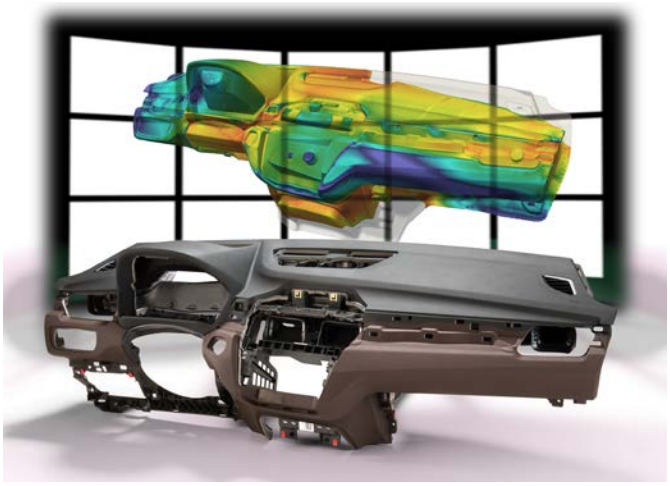
Simulation tool Ultrasim®: Foaming simulation of polyurethane systems for the automotive interior

Case Study

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.

During manufacturing, the foaming process is crucial to ensure that carrier, skin, PU foam and the respective airbag design combine 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. 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. This makes it possible to generate a location-independent calculation of the foaming process. 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.