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“60 – 65 % TPE in the application area of glass run channels – and in fact until 2020” – this is a number that the TPE compounders would probably like. It was declared by Eric Jourdain, Specialty Polymers Marketing and Technology Segment Manager at ExxonMobil. And in fact as in passing during the Technology Days, hosted by KraussMaffei Berstorff in the middle of September 2012 in Hannover, Germany. No question: 65 % is a fascinating number– all the more when we keep in mind that the mentioned field of application was still dominated in the year 2007 in about 70 % by EPDM. Jourdain’s assessment becomes even more interesting when we take a wider look at the entirety of seals used in producing a car. In fact, keeping the car interior tight to wind and weather has been one of the main application areas for EPDM. And apart from the area of car doors Jourdain knows a multitude of seals – from car glass guide over the actual door seal until the sealing of the holder of the outside mirror.



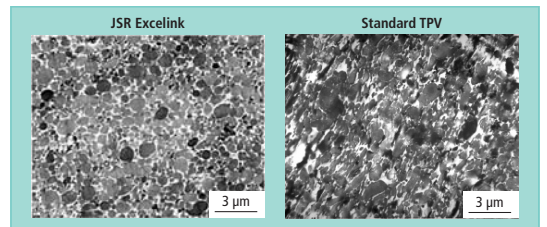
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New corner molding TPV materials for automotive weather seals 26

Thermoplastic vulcanizates (TPV) have been widely used in automotive applications, especially for both environmental benefits and cost reduction in the process. Environmental benefits include weight reduction, recyclability, safer curing agents (no nitrosamines), energy saving in process, etc. Cost reduction is caused by the simplified process and higher productivity compared to thermoset rubber. TPV technology continues to gain recognition for enhancing productivity and performance. Excelink 1st generation grades have been developed as advanced unique TPVs since 2000 and they have been used mainly for automotive weather seal applications worldwide. In the last years market requirements for better performance and more efficient and environmentally friendly processes have been increasing. In response to these market requirements, a new advanced Excelink TPV (Excelink 2nd generation) has been developed for automotive corner mold applications. We will demonstrate in this paper that Excelink 2nd generation grades will expand the domain of TPV applications and significantly contribute to more environmentally friendly processes and process cost reduction.

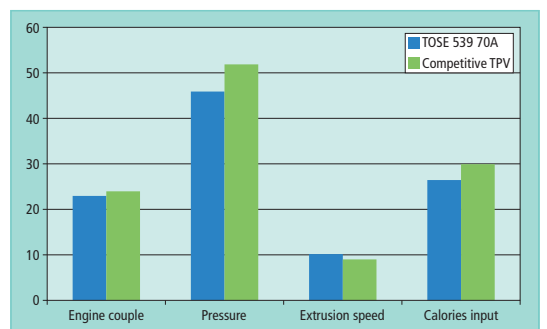


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TPEs for automotive glazing seals 29

The global sealing system market has shown steady growth for many years especially in the area of automotive seals. Today, this market is facing new challenges such as the drive for cost savings and complex designs to attempt to improve sealing performance and styling, weight reduction, and recyclability. By providing a benefit in each of these areas, TPE technology has made a remarkable breakthrough in automotive glazing sealing systems and has progressed from being a simple challenger to a true competitor of EPDM and increasing its market share drastically. Simultaneously, diverse polymer chemistries are available for innovations in materials with plastic processing and elastomeric functional improvements. More than a decade ago, CTS introduced to the market new TPE-S (SBC–SEBS based) formulations with superior compression set and relaxation behaviour as well as excellent aesthetics performances for automotive weather strips.



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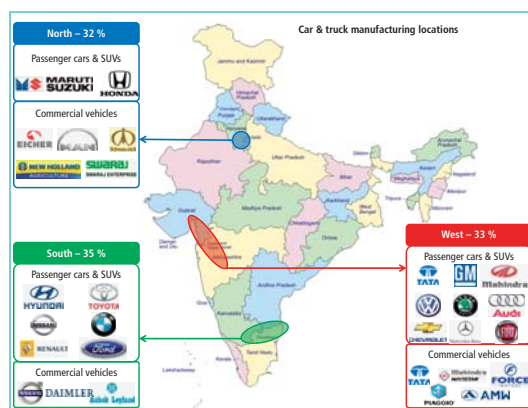
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TPE materials usage is becoming more and more important in sealing systems, therefore creating new opportunities. By combining the advantages of both material properties EPDM/TPE hybrid systems for automotive sealing applications contribute to the overall weight reduction of a vehicle at a competitive price. SaarGummi has a proven track record in supplying sealing systems for OEMs like Audi, BMW, and others. The company demonstrates its strength for innovation in understanding and developing rubber and thermoplastic materials and their combinations.



