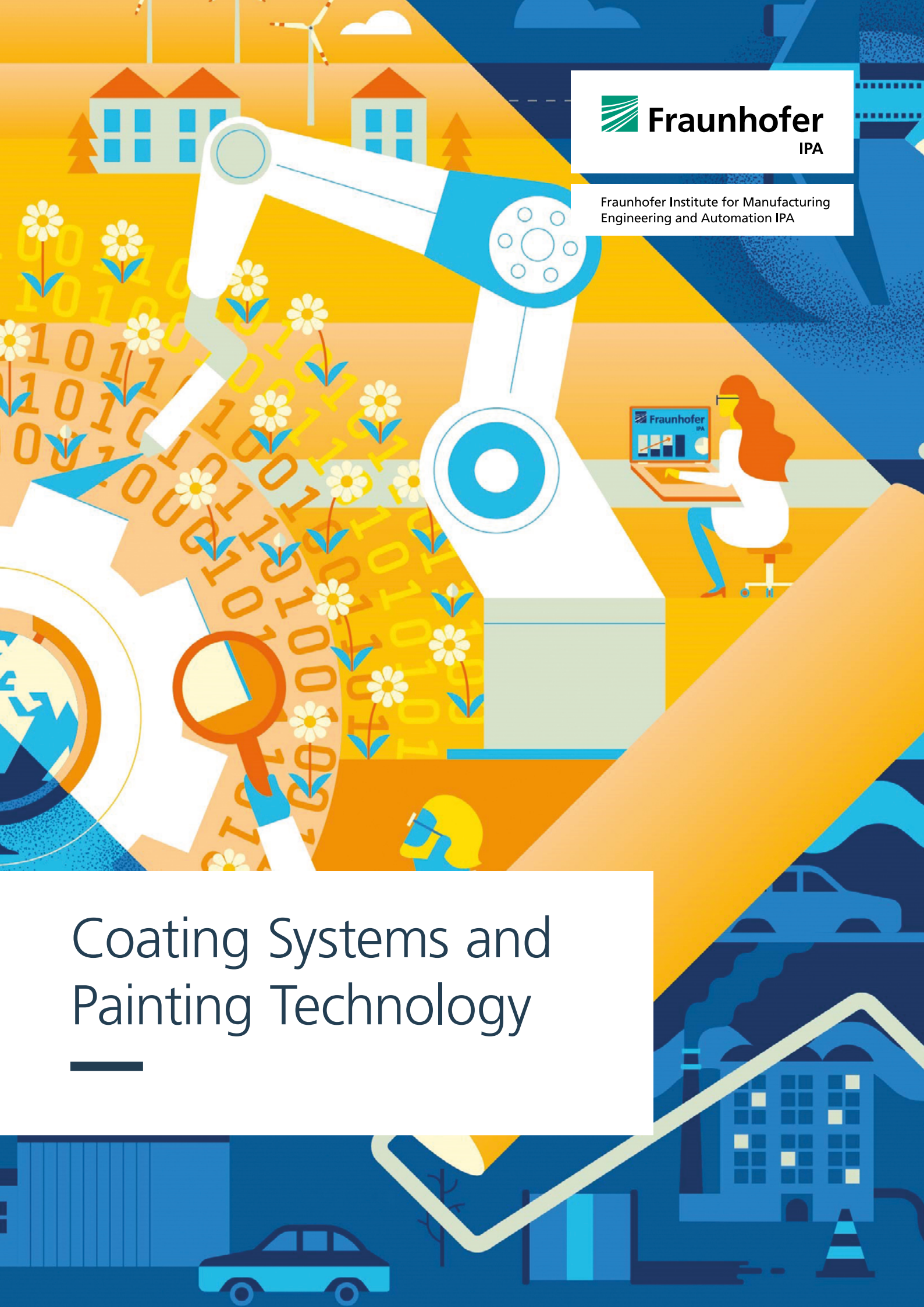
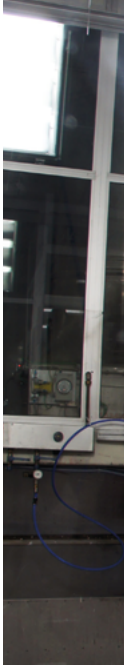


Fraunhofer Institute for Manufacturing Engineering and Automation IPA

Coating Systems and Painting Technology



Coating Systems and Painting Technology

Your partner for improving productivity, sustainability, and quality in the process chain of coating technology

Today, organic coating systems are the most important surface technology in the industry due to its flexibility and versatility. We focus on the complete process chain, from the development of new paints and raw materials to the application processes.This also encompasses development, modeling and simulation, while considering the influences of materials and processes at the same time.

Coating systems and painting technology make an important contribution to sustainability – after all, this is what makes the products durable primarily. The department also focuses on aspects of the process chain such as raw material demands and resource and energy efficiency, e.g. the development of coating systems based on biomaterials.

