

“A history of a resounding success”

Santoprene celebrates 40th anniversary

In 2017 Santoprene celebrates its 40th anniversary. The brand name Santoprene has literally become a generic name for thermoplastic vulcanizates (TPV). The name Santoprene still alludes to the company who initially filed the brand name for registration on 17 January 1977, Monsanto. The first developmental products were then brought to the market in 1978. 1981 saw the full commercialisation of the TPV, that since 2002 is owned by ExxonMobil Chemical. On the occasion of the 40th anniversary of the most famous representative of the group of thermoplastic vulcanizates TPE Magazine had the chance to speak to Kurt Aerts, Vice President, Specialty Elastomers & Butyl Polymers, ExxonMobil Chemical, about the history and the future of this fascinating material.

TPE Magazine:

ExxonMobil Chemical celebrates the 40th anniversary of Santoprene this year. How did it all begin? Could you please describe the major milestones in the history of Santoprene?

Kurt Aerts:

It all started over 40 years ago when Monsanto was undertaking research to create a new material for injection-molded tires. While it wasn't successful, the innovation resulted in Santoprene thermoplastic vulcanizate (TPV), a revolutionary polymer that has the attributes of a rubber but can be processed like a thermoplastic. There was nothing else like it, and since then, it has become a resounding success and probably the strongest brand in this sector today.

Having discovered Santoprene TPV, however, the hard work had only just begun! The business initially targeted processors that manufactured finished parts from rubber, but the new material got a very lukewarm reception from the rubber industry. Rubber processors weren't prepared to work with a material that was fully compounded or invest in the new equipment they needed to process it. While we were excited about the opportunities of the material, the rubber industry was reluctant to invest in a new business.

So, we revised the business strategy to focus on the customers of the rubber processors. Approaching automotive OEMs, such as Ford and GM, and appliance manufacturers, such as GE and Whirlpool, proved successful. Having managed to convince them that we had an interesting new material, we had

Kurt Aerts, Vice President, Specialty Elastomers & Butyl Polymers, ExxonMobil Chemical.



to encourage the creation of a supply chain that could manufacture the parts.

While Santoprene TPV obviously had to meet the performance specifications of the part, the clear message that got the interest of the OEMs was cost savings. Faster part production cycle times, lower weight and ease of production all contributed to lower part costs. By establishing the concept of Rubber Conversion Economics (RCE), we compared every aspect of producing a part in a traditional rubber material with Santoprene TPV. RCE demonstrated that an OEM could save a significant percentage of the cost of the final part if they converted to Santoprene TPV. In addition to cost savings, the establishment of unrivalled technical support capabilities and the manufacturing capacity to provide materials of consistent quality across the world led to a successful global business.

TPE Magazine:

The success story of Santoprene is strongly entwined with the advent of TPEs in the world of polymer materials. Initially TPEs gained market share because of their ease

of processing and recyclability in contrast to thermoset rubber. And in diverse applications it was Santoprene that played a significant role in the process of substituting rubber with thermoplastic elastomers. Can you cite some striking application examples?

Kurt Aerts:

As you can imagine, over the 40 year history of Santoprene TPV there have been some memorable applications in which it has been used to add value from both a performance and processing perspective. I think it's worth reflecting on some of those applications which made a difference to the business and helped make it the success it is today.

The first real commercial success for Santoprene TPV can be found in the automotive industry, which remains the largest market today. In the early 1980s, Santoprene TPV was used for automotive rack and pinion boots because it improved flex life, fluid resistance and sealability, while reducing costs. The application has proven so successful that over 90 % of cars on the road have them installed.

Another highly successful application in the automotive sector is weatherseals. Although probably the most successful Santoprene TPV application to date, our man-

agement team didn't initially think they were viable. The work and tenacity that went into proving they could work, and which is symbolic of the company's commitment to the industry and its customers, has paid dividends. The lengths the business went to even involved making weatherseals in our lab to test on employees cars. Toyota were the first manufacturer to fully recognize and embrace the opportunities for better weatherseal performance, lower weight that can boost fuel efficiency, and cost savings. Other OEMs were quick to follow. Since those early days, there have been many successful weatherseal applications, but one that comes to mind is the cowl vent grill seal for Ford Motor Company's C-Max 2013 which won the SPE 2013 Innovation Award. Another is the door module seal of the Dodge Nitro 2007 and Jeep Liberty 2007 which won the SPE 2007 Innovation Award.

In the mid-1990s, the appliance and consumer products sector started to truly understand the benefits of the toughness, flexibility and sealability of Santoprene TPV, combined with its resistance to detergents and fluids. It is used for sump boots in dishwashers, and seals in dishwashers and washing machines.

