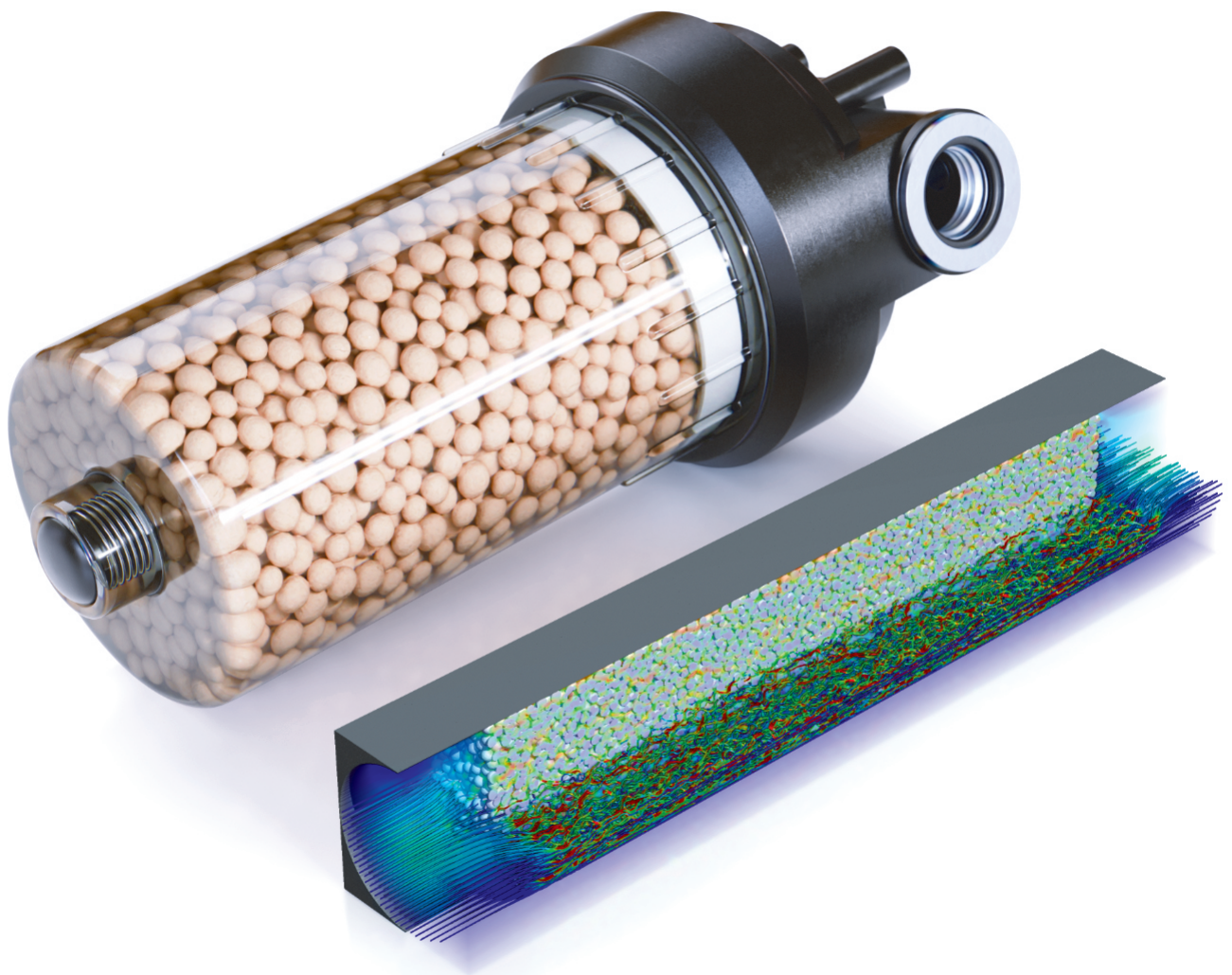


GEO DICT

The Digital Material Laboratory

SIMULATION OF
ADSORPTION-BASED
PROCESSES



THE MOTIVATION

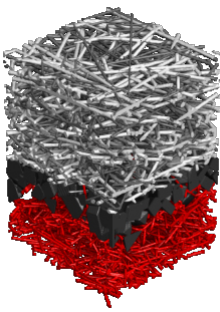
Simulations of adsorption-based processes empower users to quickly and easily test different scenarios and conditions. Simulations help in modeling and understanding complex processes and interactions, so issues are identified and solved early on. Thus, gas filtration systems can be tested for different designs and conditions to establish the optimal solution for a given application.

OUR SOLUTION

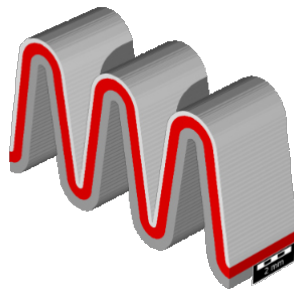
Simulation of adsorption-based processes is key in digital development of next generation filter media, under real-world conditions, to guarantee optimal performance and facilitate the customization of filter design. Simulations with GeoDict help manufacturers of filter media and filters to understand existing materials and to improve these in a targeted manner. GeoDict covers the entire development process from analysis over prediction to engineering of performance materials.

