Success Stories

Consulting Services and Sales

Several real-case industrial processes based on different applicators like

- Dip Eco fabulous 2, internally charged
- ARB G1, ARB RS100
- Atomizer Fanuc, internally charged and materials
- clear coat, base coat, filler
have already been optimized for General Motors NA and Volvo Cars, leading to a significant reduction of process costs.

Engineering consulting projects

Our engineers have the knowledge and experience to optimize your spray painting processes. Together with our customers, we find efficient solutions leading to excellent results with respect to quality improvement and cost reduction.

Software distribution

Having the worldwide exclusive distribution rights, flexstructures GmbH provides node-locked and floating licenses of the software IPS Virtual paint. For further information, please do not hesitate to contact us.

Software training

In regular intervals or upon demand, we offer training courses for IPS Virtual Paint. These flying start trainings enable users to work with the software immediately with efficient results.

About flexstructures GmbH

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.info@flexstructures.de

www.flexstructures.com

IPS Virtual Paint
Groundbreaking Software Technology for Spray Painting Simulation
Fraunhofer Technology

Computer-aided engineering and numerical simulation can play a significant role to increase product performance and reduce production costs in the automotive industry. However, the painting process is very complex, since it implies
- multi-physics
- multi-scale phenomena
- large moving geometries.

As a result, the standard CFD method leads to prohibitively long calculation times for these tools to be industrially useful. This was the starting point of a research project in 2006 of Fraunhofer-Chalmers Centre and the major companies in the Swedish automotive industry Volvo Cars, Scania CV, SAAB Automobile, Volvo and Swerea IVF. This project has opened new perspectives to
- reduce energy consumption and emissions
- reduce paint material and losses
- reduce cycle time
- improve product quality.

One Solver for Air Flow, E-field and Particle Tracing

The developed virtual paint framework is based on novel algorithms for simulation of air flow, electromagnetic fields and paint droplets in one step.

The incompressible solver is based on unique immersed boundary methods that enable modeling of moving objects at virtually no additional computational cost. Furthermore, it greatly simplifies preprocessing by avoiding the cumbersome generation of a body conforming mesh.

The very efficient implementation gives a major improvement of computational speed compared to other approaches.

Therefore it is possible to simulate spray painting of a full car in just a few hours on a standard computer.

Analyse and Optimize your Process

Due to its graphical user interface, applying the software is easy, practical and efficient. It is designed for process engineers with limited experience in numerical simulation. The preprocessing steps can be made easily by
- importing CAD geometry
- importing robot motion
- defining the process parameters
- automatic meshing.

Significant reduction of simulation time

After the simulation, results like paint thickness on the target and transfer efficiency can be analyzed directly.

Thus the software can be used for systematically studying the influence of process parameters (e.g., robot path, E-field, air downdraft in spray booth) on thickness quality and transfer efficiency.

Validation Campaign

For verifying the ability of the software to predict the paint thickness for complex geometries, an extensive measurement campaign was carried out at Fraunhofer-Institut für Produktions-technik und Automatisierung (IPA) in Stuttgart, Germany. An internally charged Dürr Ecobell 2 atomizer was used, and several car fenders were provided by Volvo Car Corporation.

Several test plates and car fenders were used for comparing the resulting paint thickness in the experiments and in the simulations. All in all the correlations between simulations and experiments were remarkably good.