8- and 10-Cylinder Intake Manifolds made from Ultramid® B3WG6 GP

Case Study

One of the largest polyamide intake modules made for passenger cars is currently being manufactured by MAHLE Filtersysteme, automotive systems supplier located in Öhringen, near Stuttgart, Germany. This module, weighing more than seven kilograms and consisting of two parts, goes into the ten-cylinder engine of BMW's new M5 and M6 sports car series. The plastic employed here is BASF's Ultramid® B3WG6 GP, a polyamide 6 reinforced with 30 percent glass fibres. This material was developed specially for the production of intake modules and displays a combination of particularly high bursting strength as well as very good dimensional stability. This is why the material is also well-suited for the complex eight-cylinder intake manifold.

Especially the eight-cylinder engine poses a major challenge for design engineers since its intake manifold has a variable length. Securely joining the seven individual parts to each other calls for five welding procedures. This requires a very low-warpage material, especially since the individual parts are stored for different periods of time. An accurate fit is also a crucial aspect with the ten-cylinder module since the two halves of the part have to be affixed to the engine exactly next to each other during the final assembly step. Moreover, much attention was also directed to the surface design of the parts.

MAHLE views Ultramid® B3WG6 GP as a jack-of-all-trades. "We use this material not only for (almost) all intake-manifold developments, but also for air filters and in-tank filters. Its bursting strength is almost twice as high as that of conventional PA grades and this material also allows us to create not only a smooth but also a structured surface design," explains Nicole Berg, production engineer at the MAHLE Company in Öhringen, Germany.

With 70 production sites on four continents and 38,000 employees, MAHLE, in its capacity as a systems supplier, is among the 30 leading companies supplying the automotive industry. MAHLE's core business comprises products in the realm of combustion engines and engine peripherals; the business is broken down into five product lines, namely, piston systems, cylinder components, valve-train systems, air-management systems and liquid-management systems.