

High demands on stone chipping resistance and flange tightness

LANXESS' Record breaking – polyamide oil pans for trucks

Oil pans fitted in the 12.8 liter Euro 6 engines for the Mercedes Actros from Daimler are up to 120 cm long, 40 cm wide and 35 cm deep. To date, they are the largest engine oil pans for trucks to be made of polyamide 6 and 66. They are manufactured by Marbach-based BBP Kunststoffwerk Marbach Baier GmbH using Durethan from LANXESS. "We used a series of calculations and simulations to confirm the feasibility of the oil pans in advance, thus helping to ensure that the pans could be designed on the computer properly and cost-effectively over a relatively short development period," explained Frank Krause, a LANXESS expert for oil-carrying engine parts made of plastic.

An alternative to aluminum, sheet steel and SMC

In this particular application, polyamide offers an alternative to aluminum, sheet steel and sheet molding compounds (SMC). It produces far lighter components than die-cast aluminum, for example. What's more, polyamide components made using injection molding processes are ready for use straight away. In contrast, die-cast and SMC parts often have to undergo laborious and costly additional processing in order to remove burring, for example.

Polyamide 6 also an excellent option

One variant of the oil pan for the 12.8 liter engine is made of the heat-stabilized polyamide 66 Durethan AKV 35 H2.0 filled with 35 percent glass fibers {Fig.}, while the other is manufactured using the corresponding polyamide 6 grade Durethan BKV 35 EF H2.0. "In the course of the joint development work, it transpired that polyamide 6, too, is able to cope with the high demands made on these large components that are exposed to a range

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of temperatures and pressures,” said Krause. Durethan BKV 35 EF H2.0 offers an additional advantage, as its glass fibers are less prominent on the surface. This ensures a high degree of tightness in the groove areas and improved removal from the mold.

Simulation of filling, distortion and thermal expansion

During the development of the oil pans, LANXESS provided its partners with comprehensive support in the form of calculations and simulations. This included structural optimization to improve the acoustic behavior of the pans, and a simulation exercise to examine resistance to stone chippings and deformation on exposure to sealing force. Simulations were also carried out for the filling of the injection molds and the distortion behavior of the oil pans. “These calculations helped us to ensure the molds were filled evenly, particularly in the flange area, thus minimizing distortion,” explained Krause.

Other investigations examined how the oil pans would behave if the entire engine block, including the transmission, was removed and set down for maintenance work or repairs. In this instance, the pans would have to bear a weight of around 1.6 metric tons. Integral simulation was used to provide detailed analysis of the directionality of the thermal expansion around the flanges resulting from the varying fiber orientation in the component. “We used this to derive measures to ensure the tightness of the flange under all the potential temperatures and pressures,” said Krause.

Speaking of the Indian prospective, Ms. Sushmita Datta - Business Unit Head (India), High Performance Materials adds, “The commercial vehicle market is changing rapidly in India, there is a visible difference in the technology used in the past to those being used in the present. The commercial vehicles have evolved to be more advanced in terms of technology, enhanced quality and performance. Understanding the growth potential of the commercial vehicle industry, many multinational companies like Volvo, Daimler, Scania, MAN etc., are very active and taking the opportunity to tap the potential and

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Product Release

establish their market position in India. Such demand will certainly result in an increase in demand for high performance materials and its applications for the commercial vehicle sector."

HiAnt – service and know-how for customers

The simulations and calculations conducted by LANXESS as part of the development of the two engine oil pans are all part of HiAnt. "This brand incorporates all the services received by our customers worldwide as part of the development of innovative system solutions. HiAnt stands for our know-how in the development of products, applications, processes and technology. This expertise is what really sets us apart from many of our competitors," concluded Krause.

Fig.: This oil pan for the 12.8 liter engine holds 36 liters of oil and is made of the polyamide 66 Durethan AKV 35 H2.0.

Detailed product information can be found at

<http://lanxess.in/en/industries-products-india/business-unit-india/hpm-india/>

About LANXESS:

LANXESS is a leading specialty chemicals company with sales of EUR 8.3 billion in 2013 and roughly 17,300 employees in 31 countries. The company is currently represented at 52 production sites worldwide. The core business of LANXESS is the development, manufacturing and marketing of plastics, rubber, intermediates and specialty chemicals. LANXESS is a member of the leading sustainability indices Dow Jones Sustainability Index (DJSI World and DJSI Europe) and FTSE4Good as well as CDP's Climate Disclosure Leadership Index (CDLI).

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You can find further information concerning LANXESS chemistry in our WebMagazine at <http://webmagazine.lanxess.com>.

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