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1 *Thermography for monitoring automated pre-treatment using atmospheric pressure plasma.*
2 *Specimens after the peel test. Left: Cohesive fracture in the adhesive film; Right: Adhesive fracture at the surface.*

CUSTOMIZED QUALITY ASSURANCE FOR ADHESIVE BONDING & SURFACES

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Adhesive bonding and surface technology

The use of innovative materials and material combinations puts very high requirements on the quality and functionality of surfaces and bonded joints. Therefore, technical quality assurance concepts are indispensable.

I Adhesive bonding technology

Adhesive bonding is the preferred joining technique in many high-tech areas, for example in the field of light-weight design. According to DIN EN ISO 9001, adhesive bonding is a "special process". This is a process which results cannot be fully tested non-destructively. In order to produce high-quality bonded joints, all processing steps must hence be adequately monitored and documented, from the planning phase to the final bonded product.

I Surface technology

The area of surface technology (including surface preparation, pre- and post-treatments, etc.) allows for controlled surface modifications and thus enables the use of innovative materials for a greater number and for more diverse applications. Even very small defects or structural abnormalities on surfaces can have far-reaching consequences for the final product. Effective quality assurance is hence vital for modern production processes involving surface technology.

Quality assurance concepts along the whole production chain

Fraunhofer IFAM is your service partner for quality assurance concepts in adhesive bonding and surface technology. Our extensive know-how helps developing customized quality assurance concepts.

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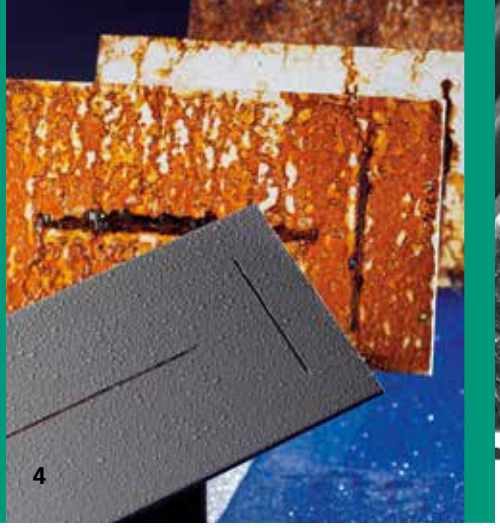

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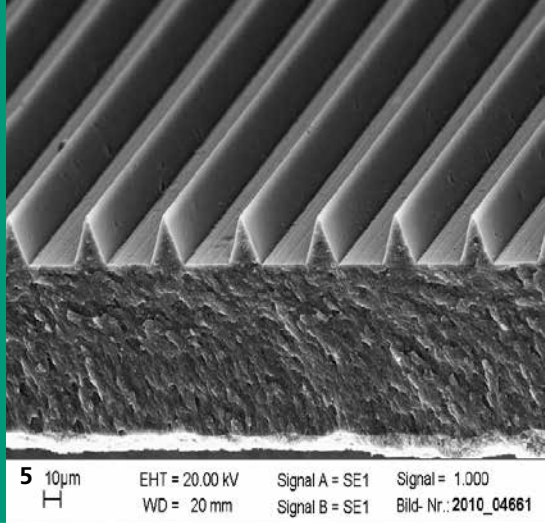

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Pre-process quality assurance

I Quality of raw materials

- I Testing material properties in an accredited Materials Testing Laboratory
- I Preparation of input files for FE programs (ABAQUS, LSDyna)
- I Development of new raw materials and adhesives for improving efficiency/integration of new functions
- I Selection/development of suitable test methods for monitoring incoming goods
- I Development of innovative joining and design concepts

I Quality of production environment

The Adhesive Bonding Technology and Surfaces division of Fraunhofer IFAM is accredited in accordance with DIN EN ISO 9001. Fraunhofer IFAM also acts as a Certification Body of the Federal Railway Authority for auditing and approving companies in the rail vehicle manufacturing sector under DIN 6701-2.

I Training of personnel

Fraunhofer IFAM offers industrial adhesive users an established and comprehensive portfolio of supra-company training courses. These training courses are given worldwide and are accredited. They are addressed in particular at companies that use adhesive bonding and fiber composite technologies. On request Fraunhofer IFAM can also give company-specific training courses. to industrial adhesive users.

Inline quality assurance

I Quality assurance of processes

- I Development/qualification of adhesive bonding production processes; computer-aided production planning
- I Application of adhesives/sealants, casting compounds (mixing, dosing, application)
- I Development of environmentally compatible pre-treatment methods and corrosion protection systems for the durable bonding and coating of plastics and metals
- I Automation and optimization of dosing and application processes
- I Process monitoring, e. g. monitoring adhesive dosing using camera systems
- I Process simulation, e. g. simulation of oven processes and crosslinking reactions as well as their effects

I Quality assurance of surfaces

- I Quality assurance concepts for adhesive bonding and surface treatment via inline monitoring of adherend surfaces
- I Inline monitoring of surface quality – development of new advanced methods for customized surface monitoring in production processes
- I Customized modification of substrate surfaces by wet- and dry-chemical pre-treatment, cleaning, and activation
- I Functional coatings via plasma processes and combined processes as well as functional coating systems

Post-process quality assurance

I Quality of final products

- I Development of test methods for measuring specific properties, e. g. ice formation and adhesion to surfaces, resistance to aging
- I Destructive and non-destructive testing of bonded joints
- I Evaluation of aging and degradation processes in composite materials and coatings; electrochemical analysis

3 *Manufacturing an FRP component by hand lay-up.*

4 *Coated test specimens after exposure in the salt spray test.*

5 *Microstructured coating for reducing drag ("riblet coating" or "sharkskin coating").*