

Giving heat the cold shoulder

- **Cooling element made from PA6 for the charge controller of an electric sports car**
- **Outstanding thermal conductivity and flame-retardant properties**
- **High tracking resistance reduces risk of short circuits and defects**
- **Great potential for use in battery components of electric vehicles**

Cologne, June 9, 2022 – Thermally conductive plastics have great potential for use in thermal management of charging systems for electric vehicles. One example is the charge controller in the fully electric vehicle of a sports car manufacturer based in southern Germany. The controller contains a cooling element that dissipates the heat generated in the plug contacts of the controller when charging the batteries. The cooling element is made of the thermally conductive and electrically insulating polyamide 6 Durethan BTC965FM30 from LANXESS. “As well as preventing the charge controller from overheating, our structural material meets the strict requirements for flame-retardant properties, tracking resistance and design,” explains Dr. Bernhard Helbich, Technical Key Account Manager at LANXESS. The manufacturer of the entire charging system for the sports car is Leopold Kostal GmbH & Co. KG of Lüdenscheid, a global system supplier of automotive, industrial and solar electrics as well as electrical contact systems.

Efficient heat dissipation with special mineral particles

Charge controllers convert the three-phase or alternating current fed in from the charging station to direct current and control the charging process. During the process, they limit the charging voltage and current to prevent overcharging of the battery, for example. A current with an amperage of up to 48 amps flows through the plug contacts in the charge controller of the sports car, causing significant generation of heat during charging. “Our polyamide is filled with special mineral heat-conducting particles that conduct this heat efficiently away from

LANXESS AG

Contact:
Michael Fahrig
Corporate Communications
Spokesperson Trade & Technical
Press
50569 Köln
Germany

Phone: +49 221 8885-5041
michael.fahrig@lanxess.com

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the source,” says Helbich. These particles give the compound a high thermal conductivity of 2.5 W/m·K in the direction of melt flow (in plane) and 1.3 W/m·K perpendicular to it (through plane).

Freedom in component design

In addition, the halogen-free flame-retardant polyamide 6 material ensures that the cooling element is highly fire-resistant. As required, it passes the UL 94 flammability test of the US testing institute Underwriters Laboratories Inc. with the best classification, V-0 (0.75 millimeters). Its high tracking resistance also contributes to greater safety. This is demonstrated by its CTI A value of 600 V (Comparative Tracking Index, IEC 60112). Helbich adds: “The tracking resistance gives designers greater freedom in engineering the component, as they can arrange electrical assemblies even more compactly without having to worry about short circuits and device defects caused by creepage currents.” Consequently, along with guides and ribs, the cooling element is equipped with six closely spaced cavities to house the plug contacts.

Good processing characteristics

Despite the high content of thermally conductive filler (68 percent by weight), the polyamide 6 has good flowability. “In terms of its processing characteristics, the material is similar to highly reinforced types of polyamide 6 that have a glass fiber content of up to 60 percent by weight,” explains Helbich. The heat-conductive thermoplastic also has potential for use in electric vehicle battery components such as plugs, heat sinks, heat exchangers and mounting plates for power electronics.”

You can find more information about LANXESS products, developments, technologies and services that use polyamides, polyesters and thermoplastic composites for new forms of transportation and particularly electromobility at <https://lanxess.com/en/Products-and-Solutions/Focus-Topics/LANXESS-e-Mobility> and www.hiant.de.

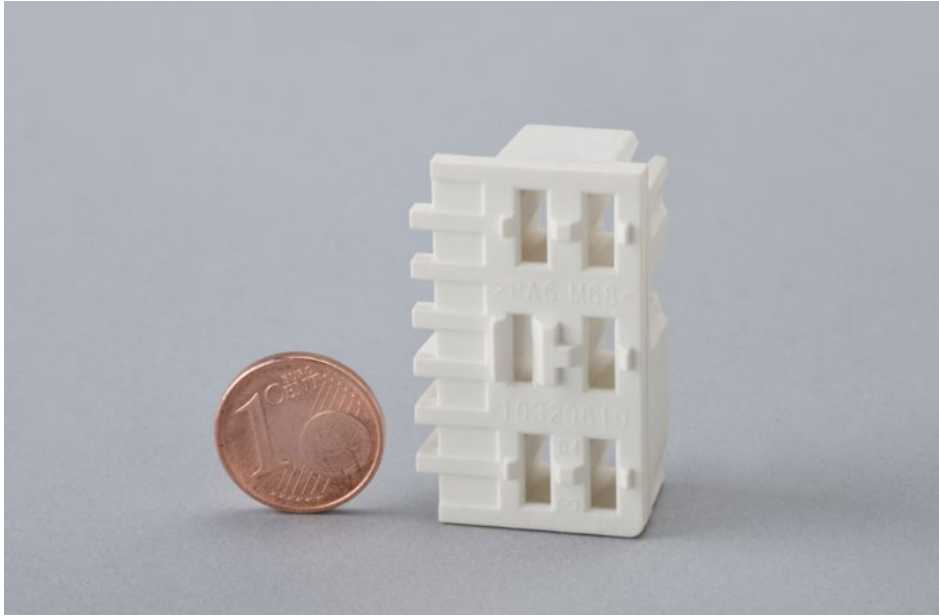
LANXESS AG

Contact: Michael Fahrig
Corporate Communications
Spokesperson Trade & Technical
Press
50569 Köln
Germany

Phone: +49 221 8885-5041
michael.fahrig@lanxess.com

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Image



The cooling element of the charge controller for the electric sports car is made of Durethan BTC965FM30. This thermally conductive polyamide 6 prevents overheating during the charging process and meets the strict requirements for flame-retardant properties, tracking resistance and design.

Photo: LANXESS

LANXESS AG

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Corporate Communications
Spokesperson Trade & Technical
Press
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Germany

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michael.fahrig@lanxess.com

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