

LANXESS establishing wide range of thermally conductive polyamides

Managing heat properly

- **Increasing demand for thermally conductive thermoplastics**
- **Excellent haptic feel and perceived quality thanks to increased density**

Cologne – Demand for thermally conductive thermoplastics is growing in many industries. This particularly applies to the automotive industry, the electrical and electronics industry, and lighting technology. One reason for this is the miniaturization of electrical and electronic components, which results in more heat being generated inside devices. In addition, many manufacturers want to take advantage of the significant freedom in design and the benefits that thermoplastics often offer in contrast to metals when it comes to processing and cost effectiveness. As a result, LANXESS is expanding its Durethan TC (thermally conductive) polyamide product line for thermal management in electrical and electronic devices. “The compounds are specifically designed with additional properties depending on their area of use which benefit the respective applications. This includes, for example, a high level of flame retardancy, excellent mechanical behavior, outstanding resistance to thermal aging, or high reflectivity,” explains Christof Boden. The expert who works in application development at LANXESS also believes the structural materials have another advantage: “Because of their high content of thermally conductive particles, the compounds have a comparably high density, which means they feel good to the touch and can be used to create components with a perceived quality similar to those made of metal.”

High reflectivity and flame retardancy

One highlight of the TC line is a new polyamide 6 that combines excellent thermal conductivity with high reflectivity, flame retardancy, and tracking resistance. Its thermal conductivity is direction-

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dependent due to the mineral filler particles and equals 2.5 watts per meter-kelvin in the direction of melt flow (Nanoflash method). The trial product is halogen-free flame retardant and achieves the best classification of V-0 (0.75 millimeters) in testing pursuant to the United States' UL 94 (Underwriter Laboratories Inc.) standard for safety of flammability of plastic materials. The results of glow wire testing pursuant to IEC 60695-2-12/13 are also impressive, with the compound achieving the best possible classification (0.75 millimeters) in the GWFI (Glow Wire Flammability Index) test, at 960 °C. With a CTI (Comparative Tracking Index, IEC 60112) value of 600 volts, the compound also exhibits particularly high tracking resistance. Despite the significant concentration of thermally conductive particles, the compound can be processed just as well as polyamide 6 types with high contents of glass fibres and exhibits a similarly low level of tool abrasion. The compound's areas of application range from heat sinks and support profiles for LED lights to LED cooling fins for automotive headlamps to housings and cell holders for battery systems.

Alternative to boron nitride-filled or aluminum oxide-filled compounds

The TC product line also includes two easy-flowing polyamide 6 compounds filled with a special thermally conductive mineral that comprises 65 and 75 percent of the compound's weight, respectively. Durethan BTC65H3.0EF and BTC75H3.0EF have a thermal conductivity of 1.3 and 1.7 watts per meter-kelvin, respectively, in the direction of flow. Their thermal conductivity is also almost entirely isotropic, meaning they dissipate heat nearly equally in all directions. Both compounds offer an excellent price-performance ratio. "We view them as alternatives to polyamide 6 types that contain boron nitride or aluminum oxide as the thermally conductive filler. This is because they dissipate heat similarly well as aluminum oxide systems, for example," says Boden. These compounds also have better mechanical properties than polyamides with boron nitride additives.

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Excellent flame retardancy in accordance with DIN EN 45545

In addition, the TC product line also includes the easy-flowing, halogen-free flame-retardant Durethan DPBM65XFM30. This glass fibre and mineral-filled compound is especially designed for applications with moderate thermal conductivity requirements. One of its strengths is its excellent flame retardancy. As such, it achieves a UL 94 classification of V-0 (0.75 millimeters). “In addition, it also achieves the highest classification of ‘Hazard Level 3’ in tests pursuant to the European DIN EN 45545 standard for fire protection on railway vehicles for specific applications such as chokes, voltage transformers, windings, contactors, and switches,” says Boden. Further potential applications include medium voltage insulating parts, solenoid valves, and high current circuit breakers, among others.

“HiAnt” – tailor-made service for customers

LANXESS supports customers in their development of thermally conductive plastic components with a wide range of services under the brand name “HiAnt”. “For example, we analyze where areas of maximum heat in assemblies occur – known as hotspots – and provide suggestions regarding which components are best designed to dissipate heat. In addition, we also advise customers with regard to the selection of the most appropriate material, offer design suggestions, and simulate thermal conductivity behavior,” explains Boden. As a result, experts from the specialty chemicals company help optimize component design so that areas affected by heat are positioned as far outward as possible and heat dissipation is increased, for example through the use of cooling fins. Furthermore, the company draws up guidelines for designing the components that take the particular characteristics of highly filled materials into account as far as their mechanical properties and processing is concerned.

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News Release

LANXESS is a leading specialty chemicals company with sales of EUR 9.7 billion in 2017 and about 19,200 employees in 25 countries. The company is currently represented at 74 production sites worldwide. The core business of LANXESS is the development, manufacturing and marketing of chemical intermediates, additives, 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 Europe) and FTSE4Good.

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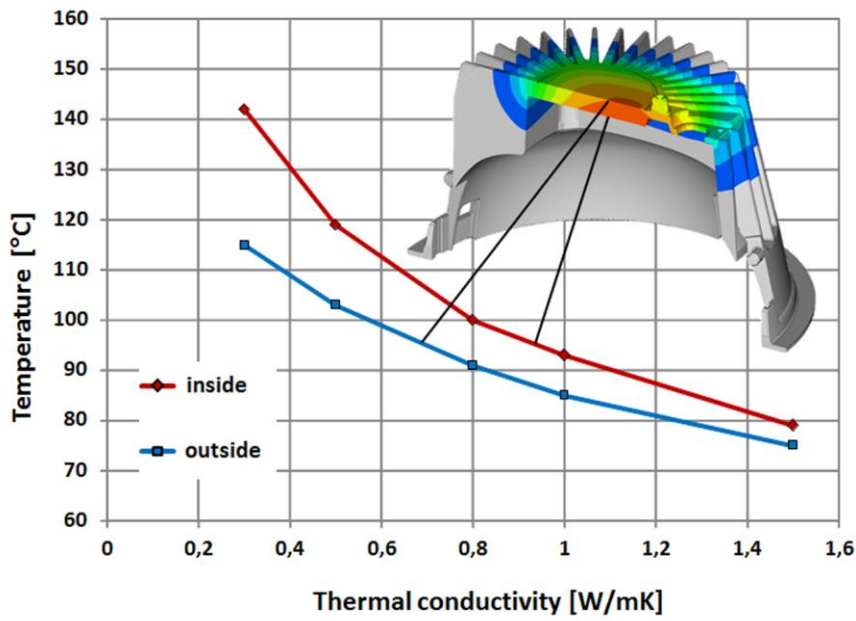
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Image



A simple heat sink can be used to demonstrate that even a slight increase in thermal conductivity is enough to significantly decrease the temperature in plastic components and prevent an accumulation of heat. In addition, as the thermal conductivity of the plastic increases, the temperature is increasingly dependent on convection. As a result, the ambient air makes heat dissipation the decisive factor. Photo: LANXESS AG

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