



- 1 *Scratch resistance test with laboratory washing machine.*
- 2 *Portable digital microscope.*
- 3 *Device for testing resistance to light and weathering.*

COATING TESTS

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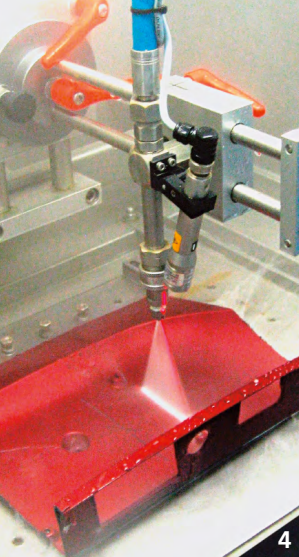
Expectations regarding the durability of paint films are enormously high compared to the amount of material used to make coated workpiece. Furthermore, these days pre-treatment processes and painting processes have to be carried out in ever-narrower process windows. Painting companies have to find ways to make their painting processes as reliable and affordable as possible. However, keeping sight of the almost infinite number of measuring and testing procedures, standards, guidelines, in-house testing regulations and specifications involved is no easy task.

In order to limit costs and ensure process reliability, it is essential to choose the right test procedure for the case at hand. Therefore, test methods should be geared to the reason behind the test. Care must be taken to distinguish between the following situations, e.g.:

- Tests for selecting pre-treatment media, paints, processes and paint shop components when planning processes

- Incoming inspection of pre-treatment media, paints and paint shop components when the paint shop is running
- Monitoring processes and systems when the paint shop is in operation
- Serial tests on painted components
- Testing and measurement technologies when dealing with quality problems

Over a period of more than 40 years, the Department of Coating Systems and Painting Technology has built customer-oriented testing equipment and carried out extensive development projects. The focus of our work is on evaluating and approving coating processes. In addition, within the scope of planning and optimization projects we help you evaluate and exploit coating technologies and rationalization potential. Figure 6 shows an overview of the tests for evaluating painting processes.



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Testing technology for coating process evaluation

Tests of the substrate	Tests of the coating material	Technical processing tests of the coating material	Testing the processing technique of the coating material	Paint film testing
<ul style="list-style-type: none"> ▪ Surface roughness test ▪ Dirt residues ▪ Surface tension ▪ Defects (cracks, pores, blowholes) 	<ul style="list-style-type: none"> ▪ Rheological tests ▪ Stability tests (sediment, flocculation, etc.) ▪ Contaminations ▪ Other physical testing (density, solids, etc.) 	<ul style="list-style-type: none"> ▪ Applicability (spreadability, sprayability, etc.) ▪ Yield ▪ Film formation ▪ Flash-off behaviour ▪ Levelling ▪ Pot life 	<ul style="list-style-type: none"> ▪ Spray pattern analysis ▪ Nebulizing properties (particle size determination) ▪ Coating thickness distribution ▪ Paint compatibility tests ▪ Transfer efficiency 	<ul style="list-style-type: none"> ▪ Mechanical technological ▪ Climatic tests/ corrosion test ▪ Resistance tests ▪ Optical tests

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We also offer the following services:

- Analysis of paint film defects and damage
- Optimization and development of testing methods for paint films
- Staff training programs and seminars

Examples of innovative test equipment and methods used by Fraunhofer IPA in the test laboratory include:

Determining the scratch resistance of paint films with a laboratory washing machine

With this test, the laboratory washing machine realistically simulates stress (e.g. scratch effects) on the outer paint skin applied to vehicles and other surfaces. Samples are moved horizontally back and forth under a rotating brush (PE bristles or fabric strips).

Characterizing paint defects with the aid of a portable digital microscope

Paint defects such as craters, dirt inclusions, bubbles etc. are visualized as a 3-D image and measured with the digital microscope capable of 5000-fold magnification. The main advantages of the portable digital microscope over conventional optical techniques for characterizing painting defects, such as the cross section method, light microscope and scanning electron microscope, are:

- Time savings
- Samples are easy to prepare
- Real-time measurement

- Non-destructive visualization and measurement
- Measurements performed on the object directly on-site, e.g. on the production line, on large objects such as buildings, ships, airplanes etc.

Determining the resistance of coatings to light and weathering

The light and weathering test device is used to expose coatings to artificial weathering in the laboratory. This simulates the aging processes that take place during natural weathering.

Determining the adhesive strength of coatings with the steam jet testing device

This test method provides information about the adherence of coatings to each other and to the substrate. In the test, a scratched coating is subjected to mechanical and thermal stress by a high-pressure water jet, e.g. 68 bars.

Visualizing temperature differences and distributions with the thermal camera

Among others, thermography is used to locate and evaluate heat sources and heat loss in systems and equipment.

New VDA climatic change test for multi-metal applications

Due to the increasing use of galvanized steel and aluminum materials for corrosion protection, a faster and more reliable test procedure is required. The new VDA climatic change test for assessing corrosion on various metals (steel, zinc and aluminum) reproduces damage patterns and corrosion creep on coatings applied to zinc, steel and aluminum substrates. Results collaborate well with natural weathering conditions.

Our laboratories

We use accredited test procedures according to DIN EN ISO / IEC 17025:2018 in our laboratories. We attach the utmost importance to the reliability of the test and measurement procedures as well as to fulfilling our customers' expectations and requirements.

- 4 *Steam jet test.*
- 5 *Thermal camera.*
- 6 *Examples of quality tests performed in the testing laboratory.*