

News Release



Foaming simulation of polyurethane systems for the automotive interior

- **Simulation tool Ultrasim® now expanded to virtual process design of instrument panels made of semi-rigid systems**
- **Yanfeng Automotive Interiors uses new BASF service for instrument panels in BMW X1**
- **Benefits: faster component development and greater process stability**

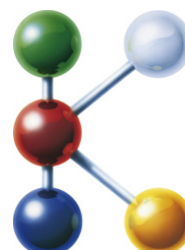
BASF now offers an additional service for polyurethane systems in automotive interiors. BASF's Ultrasim® simulation tool has been expanded so that the behavior of PU systems during foaming can now be reliably predicted for both open and closed molds. The new service has proved especially successful with instrument panels made with the Elastoflex® E semi-rigid system. The international automotive supplier Yanfeng Automotive Interiors is using the virtual process design for the instrument panels it manufactures for current models such as the BMW X1. Based on the CAE model for each panel and a new material description of the semi-rigid system within Ultrasim®, a foam-fill simulation is created, which allows the customer to spot potential problems with the design and manufacturing of the component before the mold is made. Thus Elastoflex® E instrument panels can be developed faster, their production process can be sped up and costs can be reduced.

Instrument panels are safety-relevant, large and complex components that vehicle makers approve individually for every car model. During manufacturing, the foaming process is crucial to ensure that carrier, skin, PU foam and the respective airbag design combine

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to produce a harmonious component. In addition to BASF's established technical support, with Ultrasim® the PU foam can be manufactured efficiently according to process and part. The crucial aspect is that the process design already begins at an early, purely virtual phase of the project. For customers, this is a significant help toward cutting project times, optimizing mold design and planning development work in a cost-effective and holistic way – and that globally.

Simulation adds value especially in early project phases

Within BASF's simulation tool, the manufacturing process for the component is an integral part of the calculation of the component behavior. Ultrasim® contains tailor-made material models for PU systems, so that the injection, foaming and hardening of the polyurethane can be precisely predicted. The analysis thus takes exactly into account the typical properties of the relevant materials: the temperature-dependent reaction process and foam formation as well as the resulting density profile and flowability during foaming. This makes it possible to generate a location-independent calculation of the foaming process: from injection via the complete mold filling to the final part density.

Setting the right process parameters is just as important as having an exact description of the material behavior. Foam-fill simulation allows the injection position, the route of the mixing head and the orientation of the mold to be analyzed, but also flow aids, venting designs and closing times. Thus the foaming process in both open and closed molds becomes transparent and can be examined with a virtual magnifying glass. For closed mold processes, the simulation results can be used to evaluate different injection designs, so as to prevent e.g. air voids and weld lines. For open molds, Ultrasim® can run a series of virtual simulations to optimize injection lines for the PU system. The simulation especially adds value in the early phase of a project, because it generally reduces development times. And if the simulation detects a problem, customers can adjust part geometry and venting designs at no extra cost.

Safety and comfort in car interiors with molded parts made of Elastoflex® E

With the semi-rigid Elastoflex® E polyurethane system, foam-backed parts can be tailor-made for vehicle interiors. Optimized for cost and performance, the systems, which are approved by numerous vehicle manufacturers worldwide, are distinguished by low foam density and low emissions. They are aging-resistant and offer excellent adhesion to substrates and different skins such as PVC, TPO and PU. The systems benefit from their cost-effectiveness, owing to short demolding times, low material usage and high processing safety. So complex part shapes with long flow paths can be produced in one shot or with thin walls.

The next step: Ultrasim® for automotive components made of integral and flexible foams

The new simulation service is currently being used in customer projects for other components such as engine hoods and steering wheels, i.e. for integral and flexible foams. The medium-term goal is to use Ultrasim® to determine the ideal processing parameters of all PU systems for a mold but also to gain insight into the ideal PU system for a given mold. Achieving this will require not only a virtual map of the foam process, but also a reliable simulation of selected mechanical part properties – a service which BASF has already applied successfully in customer projects dealing with fiber-reinforced engineering plastics for many years.

BASF at K 2016

Where your ideas become ideal solutions: BASF at K fair from October 19-26, 2016 in Dusseldorf, Germany, in hall 5, booth C21/D21. You can find all related press releases, photos and further information here: www.basf.com/k2016.

About BASF's Performance Materials Division

BASF's Performance Materials division encompasses the entire materials' know-how of BASF regarding innovative, customized plastics under one roof. Globally active in four major industry sectors - transportation, construction, industrial applications and consumer goods – the division has a strong portfolio of products and services combined with a deep understanding of application-oriented system

solutions. Key drivers of profitability and growth are our close collaboration with customers and a clear focus on solutions. Strong capabilities in R&D provide the basis to develop innovative products and applications. In 2015, the Performance Materials division achieved global sales of € 6.7 bn. More information online: www.performance-materials.basf.com.

About BASF

At BASF, we create chemistry for a sustainable future. We combine economic success with environmental protection and social responsibility. The approximately 112,000 employees in the BASF Group work on contributing to the success of our customers in nearly all sectors and almost every country in the world. Our portfolio is organized into five segments: Chemicals, Performance Products, Functional Materials & Solutions, Agricultural Solutions and Oil & Gas. BASF generated sales of more than €70 billion in 2015. BASF shares are traded on the stock exchanges in Frankfurt (BAS), London (BFA) and Zurich (AN). Further information at www.basf.com.