as well as 90 Sarlink employees working in Detroit, Sittard in the Netherlands, Shanghai and Singapore.

Both companies did not reveal the financial details of the deal but DSM said Sarlink sales last year was €50 mil.

After the acquisition, Teknor Apex will continue to sell the products under the Sarlink name. Sarlink TPVs are expected to complement rather than duplicate the thermoplastic elastomer (TPE) offerings of Teknor Apex.

"Teknor Apex is a natural fit for the Sarlink group, and the synergies from our combined people and resources will benefit the customers of both," said Bertram M Lederer, executive vice president of Teknor Apex.

"The addition of the Sarlink TPV business will strengthen the position of Teknor Apex as the world's most diversified independ-

ent compounder of TPEs and expand our portfolio at the high-performance end, particularly for automotive applications," Lederer said. "It will also increase our capability to serve customers as a single source for multiple materials, including vinyl and engineering thermoplastics as well as TPEs, and to do so worldwide. Here, too, Sarlink complements Teknor Apex, bringing a strong market position in Europe, just as Teknor Apex is particularly strong in Asia."

The sale of Sarlink is part of DSM's plans to divest business entities not related to its life sciences and materials sciences foci. DSM continues to seek buyers for the second part of its elastomer portfolio Keltan (EPDM) and other base chemicals and materials businesses.

Automotive is the largest market for Sarlink TPVs, with applications in soft touch interior, sealing system, chassis, underhood, and wiring components. Other applications for Sarlink include building and construction, consumer products, corrugated hoses, tubing, and industrial components. Specialty Sarlink grades are used for potable water, food-contact, and medical applications.