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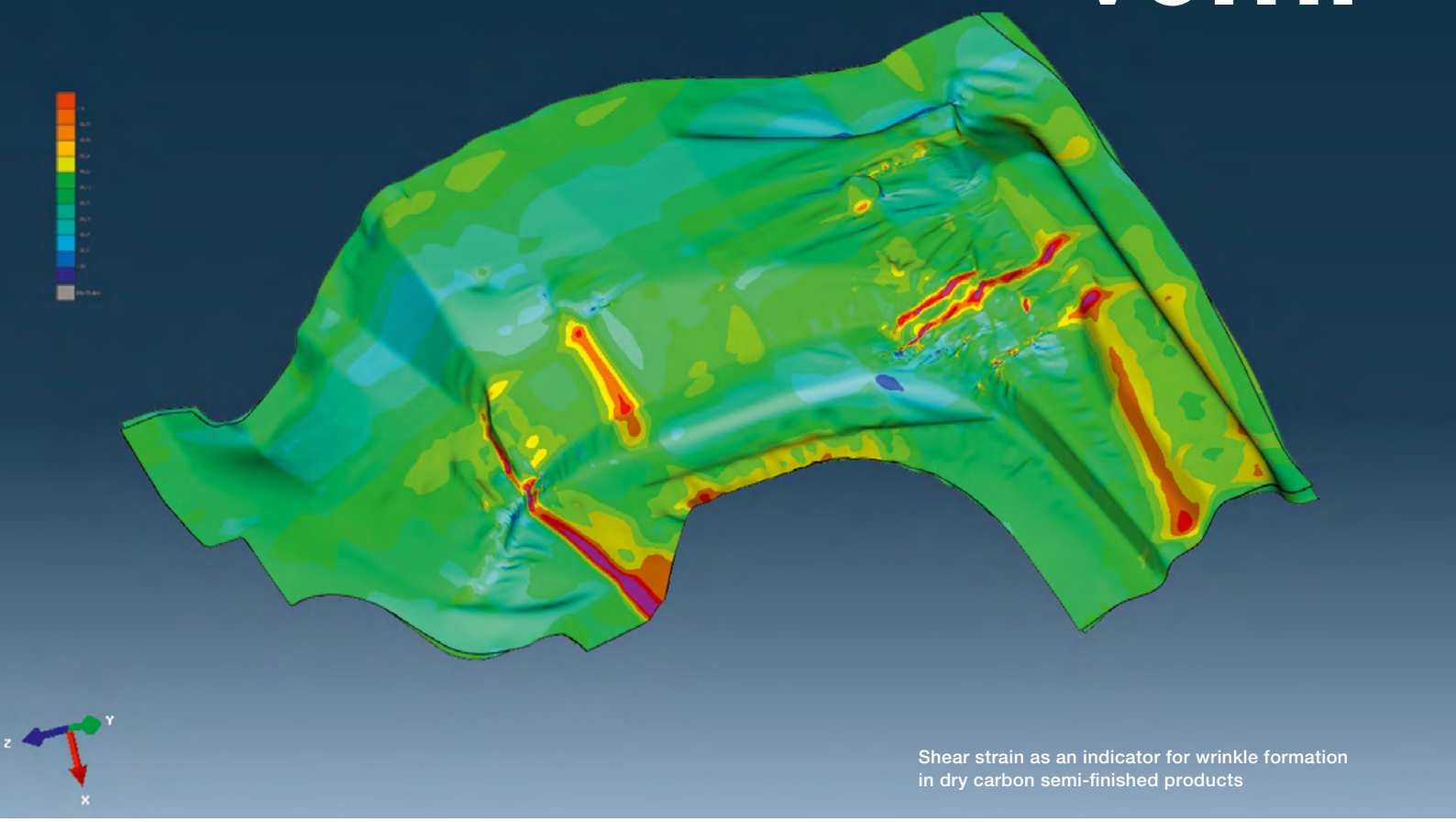


Shear strain as an indicator for wrinkle formation in dry carbon semi-finished products

Engineering as a service
Voith Composites

Unique and seamless combination of engineering and production knowhow creates maximum customer value.

Using our knowhow from real-life customer projects and ongoing research, we provide strong support at every stage of the development phase. From the start, we offer feasibility and concept studies for composite parts, tooling and special machinery. Working at any depth of detail required, we develop our customer's ideas using mechanical design (CAD) to structural and process simulation (FEA) to virtual process layup – always keeping composites-based design and cost-efficient manufacturing processes in mind.

Feasibility and concept studies

An early evaluation of ideas and concepts is mandatory for the quick and efficient development of components. Therefore, Voith provides feasibility studies regarding function, manufacturability and costs for various markets from automotive and aerospace to machinery.

Furthermore, Voith elaborates mature concepts including joints and add-on parts for composite parts with optimal use of material properties for achieving cost-efficient, lightweight solutions. For every concept, we offer matching tooling concepts for each process step (e. g. preforming, molding, cutting and assembly) and when appropriate new concepts for matching special machinery.

Pressure vessel prototpyes

Detailed design concept for composite roll and associated metal parts

Mechanical design and virtual process layup

We are able to develop all design details for parts, toolings, machines and associated engineering data (detailed drawings, ply books, etc.) for later production steps. Even layup simulation of whole manufacturing processes and machines can be done by us using our digital twins for the Voith Roving Applicator and the filament winding process.

Structural and process simulation

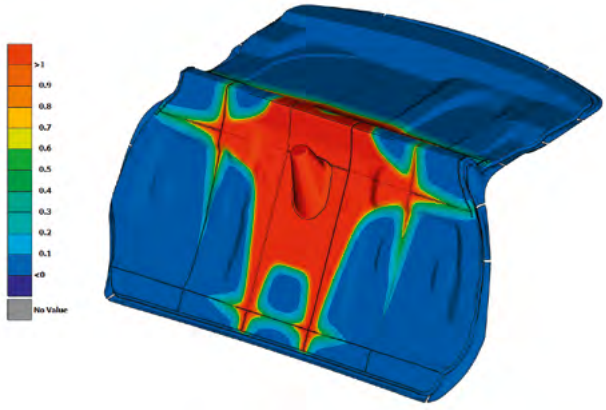
Having worked on new methods for numerical process simulation Voith has gained an outstanding expertise for virtual testing of manufacturing processes which leads to a significant reduction of development costs and risk in production processes:

- Linear and non-linear structural analysis
- Modal analysis
- Thermal analysis
- Draping: Evaluation of preforming concepts (fabrics and direct fiber placement material) and prediction of defects (folds, gaps etc.) and process parameters (clamping forces etc.)
- Filling: Evaluation of gate control concepts and prediction of dry spots (RTM, WCM)
- Bonding: Fluid-Structure-Interaction-Simulation (FSI) and evaluation of assembly devices

Software

- CAD: CATIA V5, Autodesk Inventor
- FEA: ABAQUS, EPILYSIS; ANSA / META
- Process: CATIA V5, Cadwind

Saturation and flow front within HP RTM simulation



Certified according:

- **ISO9001**
- **ISO14001**
- **EN9100 (pending)**

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Inspiring Technology for Generations