

Optimization of Plants and Components for the Polyurethane Production

HPC-Competence Center

The Fraunhofer Institute for Algorithms and Scientific Computing SCAI offers the application of sophisticated in-house and/or commercial optimization and robust design methods in combination with numerical simulations for complex flow problems.



Enterprise

The participating industrial company was Hennecke Polyurethane Technology. Hennecke designs and constructs high-performance machine and plant technology for polyurethane processing, enabling their customers to achieve high-quality and efficient production results. Over 440 employees worldwide ensure that Hennecke's leading position is maintained and developed.

How HPC makes the difference

The cooperation between SCAI and Hennecke comprised the optimization of two different subdomains of polyurethane processing.

The first case examined an injector for mixing the polyurethane components Polyol and Isocyanate. Based on a sensitivity analysis varying several geometric parameters, an optimization process was launched, which yielded a set of optimal parameters for a required range of operating mass flow.

In the second case, slab stock foam plants used for the production of foam blocks have been optimized, to achieve a foam of high quality.

In both tasks the fluid solver STAR-CCM+ from cd-adapco, the optimization software DesParO from Fraunhofer SCAI and a self-developed process chain environment was applied to optimize processes and simulate them in acceptable computation times on SCAI's HPC Cluster.

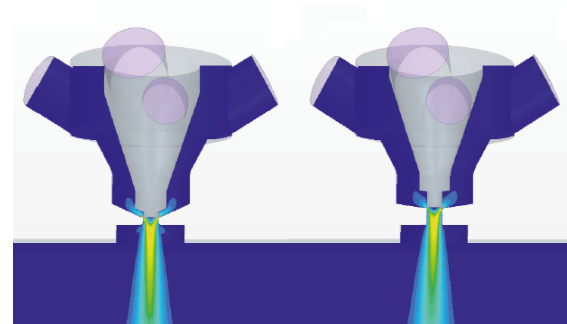


Fig1: Mixing injectors

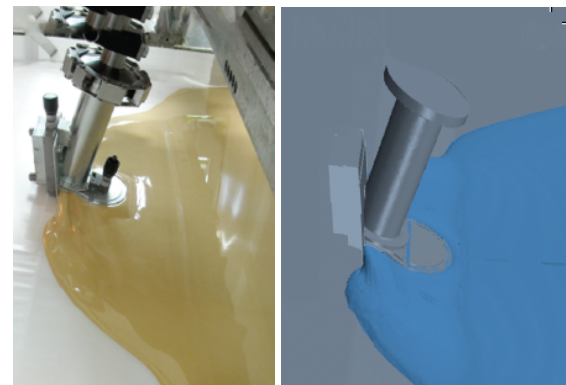


Fig2: Slab stock foam (left), Simulated process (right)

