

PRESS RELEASE

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Fraunhofer ITWM at Foam Expo Europe in Stuttgart

Developing Optimal Foam Components With Simulation

The Foam Expo trade fair, which takes place in Stuttgart from December 5 to 7, promises new connections and new insights. The researchers at the Fraunhofer Institute for Industrial Mathematics ITWM in Kaiserslautern are taking the latter literally: the FOAM software enables insights into the microstructure of a wide variety of foams. The tool will be presented in Hall 1 at Booth 250.

Foams are ideal thermal or acoustic insulating materials and a good substitute for composite materials. They are therefore not only found in seats of all kinds, but are also used as shock absorbers or for sound and heat insulation. The properties of the foams significantly determine the functionality of the applications. That is why it is important to be able to take a look inside the foam during production.

New: Automated Material Characterization and Foam Database

This is made possible by the FOAM software developed at the Fraunhofer ITWM: It simulates the manufacturing process of foams for any components, such as cooling units, seats and much more. The automated process of material parameter identification of foam rheology and expansion chemistry from simple experiments or directly from Foammat® measurements will be presented as a new feature. This allows you to create your own foam databases quickly and directly in FOAM.

Simulation Chain for Foam Components

The digital twin for foam components begins by simulating the foaming process with FOAM to determine the local density and pore size distribution of the foam component. Based on these results, a foam database is then dynamically created for different densities and pore sizes. This step is based on microstructure simulations of the foam; this is realized with the FeelMath tool, which was also developed at the Fraunhofer ITWM.

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Load-Compliant Design of a Child Seat

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A good example of the use of FOAM are lightweight, stable children's car seats made of foam. The process simulation with FOAM provides the local foam density in a range between 50 and 100 kg/m³.

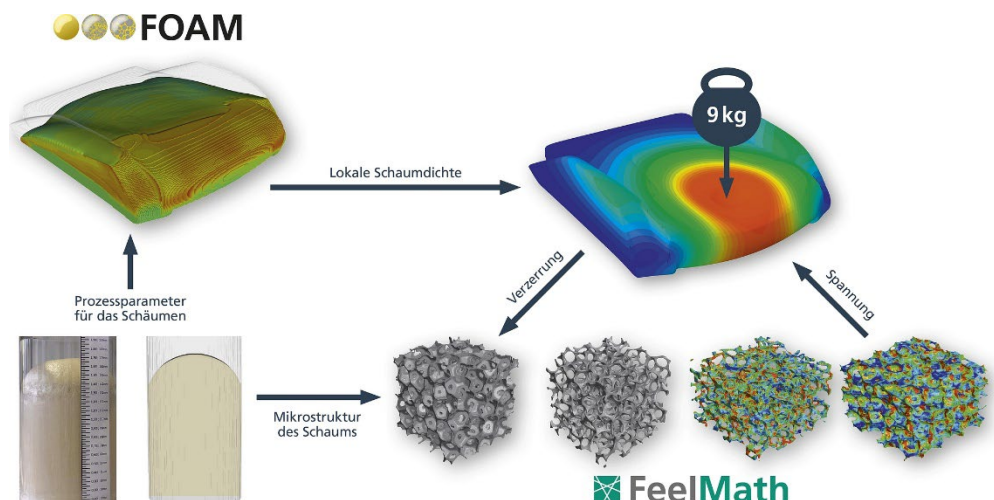
In this density range, the researchers simulate the mechanical microstructures, whereby the local foam structure changes with increasing density towards more closed-cell foams.

The microstructure simulations provide the data basis for determining density-dependent material composition, which is used in the load simulation. The comparison with a conventional FE simulation shows that the multiscale simulation can predict the displacements and loads much more accurately.

You can find out more about this exciting topic from our colleagues directly at booth 1/250 and in the presentation by Dr. Dariusz Niedziela, who focuses on foam simulation at the Fraunhofer ITWM: »Digital Prediction of Foam Expansion: Foam Parameter Identification and Process Simulation«

He can be heard on December 7, 2023 in the morning session at 11 am on stage 1.

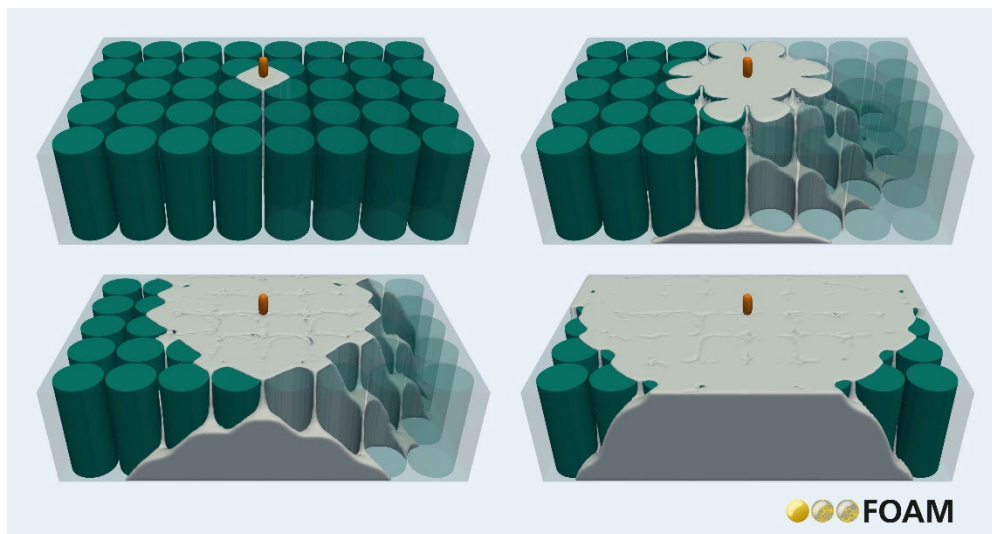
Visuals:



Simulation Chain for Foam Components © Fraunhofer ITWM

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Potting a Battery Cell Module with PU foam © Fraunhofer ITWM

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FRAUNHOFER INSTITUTE FOR INDUSTRIAL MATHEMATICS ITWM

About the Fraunhofer Institute for Industrial Mathematics ITWM

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The Fraunhofer Institute for Industrial Mathematics ITWM in Kaiserslautern is one of the largest research institutes for industrial mathematics worldwide. We see our task in further developing mathematics as a key technology and providing innovative impetus. Our focus is on the implementation of mathematical methods and technology in application projects and their further development in research projects. The close cooperation with partners from industry guarantees the high practical relevance of our work. Their integral components are consulting, implementation and support in the application of high-performance computer technology and the provision of tailor-made software solutions. Our various competencies address a wide range of customers: automotive industry, mechanical engineering, textile industry, energy and finance. This also benefits from our good networking, for example in the High performance center »Simulation- and Software-Based Innovation«.

About the Fraunhofer-Gesellschaft

The Fraunhofer-Gesellschaft, based in Germany, is the world's leading organization for application-oriented research. With its focus on future-relevant key technologies and on the exploitation of the results in business and industry, it plays a central role in the innovation process. As a guide and stimulus for innovative developments and scientific excellence, it helps shape our society and our future. Founded in 1949, the organization currently operates 76 institutes and research facilities in Germany. Around 30,800 employees, most of them trained in the natural sciences or engineering, generate an annual research volume of around €3.0 billion. Of this, €2.6 billion is spent on contract research.

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