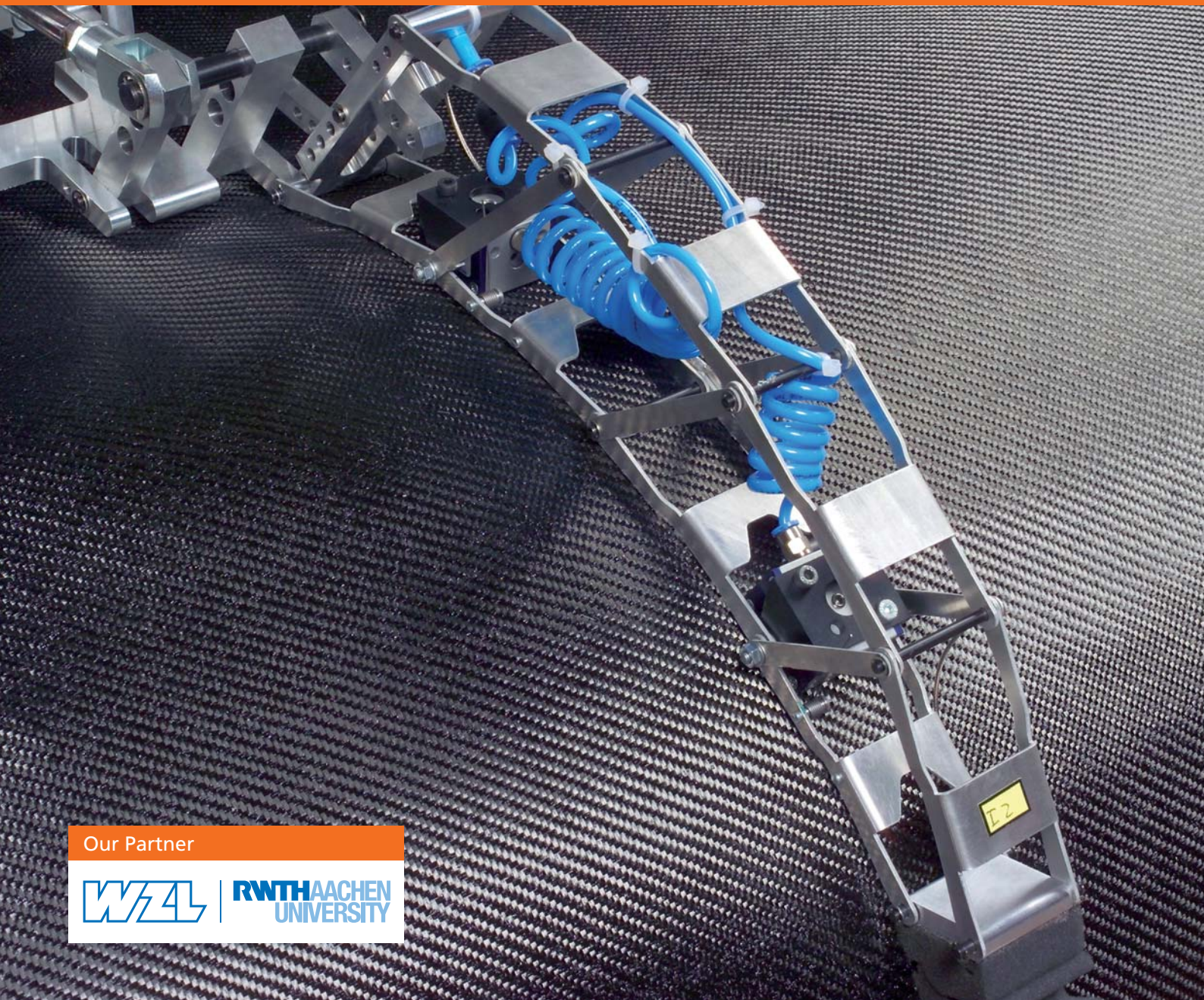
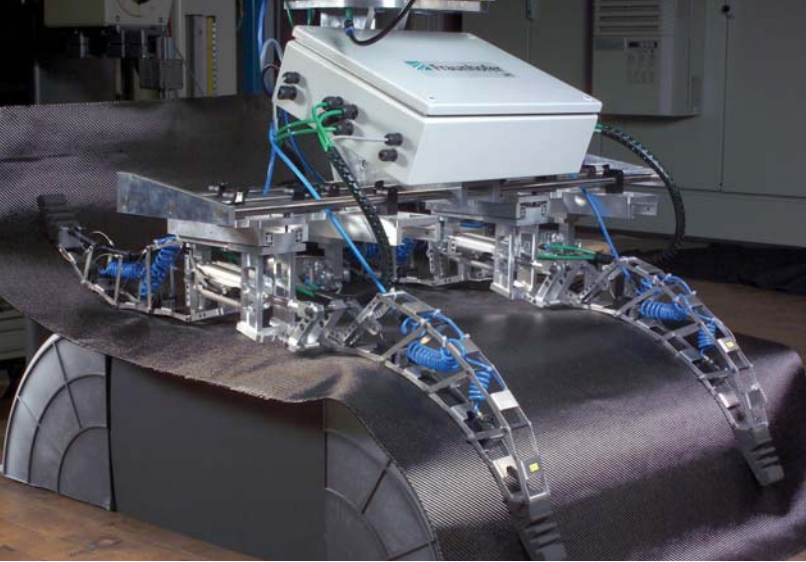