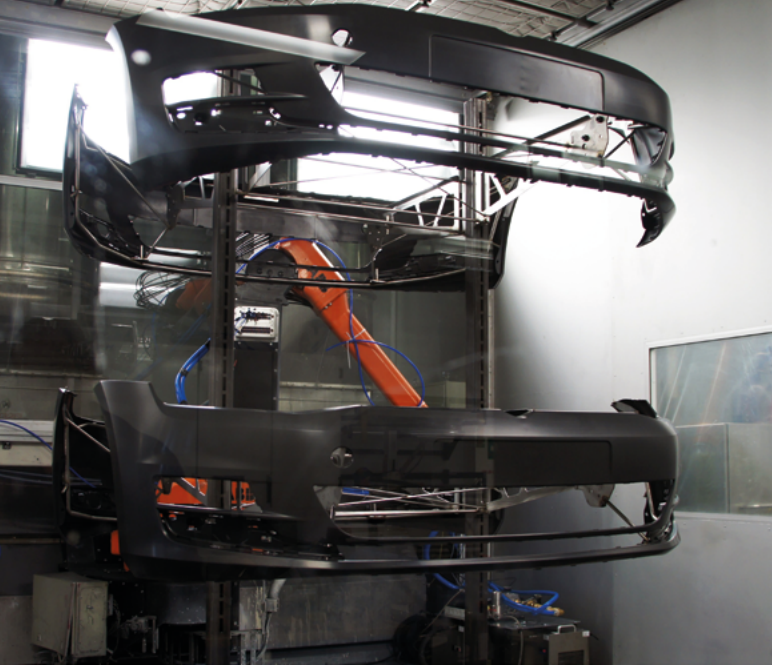
On the project side, the department handles challenging bilateral or consortium-based industrial projects, in addition to funded applied research projects. In our laboratories, we apply accredited test methods according to DIN EN ISO/IEC 17025:2018.

Together with you, we plan and optimize efficient, modern and resource-saving coating processes and paint shops.

Improved application efficiency, shorter throughput times, energy and material savings, and new materials are all solutions that make processes much more efficient when implemented and integrated into day-to-day operations.

Overview

- **70 employees from the fields of natural sciences and engineering sciences as well as scientific research assistants**
- **Pilot plants with production-related painting equipment**
- **Development, testing and analytical laboratories**



Wet application and simulation technology

- Research and development of spray painting processes (coating line)
- Development of overspray-free coating technologies and mask-less multi-colour coatings
- Optical (laser) measuring equipment for spray painting processes
- Fluid dynamic simulations for paint application and drying processes

Development of pigments and coatings

- Surface design and engineering of fillers and pigments by targeted modification of (in)organic ingredients
- Innovative components for functional, weather-resistant coatings
  - Nanoscale corrosion protection
  - Self-stratifying coatings for efficientcoating systems
  - Intrinsic laser marking

Powder application technology

- Development of high-efficiency and low-separation powder spray systems as well as consistent recirculation of powder paint materials
- Development of time-, cost- and energy-saving solutions for processing paints
  - Gunless high-speed coatings with energy-efficient infrared curing
  - Selective powder coating without masking

Applied coating technology

- Research on innovative applications and usage of paint raw materials
- Research and development of biobased coating materials
- Development of anti-corrosion concepts
  - Surface pretreatment
  - Multi-metal concepts
  - Corrosion protection tests incl. digital analysis (corrosion inspector)
- Determination of structure-property relationships of coating materials with state-of-the-art testing equipment
- Photocatalysis

Failure analysis

- Infrared spectroscopic tests to detect surface contamination, comparative analyses of coatings and raw materials
- Thermal analytics (DSC, TGA, DMA)
- Investigation of surface defects and adhesion problems as well as curing states
- Gas chromatography: analysis of volatile components

Product and testing concepts for painting technology

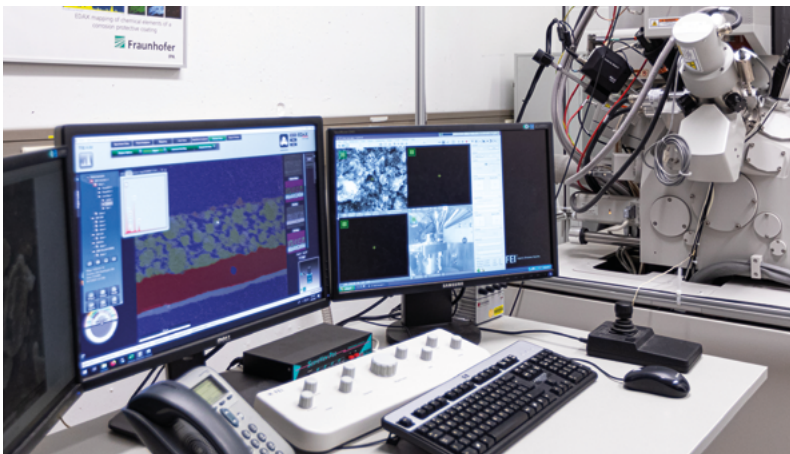
- Pilot plant trials
- Joint implementation of research projects
- Use of standardized test methods
  - Accredited test procedures: durability, adhesion, ...

