

In series production: gears made of VESTAKEEP® PEEK in mass balance transmission

- First use of the high-performance plastic in this application
- Can be used in engine oil up to 130 °C
- Noise reduction compared to metal gears

Essen/Marl, Germany. For the first time, VESTAKEEP® PEEK plastic gears are being used in a mass-balance transmission. Evonik has developed a PEEK molding compound (polyetheretherketone) with very good tribological properties and high durability for use in the harsh environment of an internal combustion engine to replace metal gears. The series component is manufactured by IMS Gear SE & Co KGaA and is used by Mercedes-Benz AG in various models.

Mass balancers ensure the smooth running of an internal combustion engine by reducing the vibrations caused by the pistons on surrounding structures. Mass balancer gears come into contact with engine oils and are therefore exposed to maximum temperatures of up to 130 °C. Until now, only metal gears have been used in this environment.

Less friction, lower energy consumption, lower costs

With VESTAKEEP® PEEK 5000 G, Evonik offers a suitable material with high resistance and high performance to replace these metal gears. In addition to the required vibration damping, plastic gears offer an additional advantage of high resistance to mechanical and tribological stress. Compared to conventional metal gears, they have lower friction losses and are significantly quieter. The lower mass moment of inertia saves energy. Gears made of VESTAKEEP® PEEK are manufactured cost-efficiently by injection molding and eliminate the extensive reworking that was previously necessary when using metal.

With the use of its own gear testing rig, Evonik supports development activities during close coordination with the customer. "We can generate specific material data that can be used to optimally design the gears made of our high-performance

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plastics," says Philipp Kilian, Head of Tribology Development High Performance Polymers at Evonik, describing the advantages. "We can test in a temperature range from $-20\text{ }^{\circ}\text{C}$ to $260\text{ }^{\circ}\text{C}$, both in dry and lubricated condition."

Dr. Steffen Kanzler, who is responsible for VESTAKEEP® for Transportation at Evonik, considers the use of the high-performance plastic under the difficult conditions of a mass-balance transmission to be another step in the material's success story: "We are demonstrating the extraordinary properties of VESTAKEEP® here. These are also relevant for other challenging applications, where we are the suitable development partner for new projects. Our customers receive qualified support from the material selection and computer assisted simulation up to the technical implementation by our application technology team."

Thanks to their high temperature, chemical resistance and high ductility, the high-performance polymers of the VESTAKEEP® brand can replace metal components, for example, to enable sophisticated lightweight construction applications. Evonik has more than 50 years of experience in the development and production of high-performance plastics. The extensive product portfolio includes solutions for almost all industrial applications.



Caption: VESTAKEEP® PEEK forms the outer low-wear gear rim of the plastic gear used in series production in a mass balancer.

Company information

Evonik is one of the world leaders in specialty chemicals. The company is active in more than 100 countries around the world and generated sales of €12.2 billion and an operating profit (adjusted EBITDA) of €1.91 billion in 2020. Evonik goes far beyond chemistry to create innovative, profitable and sustainable

solutions for customers. About 33,000 employees work together for a common purpose: We want to improve life today and tomorrow.

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The Smart Materials division includes businesses with innovative materials that enable resource-saving solutions and replace conventional materials. They are the smart answer to the major challenges of our time: environment, energy efficiency, urbanization, mobility and health. The Smart Materials division generated sales of around €3.24 billion in 2020 with about 7,900 employees.

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