HANDLING OF NON-RIGID SEMI-FINISHED TEXTILES FOR FRP-PRODUCTION



Our Partner



GRIPPER KINEMATICS

The relevance of fiber-reinforced plastics (FRPs) as engineering materials is increasing steadily due to their outstanding properties. They have become a key element in any energy-efficient, resource-conserving approach to natural resources. In a mass production environment, it is vital to maintain a fully automatic process chain in order to ensure that manufacturing costs remain competitive in comparison with those incurred in conventional manufacturing processes.

In addition to damage-free pick-up, adaptation to the shape of the deposition point is a key element in the handling process. This requirement has been met by the Fraunhofer IPT, which has developed new gripper kinematics such as the octopus gripper and implemented them in industry.

Advantages of innovative gripper kinematics

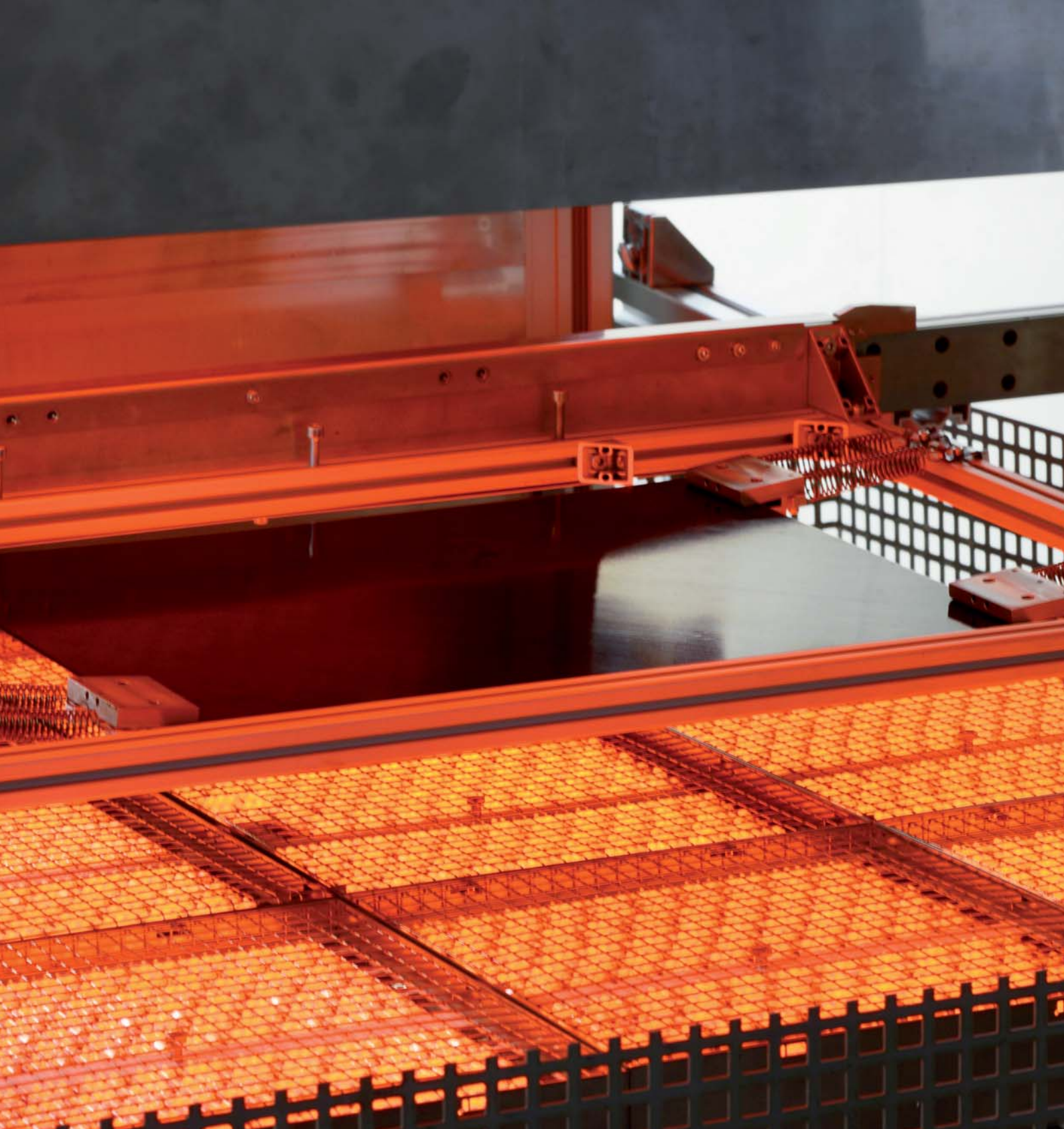
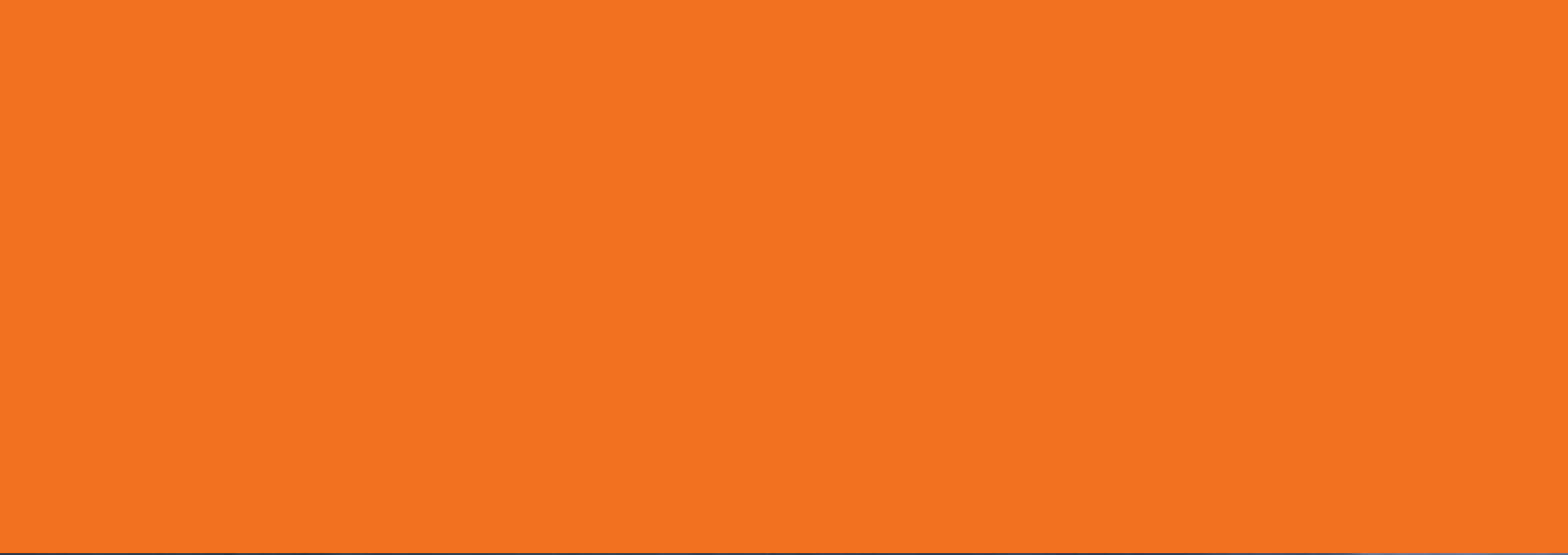
- Option of deployment in the mass production of complex fiber-reinforced composite parts as a result of their ability to handle non-rigid FRP semi-finished goods (textiles), allowing the process chain to be fully automated
- Minimum machine set-up time coupled with maximum reliability due to the self-adapting gripper system
- Damage-free pick-up and deposit of semi-finished FRP products
- Wrinkle-free deposit by virtue of near-net-shape adaptation to the geometry of the deposit point