The use of Santoprene TPV in the consumer products sector expanded in the mid-

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Santoprene milestones:	
1977	Santoprene TPV discovered
1981	Santoprene TPV commercialized
1982	Detroit sales office opened
1983	Rack and pinion boot application which has proved so successful that over 90 % of cars on the road today have them installed
1984	Extruded profiles and weatherseals Newport, South Wales plant start-up
1985	Appliance sump boot Pensacola, Florida start-up
1987	Automotive air ducts and medical grades
1988	Construction expansion joints
1989	Medical syringe tips
1990	Monsanto and Exxon form Advanced Elastomer Systems (AES) Newport plant expansion
1991	Toothbrush grips and Design Center start-up
1992	Pensacola plant expansion
1995	Newport plant expansion
1996	Newport plant expansion
1997	Pensacola plant expansion
2002	ExxonMobil Chemical acquires full ownership of AES
2006	Pensacola plant expansion
2008	Newport plant expansion
2017	Newport plant expansion underway



Source: ExxonMobil Chemical

1990s when the design community recognized it could enhance the feel and appearance of products. By collaborating with design engineers Santoprene TPV started being used for aesthetic effects such as soft-touch, color, texture and special effects. While this capitalized on the aesthetics, the engineering aspect and functionality of the part still needed to be understood and, of course, it had to be economical. Such was the success of these applications they won many design industry awards and Santoprene TPV even featured in the Mutant Materials in Contemporary Design Exhibit at the Museum of Modern Art in New York.

Some of the most striking and perhaps best-known applications included the grips of OXO kitchen products and Black & Decker power tools. Even today, few people know that Santoprene TPV plays a significant role in the soft-grip market for everyday products like gardening and power tools, kitchen products, razors, ski poles, toothbrushes and pens.

TPE Magazine:

Let's have a look at Santoprene today. Where are production sites of Santoprene and are you planning any investments in new capacities?

Kurt Aerts:

Santoprene TPV is currently produced in Pensacola, Florida, and Newport, Wales and, because of anticipated growth opportunities, we are investing in new production capability. An expansion at our specialty elastomers plant in Newport will result in a 25-percent

increase in global capacity. The expansion is due to be completed by the end of 2017 with product being available in 2018.

TPE Magazine:

How do you position Santoprene today in your portfolio? Would you say that Santoprene is the flagship brand within your

"Another highly successful application in the automotive sector is weatherseals."

elastomer portfolio? And what are the synergies to other elastomers in your portfolio?

Kurt Aerts:

Santoprene TPV is undoubtedly a flagship brand within our elastomer portfolio as it has been throughout its 40 years, and our commitment to the brand, our customers and the industry remains as strong as ever. There are many synergies with our Vistalon EPDM rubber brand, which we invented over 50 years ago, as it is a fundamental building block of Santoprene TPV. Our elastomers knowledge and expertise, especially relating to TPVs and EPDM rubber, is invaluable in

providing customers with the support they need to develop successful applications.

TPE Magazine:

Market specialists such as Bob Eller have identified a certain challenge to the position of olefinic TPVs by improved SEBS compounds. Would you agree to that?



Source: ExxonMobil Chemical

Kurt Aerts:

Because Santoprene TPV is an EPDM rubber cross-linked within a PP matrix, we believe it has a unique position in the industry with proven performance in a wide range of automotive, consumer and industrial applications. Of course, we are continually investing in new products. A series of new Santoprene TPV grades is lined up that are designed to satisfy new opportunities and meet expected growth in the automotive industry. These include foaming grades for weatherseals, grades for door/body seals and grades which can withstand under-the-hood environments. So, it's important to recognize that while other polymer compounds may be evolving, so too is the Santoprene TPV gradeslate – it's not standing still.

TPE Magazine:

After 40 years Santoprene today is a mature product with established applications. How much do you invest in developing it further?

Kurt Aerts:

After 40 years, Santoprene TPV may be regarded as a mature product but today we are as committed to the brand and our customers as we have ever been. Because of the



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Source: ExxonMobil Chemical

growth opportunities for Santoprene TPV we are continually investing in new products, capacity and technical support capability.

A series of new Santoprene TPV grades is being designed to satisfy new opportunities and meet expected growth in the automotive industry. The first grades to be introduced are new foaming (micro-foaming) products. Moving from a dense rubber profile to a foamed TPV profile allows the extrusion of profiles that are much lighter and use less material than thermoset rubber alternatives. These new foaming grades are generating tremendous OEM interest and many customers are currently qualifying the material for specific applications.

Other new Santoprene TPV grades, such as UV-resistant and low friction molding grades, are in development which will provide specific attributes for other applications. For example, we're looking at grades for door seals which need to withstand the dynamic stress and impact related to the repeated opening and closing of the door. And, grades for under-the-hood components that can tolerate high temperatures, chemicals, oils and solvents.

