The efficient implementation allows to simulate the application of one meter of sealing material in less than an hour on a standard computer. Consequently, it is possible to apply such detailed simulations in production preparation processes and off-line programming of the sealing robots.

This approach to virtual sealing is an important step towards the virtual paint factory and contributes to lean production in the automotive industry: Using simulation tools that lead to tremendous reductions of time required for introduction of new car models, improve the environmental impacts and increase quality.

In various validation campaigns the software has proven its quality and accuracy in the field of sealing simulation. Furthermore, it is the first simulation software on the market which is dedicated to this topic.

The Company
fleXstructures GmbH is specialized in development and distribution of innovative high-end technology, developed in cooperation with Fraunhofer research. The latest high-tech product IPS Virtual Paint is a groundbreaking technology due to the tremendous savings in computing time, costs, energy and emissions.

The company collaborates in common research projects in the field of numerical simulation (spray painting simulation, simulation of flexible components such as cables and hoses, etc.) with Fraunhofer Institute for Industrial Mathematics ITWM in Kaiserslautern, Germany, Fraunhofer-Chalmers Centre in Gothenburg, Sweden, and industrial partners.

Contact
fleXstructures GmbH
Trippstadter Straße 110
67663 Kaiserslautern
Germany
Phone +49 631 680 39 360
ips.products@flexstructures.de
www.flexstructures.com
**Approach**

**Why IPS Virtual Paint Sealing?**
The reachability of the nozzle and the bead quality are highly relevant values when it comes to the sealing process. Therefore, the digital validation of these parameters is a tremendous advantage.

**Specific features**
- Laydown simulation including the complex rheology of the sealing material
- Immediate visualization
- Export of sealing beads geometry for packing and geometry assurance analysis in DMU

**Benefits**
- Easy to use (one day crash course, GUI tailored for the sealing process)
- Outstanding results of realistic bead shape
- Realistic setup of the paint shop in a few hours

**Values and significant savings**
- Achieve reliable simulation results in early phase of product development
- Process optimization in paint shop (correction of inappropriate setup)
- Cost and time savings due to less prototyping and iterations

---

**Process Analysis and Optimization**

The software is designed to optimize the work flow when it comes to sealing processes. Therefore, an user-friendly GUI provides an easy, practical and efficient way to set up and perform the simulation in short time. Preprocessing is very easy:

- Import CAD geometry
- Import applicator motions
- Define the process parameters

**Results**
- Realistic geometry of sealing beads
- Visualization of bead geometry with powerful and intuitive post-processing tools (measure e.g. injected material and transfer efficiency)
- Analyze bead width, thickness and cross-section area

---

**Measurement and Validation**

**Measurements for sealing simulation**
- Applicator data – Bead width measurement
- Material data – Rheology measurement
- Lay down validation of sealing seam

**Industrial validation**
- Comparison between simulation and 3D scans of sealing beads in industrial use
- Various studies have shown excellent results between simulation and experiments