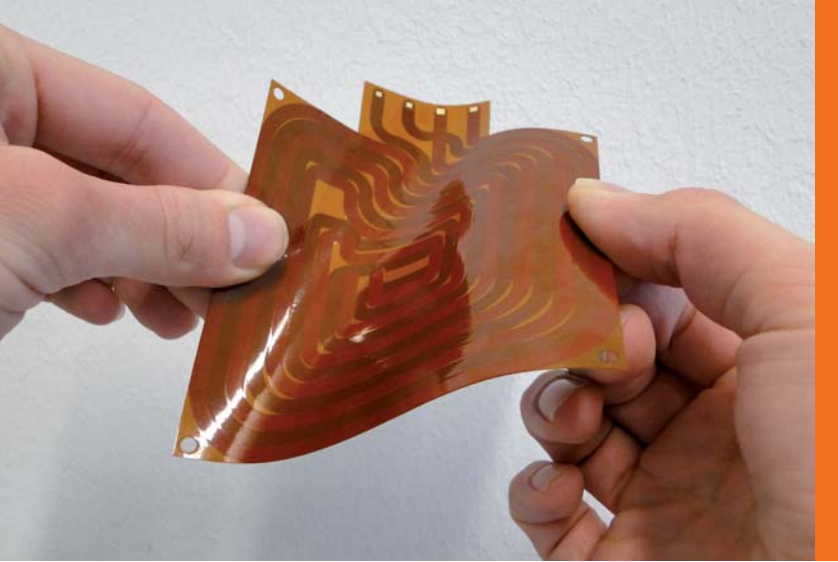
Our service

- Development and industrial implementation of new gripper kinematics to ensure damage-free handling for pliable semi-finished products
- Plant and process design for handling systems
- Concept planning and integration of the metrology and sensor systems required within the gripper systems (design, evaluation, optimization) and integration of quality assurance concept
- Consultancy service relating to automated handling of semi-finished FRP products

Our strengths

- The Fraunhofer IPT has extensive expertise in the design of kinematics for handling processes
- We have many years of experience in designing control and monitoring units for gripper systems
- We offer concept development, design and construction of complete handling systems and process chains, all from one single source





GRIPPER MECHANISMS

Innovative gripper systems permit semi-finished products which could previously be handled only with difficulty, to be handled automatically. This means that the process chain can be reproduced fully automatically and guarantees a cost-effective manufacturing process.

Adhesion and flexibly-shaped electrostatic grippers are just two examples of developments to come out of the Fraunhofer IPT.