Planning of paint shops

- Software-supported, methodical, clear design and detailed planning process (from the idea to the finished system)
- Technical and economic assessment of technology alternatives in our pilot plants and laboratories
- Modular planning services

Laboratory according to DIN EN ISO/IEC 17025:2018

- Accredited test procedures in coatings assessments and analytical investigations
- Testing according to many automotive standards



Process chain – Coating Systems and Painting Technology

Paint raw materials

- Binders
- Pigments
- Fillers
- Additives
- Diluents, solvents

Coating materials

- Development of formulations, model paints
- Dispersion technology
- Rheology
- Colour
- Wetting
- Film formation

Coating technology

- Substrate/surface pretreatments
- Application
- Wetting, film formation
- Drying, crosslinking
- Process concepts
- Technology alternatives

Coating

- Adhesion
- Corrosion protection
- Resistance
- Mechanical, optical, chemical properties
- Functionality
- Error, defect and damage analysis

Determine **structure-property relationships**

Ensure **material and resource efficiency**

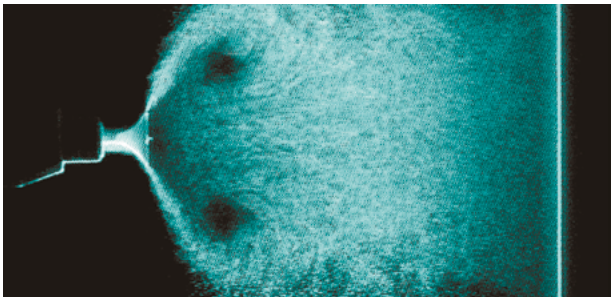
Develop **digitization solutions / simulations**

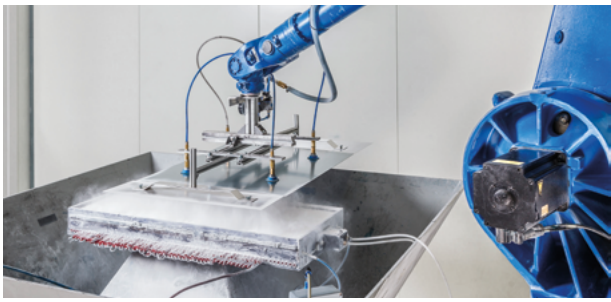
Our cooperation services

1. Contract research and development along the entire coating process chain: from paint raw materials to industrial painting processes, including the necessary measuring and testing technology
2. Painting process engineering with paint shop planning and optimization
3. Implementation of accredited test procedures
4. Quality optimization by analyzing coating and process errors as well as evaluating failure mechanisms
5. Application measurements and analyses in the fields of paint raw materials, paints, coatings and process technologies

Your advantages

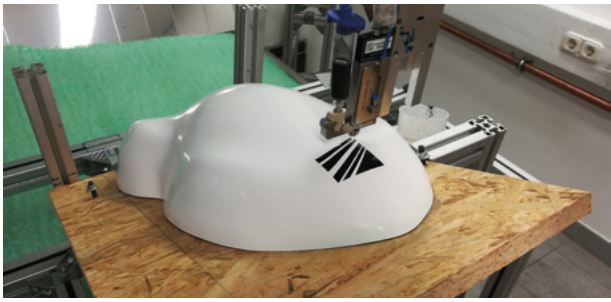
- **Clear, target-oriented approach**
- **Efficient and independent advice**
- **Access to our experts and facilities as required**

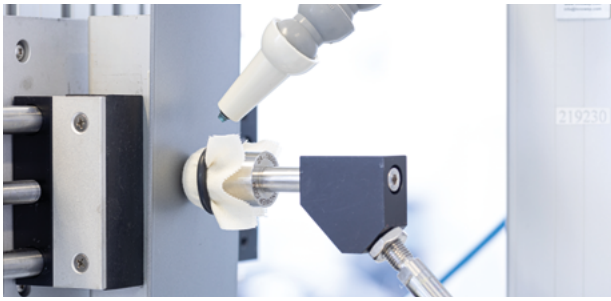




Our laboratories and research environment

- Testing methods accredited according to DIN EN ISO/IEC 17025:2018
- Applied coating technology lab
- Analytics and material testing lab
- Microcoating system for loss-free coating
- Laboratory area dedicated to electron microscopy
- Production-scale painting pilot plant
- Powder pilot plant
- Particle Technology Center
- Dispersing Technology Center
- Competence Center Coating Systems and Process Planning





Joint research projects

In collaborative research projects, the department's employees develop material concepts and process concepts for the future. We also provide assistance when it comes to strategic planning issues and submitting applications, and we are at your disposal as a contact point for planning projects and for national and international cooperation requests.

In the case of pre-competitive collaborative research projects, we identify and apply for the appropriate funding.

For your research needs in the field of coating systems and painting technology, we are the right address for bilateral projects or large consortia.

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