Our investment is not only in new grades. As I mentioned earlier, we are investing in an expansion at our specialty elastomers plant in Newport, Wales which will result in a 25-percent increase in global capacity. Plus, an expansion of our Shanghai Technology Center (STC) is currently underway with completion due in early 2018. The ex-

pansion includes a new, state-of-the-art research and development facility to support customer collaboration and growth.

TPE Magazine:

ExxonMobil supplies a broad portfolio of elastomers – thermoset rubbers and TPEs – for automotive applications. Alternative mobility concepts such as e-mobility will lead to a significant shift in the use of elastomer materials in automotive indus-

try. What are in your opinion the principal opportunities and challenges here for your portfolio and especially for Santoprene?

While electric vehicles are powered differently from conventional cars, some trends



Source: ExxonMobil Chemical

“Designers and manufacturers of electric vehicles are still looking for lightweight solutions...”

try. What are in your opinion the principal opportunities and challenges here for your portfolio and especially for Santoprene?

Kurt Aerts:

There are many parallels between applications in the automotive industry and

driving the industry are similar. For example, there is still a need for the performance, processing and sustainability benefits that Santoprene TPV can provide for a range of applications. Materials for weatherseals, for example, still need to provide: sealing performance; UV and ozone resistance; opportunities for low weight; processing ease; and, the ability to re-process in-house scrap or opportunities to recycle end-of-life parts. Santoprene TPV is perfect for meeting those needs.

It is important to remember that designers and manufacturers of electric vehicles are still looking for lightweight solutions because the lighter the car, the longer the battery range. As has been proven, Santoprene TPV can help meet the light-weighting needs of OEMs.

TPE Magazine:

Where do you see most promising new applications for Santoprene in the near future?



Source: ExxonMobil Chemical

Santoprene TPV is also widely used in window and door seals for commercial and residential high-rise buildings, as it can improve sealing performance and weathering resistance for long-term durability.

Kurt Aerts:

There are many new application opportunities for Santoprene TPV with the automotive industry leading the list. Needless to say, close collaboration across the automotive value chain including OEMs, Tier 1 and Tier 2 companies helps us predict where the



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industry is going. Having a voice in those discussions is key to developing new grades which can help customers innovate and create new applications.

For example, new weatherseal applications like glass run channels (GRC), window sealing systems, and the seal between the car body and door. Plus, there are possibilities for thermoset rubber replacement in under-the-hood components.

Because weatherseals like GRCs are often more visible in vehicles today, they have a major impact on the "look" of a car. Aesthetics of the part, in terms of aspect and appearance, are increasingly important. For an OEM to consider changing from rubber to Santoprene TPV for its GRC, they need to be confident that it will meet their high expectations for visual appearance and color consistency while still meeting the technical requirements of the part, deliver lower weight and cost, and be easy to process.

A new series of Santoprene TPV grades is lined up which can satisfy new opportunities and meet expected growth in the automotive industry. The first to be introduced are new foaming (micro-foaming) grades. Moving from a dense rubber profile to a foamed

TPV profile allows the extrusion of profiles that are much lighter and use less material than thermoset rubber alternatives. The new foaming grades are generating tremendous OEM interest and many customers are currently qualifying the material for specific applications.

Other new Santoprene TPV grades are in development for door seals which need to withstand the dynamic stress and impact related to the repeated opening and closing of the door. While grades are in development for under-the-hood components that can tolerate high temperatures, chemicals, oils and solvents.

It is also worth pointing out that it is not just new applications which offer opportunities for growth. A growing global population and emerging middle class is driving demand for consumer goods. For example, after rapid development over the past 10-20 years, the Chinese automotive industry

is heading down a new path of improved quality and sustainable development. On one hand, the growing middle class is driving automotive enterprises to adopt materials with better performance and higher quality that improve the driving and riding experience. On the other hand, growing stringent fuel economy standards and emissions regulations have prompted these enterprises to take a variety of measures to effectively increase fuel efficiency and reduce emissions. These automotive opportunities in China, plus the increased demand for consumer products from the growing middle class, all provide opportunities for Santoprene TPV.

There are plenty of opportunities for growth making this an exciting time for the brand as we celebrate its invention 40 years ago.

But, of course, the growth of Santoprene TPV wouldn't have been possible without our customers. They believed in this revolutionary polymer from the outset and we appreciate them for putting their trust in the product and us. This business has always been about understanding our customers' world, their applications and products, and of course the economics. Through our technology support centers we can be with them, collaborate and innovate with them, and invest in them for mutual success.

TPE Magazine:

Mr. Aerts, thank you very much for the interview!

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