Ultramid® nylon in the new Mercedes-Benz Actros truck: World's first thermoplastic truck-engine sump

Case Study

In July, KTSN (Ottendorf-Okrilla, Saxony) won the special award for engineering innovation from the Society of Plastics Engineers (SPE) for the development of the world's first truck engine oil-sump to be made from a thermoplastic material. Among those working on the project was a group of engineers from BASF, whose expertise in plastics engineering and design was a significant contribution to the sump's technical success. The material used is a BASF Ultramid® nylon resin.

The award-winning oil sump is to be moulded from Ultramid® A3HG7, BASF's 35 percent glass-fibre reinforced nylon resin. Acoustically, the component is about one decibel quieter than its metal predecessor (lower noise emission is a paramount criterion in modern truck engineering). It also holds 30 percent more oil, enabling the oil change interval to be increased by a half, and is 50 percent lighter than a comparable aluminium sump. The oil sump will be part of a V6 engine fitted to the new range of Mercedes-Benz Actros trucks, which will start to roll from the production line this autumn. The engine is planned to be produced for at least the next 20 years.

The injection mould was built by Presswerkzeugbau Großdubra GmbH and at 30 metric tons is no toy. The tool is very complex and features a number of slides in order to cope with the various undercuts in the sump's structure. The part is moulded in a single 6-kg shot via a single gate. Ultramid® A3HG7's good melt flow is therefore extremely important. Because the sump is located adjacent to the wheels, it has to be tough to resist impacts from stones. The ultimate test of the material in this application is resistance to hot oil and heat aging: the polymer must withstand contact with hot oil at 120°C for sustained periods as well as peak temperatures of 150°C. BASF test engineers subjected the sump to 130°C for 3000 hours – after all, the truck is expected to run for at least 10 years or one million kilometres.