YOUR BENEFIT

Reduce and limit costly laboratory testing to a few promising filter media and filter pleats designs selected from computer simulation results. The development cycle is significantly accelerated by parallelized parameter studies, for superior products in a shorter timeframe - saving material costs and time to market.



Combi filter media incl. activated carbon

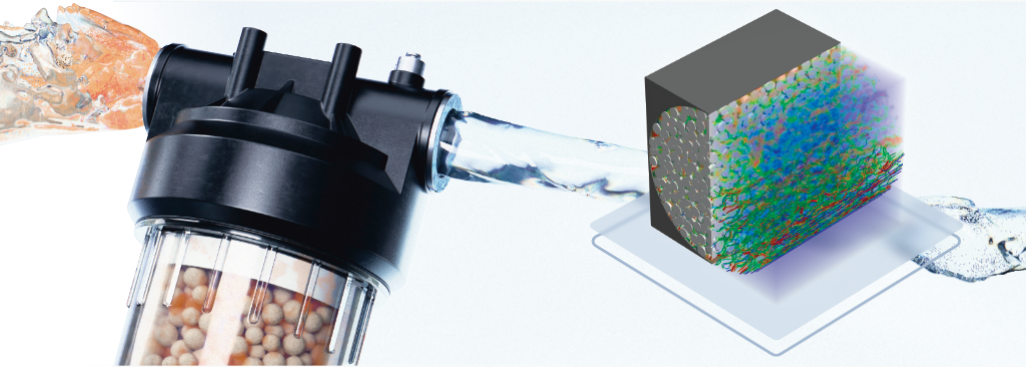


Filter pleats

STRUCTURE GENERATION

Generate filter media using a wide range of structure generators for granular materials, such as activated carbon and zeolites.

Generate rectangular or cylindrical pleated structures with several layers of filter media



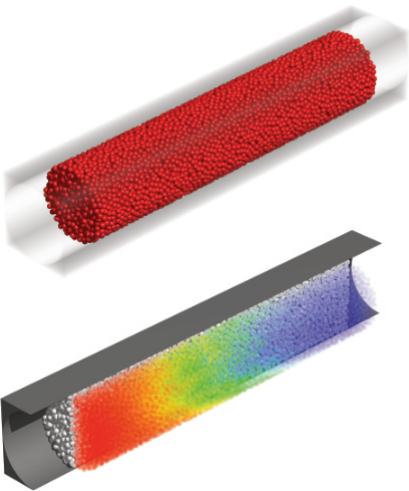
PROPERTY PREDICTION

Calculate flow through the structure and analyze the flow field for possible leaks by solving Navier-Stokes-Brinkman equations utilizing state-of-the-art numerical solvers.

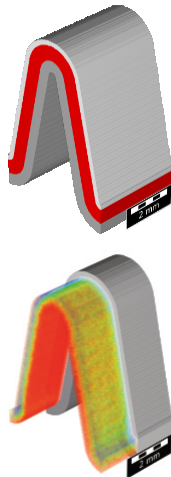
ADSORPTION SIMULATION

Simulate adsorption through filter media and pleated structures using Langmuir and Toth's adsorption isotherms.

Applications range from classical carbon capture over cabin air filter to waste water treatment.



Adsorption simulation in a packed bed



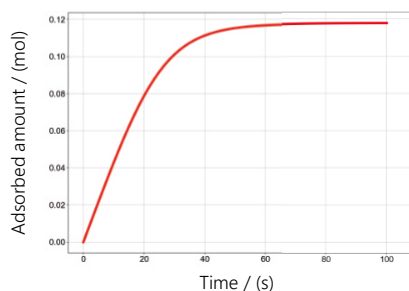
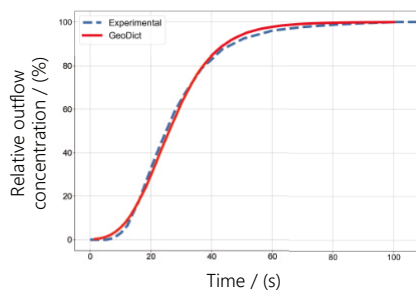
Adsorption simulation on a single pleat

Simulate flow and diffusion:

- Simulate flow through the media
- Calculate effective diffusivity

Analyze filter media and filter performance:

- Analyze flow field in the media
- Calculate break-through curves
- Obtain total adsorbed amount of molecules in the media



FILTER PERFORMANCE

Simulation of the filtration relevant properties of filter media, filter elements, and filters with housing, such as total adsorbed amount of molecules and break-through curves.

Performing large parameters studies to analyze the influence of specific parameters on the filter media and filter performance.

Maximize productivity with cloud solutions and GeoDict.