Applications of thermoplastic elastomers in the Indian automotive markets..... 36

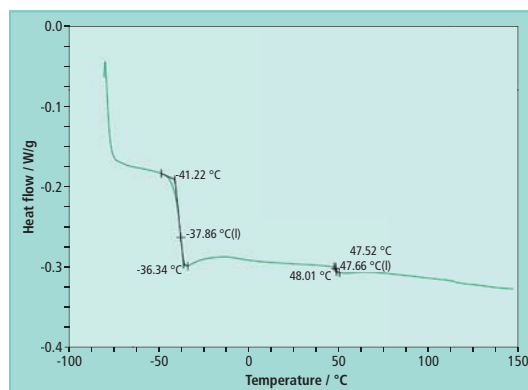
India is today the sixth largest automotive producer in the world with 3.9 million passenger and commercial vehicles produced in 2010 – 2011. This figure is expected to reach 5 million by 2015. Over 75 % of cars and SUVs sold in the country belong to small, entry level and compact segment, which is highly price sensitive and this is where TPOs/TPes and PP compounds find major applications. TPOs/TPes have made significant in-roads in the Indian auto industry through a wide variety of applications ranging from bumpers to instrument panels; from glass run channels and weather seals to under the hood ducts and bellows – with current average volumes pegged at around 50 lbs (~22.7 kg) per vehicle. Indian TPE compounders, over the years, continued technology development to now reach a level of competence that is at par with global multinational compounders. As India emerges as an export hub for small/compact cars, the local compounders have successfully developed materials complying with global specifications and standards. This paper will dwell on the current application areas of TPOs/TPes and PP compounds, with primary focus on latest technology that is critical to class "A" items like bumpers, instrument panels etc. Furthermore, the paper will provide an insight into the local compounders – that are very well entrenched in the Indian automotive market and the issues/concerns for offshore suppliers seeking to penetrate one of the fastest growing markets in the world.



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Evaluating the properties and performance of Susterra 1,3-propanediol and Biosuccinium sustainable succinic acid in TPU applications 42

Susterra propanediol (PDO) and Biosuccinium sustainable succinic acid (SA) have been evaluated as potential alternatives for 1,4-butanediol (BDO) and adipic acid (AA) in polyester polyols for thermoplastic polyurethanes (TPU). Biosuccinium and Susterra are unique 100 % bio-based offerings from their respective suppliers, Reverdia and DuPont Tate & Lyle Bio Products. Their use makes it possible to yield a final polyester polyol and polyurethane product with a substantial renewable content of up to 100 % and 70 % respectively. Susterra reduces greenhouse gas emissions by more than 56 % compared to petro-based PDO and Biosuccinium has a 90 % carbon footprint reduction potential compared to adipic acid. The work presented here is intended to be a reference for a first technical evaluation of use of these bio-based raw materials in a straightforward standard formulation of polyester polyol and thermoplastic polyurethane. No attempt was made to optimise or to improve the products. PDOSA and BDOSA polyols were synthesized without problems and their properties were within expectations of standard PDOAA type of polyols. However, the BDOSA polyol exhibited a higher melt temperature – ~100 – 110 °C vs. 48 °C and 65 °C for PDOSA and BDOAA respectively – this leads to a higher viscosity requiring a higher processing temperature. Reduction of the melt temperature is possible by adjusting the formulation. TPUs were produced via a prepolymer and one shot method at 20 – 30 % hard segment concentration. BDOSA TPU could only be produced via a one shot method because BDOSA prepolymers could not be processed in available lab equipment. PDOSA TPU is relatively soft and elastomeric at the chosen hard segment concentration. BDOSA TPU is very hard due to the crystalline morphology of the soft block. This is in line with previous work by Sonnenschein et al. [9] and Theunissen et al. [11, 13]. In general, the PDOSA and BDOSA TPUs exhibit very good heat and abrasion resistance, as well as solvent and moisture resistance. The resilience of these TPUs is low but can be altered by selection of chain extenders. This was a first evaluation of polyurethanes based on Biosuccinium and Susterra using formulations optimized for adipic acid and 1,4-butanediol. The next step in any application will be to improve and optimize the performance portfolio of the polyol and TPU.



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