Advantages of the new gripper mechanisms

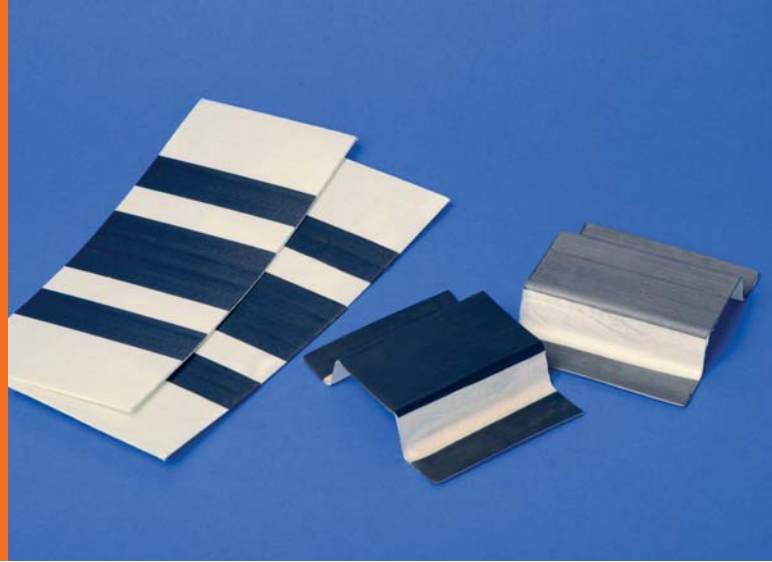
- Potential for automation of process steps which could previously be performed only manually
- High degree of reproducibility and close tolerances resulting from an automated process
- Shifting center of gravity ensures that flat, easily deformed items are picked up in a distortion-free operation
- Flexible gripper films permit optimum adaptation to the geometry of the deposition point
- Segmented gripper surface permits selective pick-up of semi-finished items
- Stacked items are separable
- Air-permeable textiles can be handled
- Extremely low operating cost

Our service

- Design of control electronics for electrostatic grippers to suit your requirements
- Integration of the sensor system for continuous process monitoring and implementing quality assurance concepts
- Validation of the entire process chain
- Consultancy service relating to automated handling of non-rigid semi-finished goods

Our strengths

- The Fraunhofer IPT developed the electrostatic principle underlying the handling of flexible items and pioneered its transfer to an industrially viable model
- The electrostatic grippers developed at the Fraunhofer IPT are the first worldwide which are capable of depositing items in a controlled move without any additional mechanisms
- We have experience of designing complete electronic drive systems including software.
- The Fraunhofer IPT has acquired unrivalled experience and expertise in designing gripper pads
- The Fraunhofer IPT has extensive know-how relating to the control of electrostatic effects and their interactions



HANDLING OF ORGANIC SHEET MATERIALS

The capacity to form organic sheet materials opens up the potential to produce structural components made of fiber reinforced plastic cost-effectively on a large scale. One of the challenges in the manufacturing process, is how to handle the warm organic sheet materials. At elevated temperatures, the matrix is in a state of high viscosity. The handling operation cannot, therefore, be replicated by modifying any of the handling solutions currently available on the market due to the high level of complexity involved.

Advantages of automated organic sheet material handling

- High quality mass production of fiber composite parts in short cycle times
- High level of organic sheet material consistency and tight tolerances achieved in an automated manufacturing process
- Optimum utilization of the marginal areas of the organic sheet material as a result of the highly adaptive clamping mechanisms
- Power-controlled gripper mechanisms permit highly complex geometries to be thermoformed without leaving any wrinkles

Our service

- Design and optimization of gripper systems specifically for handling organic sheet materials
- Optimization of the thermal management of the grippers in order to guarantee consistent handling
- Adaptation of the grippers to suit the areas of application required (geometries, temperatures, materials)
- Integration of the sensor system required for process monitoring and implementation of the quality assurance concept

Our strengths

- The Fraunhofer IPT has years of experience in manufacturing and processing organic sheet materials
- We combine a theoretical, scientific approach with our extensive process knowledge and transfer these areas of expertise into adaptive system solutions
- We have expertise in the design of highly customized, individual solutions
- The Fraunhofer IPT develops tailor-made handling systems for processing individual organic sheet materials

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