

Economical alternative to polyamide 6.6

LANXESS polyamide 6 for the engine oil pan of a six-cylinder boxer engine

- **First use of a plastic oil pan in the Porsche 911 Carrera**
- **High level of functional integration**
- **Much lighter than an aluminum design**
- **Outstanding long-term resistance to engine oils**

Cologne – The trend of manufacturing engine oil pans from plastic instead of metals such as aluminum is continuing to gain ground. For historical reasons, the plastic of choice to date has almost always been polyamide 6.6. However, newer designs are favoring polyamide 6, an alternative that offers a similarly high-quality property profile, but is much more economical. The latest design of this type is the oil pan module for the new six-cylinder boxer engines of the Porsche 911 Carrera, which is being manufactured using Durethan from LANXESS. “The component fully satisfies the specific requirements for functional integration, lightweight construction and cost-effective production that the new generation of engines has to meet,” explains Jorge Soares, project manager for the highly complex component at POLYTEC PLASTICS Germany GmbH & Co KG, which is based in Lohne. The oil pan module has been developed in close collaboration between POLYTEC and Porsche.

Material data for development partners

In a study carried out for Porsche, LANXESS proved the feasibility of manufacturing motor oil pans from polyamide 6. For example, aging tests were carried out to determine the durability of the thermoplastic under exposure to elements such as new and used engine oil. Specimen storage tests spanning a total of 3,000 hours at 150 °C were performed on highly reinforced, hydrolysis-stabilized, easy-flowing and high-temperature-stabilized Durethan grades, among others. “The test results show that the aging behavior of heat-

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stabilized polyamide 6 is only marginally different to that of heat-stabilized polyamide 6.6 in terms of tensile strength, Young's modulus, elongation at break and impact strength. Appropriately optimized polyamide 6 compounds are therefore ideally suited for use in components that convey engine oil," says Christof Boden, expert for engine compartment applications from LANXESS. The specialty chemicals company is making the test results – and other material data – available to development partners as part of joint projects. Furthermore, customers are supported through every stage in the development of an oil pan as part of the HiAnt customer services package. This brand incorporates HPM's extensive material, simulation and processing competence, which it offers to customers through all stages of component development. Services include, for example, simulating mold filling including warpage calculation, simulation of stone impact and sealing forces, or testing of components with regard to sealing gap expansion and stone impact.

Greatly simplified production and installation

The engine oil pan for the Porsche 911 Carrera consists of an upper and a lower part made from 30 percent glass fiber-reinforced Durethan BKV 30 H2.0 from LANXESS. The upper part is screw-connected to a pipeline carrier that is also made from polyamide 6. Using plastic instead of aluminum means that numerous functions can be shaped directly during injection molding, thereby integrating them into the component. This has helped to reduce the number of separate parts that need to be manufactured and mounted for the oil pan from 14 on the metal design to eight. The number of key work steps needed in the final assembly of the engine has also been cut from eight to two. For example, the bulkhead panel is integrated into the lower part of the pan and no longer has to be installed separately with a seal. Furthermore, the oil return lines of the turbocharger, the oil separator and the air-oil separator are combined in the pipeline carrier.

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More than two kilograms of weight saved

Polyamide 6 has helped to reduce the weight of the upper and lower sections of the oil pan to 1.3 and 1.8 kilograms respectively. Overall, the oil pan is more than two kilograms lighter than its aluminum predecessor, due to the lower density of the plastic and the optimized wall thicknesses.

Injection molding process with benefits

A key argument in favor of manufacturing the oil pan using injection molding was the huge potential that the process offers for integrating functions and thereby cutting costs. What's more, as the parts are produced in a single step in the mold, there is no need for complex finishing work such as deburring die-cast aluminum parts. The lower energy costs are another benefit in favor of manufacturing injection-molded parts.

Detailed information on the properties, applications and processing technologies for Durethan can be found at www.durethan.com.

LANXESS is a leading specialty chemicals company with sales of EUR 7.9 billion in 2015 and about 16,600 employees in 29 countries. The company is currently represented at 52 production sites worldwide. The core business of LANXESS is the development, manufacturing and marketing of chemical intermediates, specialty chemicals and plastics. Through ARLANXEO, the joint venture with Saudi Aramco, LANXESS is also a leading supplier of synthetic rubber. LANXESS is listed in the leading sustainability indices Dow Jones Sustainability Index (DJSI World) and FTSE4Good.

Cologne, June 28, 2016
mfg/rei (2016-00057e)

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News Release

Information for editors:

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