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1 *Digital analysis of corrosion.*

DIGITAL CORROSION ANALYSIS

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Manual and visual assessment

Paint laboratories that develop or test corrosion protection products have to make a vast number of coated test plates. To assess their resistance to corrosion, these plates are then exposed to artificial atmospheres, such as salt spray, in spray cabinets. Evaluation methods must be highly reproducible if the resulting corrosion phenomena are to be reliably assessed in day-to-day quality controls as well as in development and approval tests. For this reason, the same reliable and trained examiners are invariably responsible for carrying out the respective tests and evaluations, which are performed manually and visually. But despite this high degree of professionalism, person-based assessments are no longer able to keep up with the steadily-rising level of automation and the demand for immediate documentation of the results. Growing requirements for faster processes, higher numbers of test specimens, and the unprejudiced evaluation of results have pushed this method to its limits.

Digital solution

In the Applied Coating Technology Group's laboratory area, the scientists work with a device that automatically detects corrosion phenomena on scored lines (straight, oblique, intersecting, as well as multiple scored lines) with first-class imaging quality.

The sensor head is fitted with a color line scan camera and integrated coaxial line illumination unit as well as a swiveling console. This ensures high reproducibility of the images.

A test plate (maximum 100 mm x 200 mm) can thus be analyzed and documented in a fully-automated process within a matter of minutes.

Standardized tests

These highly-reproducible images are then analyzed automatically in accordance with standards in real time.

The device is capable of detecting and analyzing the following corrosion phenomena:
- Corroded surfaces (red rust / white rust / undercreepage)
- Edge rust
- Mean undercreepage width
- Number and lengths of filiform threads
- Classification of size amount frequency of corrosion spots
- Blistering

The following standards are met in full:
- Filiform analysis according to DIN EN ISO 21227-4
- Undercreepage, degree of delamination and corrosion around a scored line as per DIN EN ISO 4628-8
- Degree of blistering according to DIN EN ISO 4628-2
- Degree of rusting according to DIN EN ISO 4628-3

- Edge rust DBL 10494-6
- Cross-cut test according to DIN EN ISO 2409
- Multi-impact stone chip test according to DIN EN ISO 20567-1

New evaluation procedure

The existing digital corrosion analysis system was further developed and technically adapted to meet the requirements of the Fraunhofer IPA scientists, thus enabling edge rust to also be detected. Likewise, the software was extended in collaboration with the Applied Coating Technology experts to allow cross-cuts and the degree of blistering to be analyzed fully automatically in accordance with the relevant standards.

This was accomplished while ensuring that the analyses comply exactly with the specifications of the respective standards so that they can also be implemented in the accredited test laboratory.

Customer benefits

- Objective analysis in compliance with standards
- Reproducible tests and evaluations
- Automatic sample analysis
- Faster analysis procedures and results
- Immediate digital documentation of results

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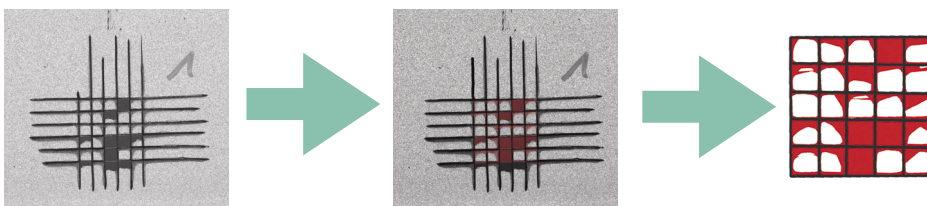
2 *Example of a digital analysis of filiform corrosion on scored lines made at an oblique angle.*
3 *Example of a digital analysis of a cross-cut pattern on a coated test plat.*