

Press release

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Virtual Thermoplastics

Understand the injection molding process in detail and predict it more precisely

The goal of predicting the injection molding process more accurately requires high-quality and precise material data, which is not always available in practice. In cooperation between DUFNER.MDT GmbH and SIGMA Engineering GmbH, a completely new database for simulation is created.

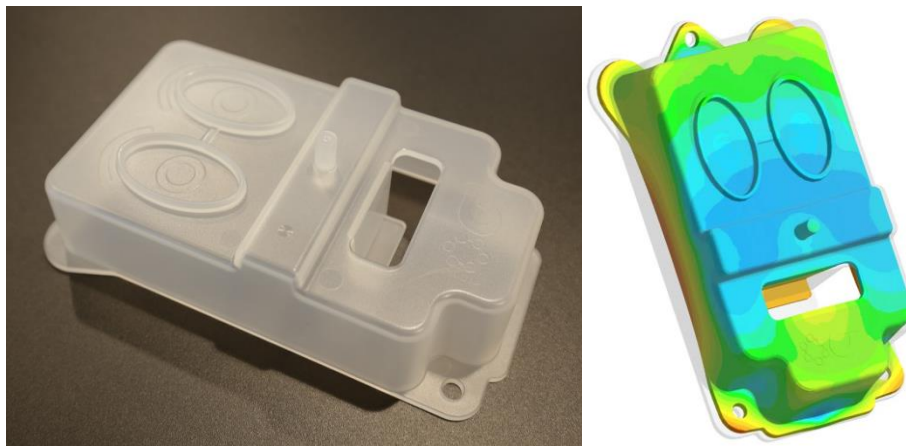


Figure 1 – The test object "Teddy" in reality and the consideration of distortion in simulation

Virtual Thermoplastics

Aachen, 04.04.2022 – SIGMA Engineering will give an insight into the world of Virtual Thermoplastics at the FIP (April 5-8, 2022) in Lyon at booth D21. The behavior of plastics in injection molding is complex and the influence of material properties on the injection molding process is substantial. For a further increase in simulative accuracy, the material properties

measured so far are no longer sufficient. For an exact match between simulation and reality, accurate and holistic data sets are essential - the higher the quality of the material data, the higher the accuracy the results.

In cooperation with DUFNER.MDT GmbH, SIGMA Engineering has developed a complex test shape "Teddy" in order to test and implement model validations. With this approach, extensive data (pressures, temperatures, paths, precision and exact dimensions) are recorded from the injection molding machine, the injection mold and molded part. These measurements add to the existing laboratory data stored in the SIGMASOFT® database for the individual materials. In order to refine the simulation with these previously unrecorded data from reality, the mathematical model approaches had to be extended accordingly.

Finite models extrapolate and interpolate results based on the implemented measurement range with a certain margin of error. Through additional measurements and the validation of the material parameters, based on concrete processes, this margin of error can now be significantly reduced. In this way, a special and refined material database is created that considers phenomena such as crystallization or extensional viscosity, which are usually not measured. For the reliable prediction of shrinkage and warpage, additionally pressure, thermal properties, fiber orientation and mold filling are considered and compared simultaneously.

"The goal is not just to measure thermoplastics, but to build measurement and validation routines for a virtual behavior of thermoplastics," says Timo Gebauer, CTO of SIGMA. "The combination of experience and know-how leads to a level of reliability in predicting the behavior of thermoplastics which was impossible before." This is what makes the difference - Virtual Molding in combination with the measurement data from trials in the pilot plant showcases the full potential of SIGMASOFT® with the new version 5.3.1 by even better verifiable conformity between simulation and reality.

Since 1998 SIGMA Engineering GmbH has been driving the development of the injection molding process with its simulation solution SIGMASOFT® Virtual Molding. This virtual injection molding machine enables the optimization and development of plastic components and molds as well as the mapping of the entire production process. The SIGMASOFT® Virtual Molding technology combines the parts 3D geometries with its tooling and temperature control system and integrates the parameters of the production process. This ensures a cost-efficient and resource-saving production as well as high-performance products - from the first shot.

SIGMASOFT® Virtual Molding integrates a multitude of process-specific models including 3D simulation technologies that have been developed and validated over decades and are continuously optimized. The SIGMA Solution Service and Development team supports its customers technical goals with application-specific solutions. The software company SIGMA offers application



engineering, training, direct software sales and as a result, a software straight from its developers and designers to help give a solution service by engineers all over Europe.

SIGMA Engineering GmbH, headed by Managing Director Thomas Klein, has subsidiaries in the USA, Brazil, Singapore, China, India, Korea and Turkey. In addition, SIGMA supports its users worldwide in a variety of international companies and research institutions with its Virtual Molding technology.
Further information: [sigmasoft.de](https://www.sigmasoft.de)

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