PAINT/COATING TESTING & FAILURE ANALYSIS

ExcelPlas MATERIALS TESTING

A significant amount of financial loss is incurred every year as a result of premature failure of protective paints and coatings. The cost to repair such failures far outweighs the initial cost of painting due to the extreme cost and liability associated with excessive rigging and downtime to correct the problem.

Causes Of Paint And Coating-Related Failures

- **Improper surface preparation** – the substrate surface is not adequately prepared for the coating that is to be applied. This may include cleaning, chemical pretreatment or surface profile.
- **Improper coating selection** – either the paint or coating selected is not suitable for the intended service environment, or it is not compatible with the substrate surface.
- **Improper application** – this can be a problem with either shop-applied or field applied coatings, and occurs when the required specifications or parameters for the application are not met.
- **Improper paint formulation, drying, curing and over coating times** – this problem relates to a lack of conformance to the required specifications or parameters.
- **Lack of protection against water and aqueous systems** – this is a particularly serious problem with aqueous systems containing corrosive compounds such as chlorides.
- **Mechanical damage** – which results from improper transport, handling of the painted or coated substrate, resulting in a breach in the paint or coating.

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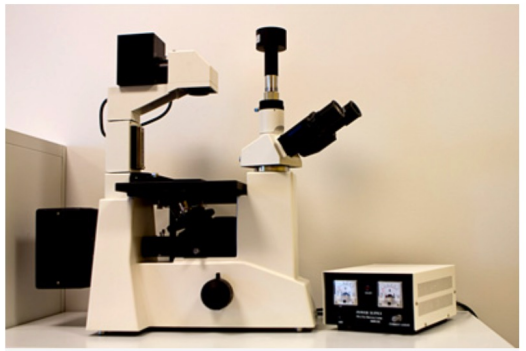
OUR UNIQUE PROCESS

Each Failure Analysis Investigation Will Include A Formal Report Containing The Description Of The Defect, Review Of The Application And Exposure Conditions, Laboratory Analysis, On-Site And Analytical Test Results, Factors Influencing The Paint Failure, Root Cause, And Corrective Actions If Requested.

COLLECTION Of DATA & SAMPLES

A preliminary examination of the failed coating and the substrate, as well as a non-destructive examination of the failure, with extensive photographic documentation. The preliminary examination does not change or damage the failed coating or substrate in any way.



EXAMINATION

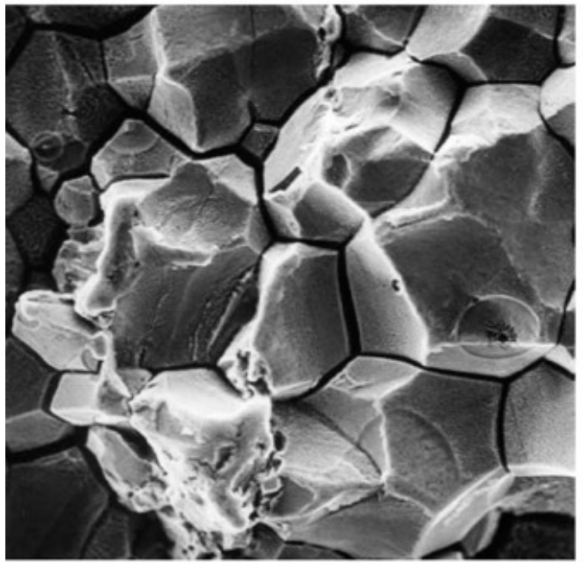
An examination of failed paint and coating chips using a microscope may reveal that one of the layers is brittle and full of cracks, or perhaps that an entire layer of paint is missing. A microscope at magnifications ranging from 50x to 1000x can be used to examine the cross section of failed paint and coating samples for voids or inclusion, as well as observation of underlying corrosion products on substrates.

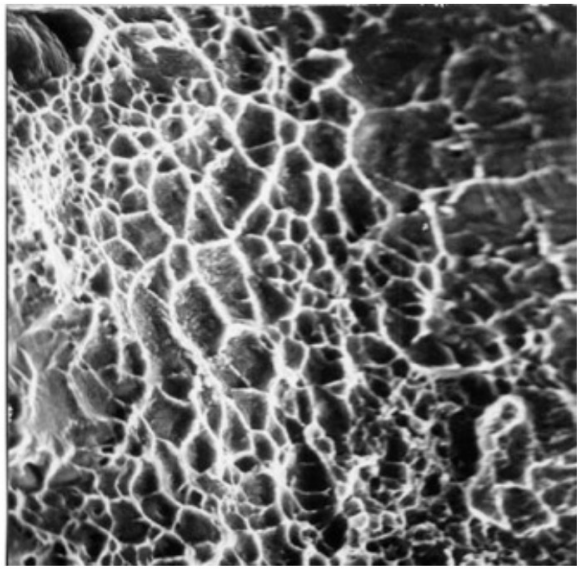
CHEMICAL ANALYSIS

Chemical analysis techniques typically used in the laboratory for paint and coating failure analysis are Fourier transform infrared spectroscopy (FTIR) for organic functional group analysis, scanning electron microscopy (SEM) with associated energy dispersive x-ray spectroscopy (EDS) for elemental analysis, and x-ray photoelectron spectroscopy (XPS) for surface elemental analysis.

- Paint and Coating Testing and Analysis,
- Field Investigations
- Technical Audit of Painting Process and Production Facilities
- Paint Analysis, Chip Analysis and Evaluation
- Accelerated Testing
- Physical and Chemical Paint Exposure Tests: ASTM D1308. ASTM D3359, ASTM D4541, ASTM D4060
- Salt Spray (ASTM B117) Testing, Cyclic Tests (ASTM G 85), QUV (ASTM G53), Humidity (ASTM D2247), Prohesion (ASTM D5894)

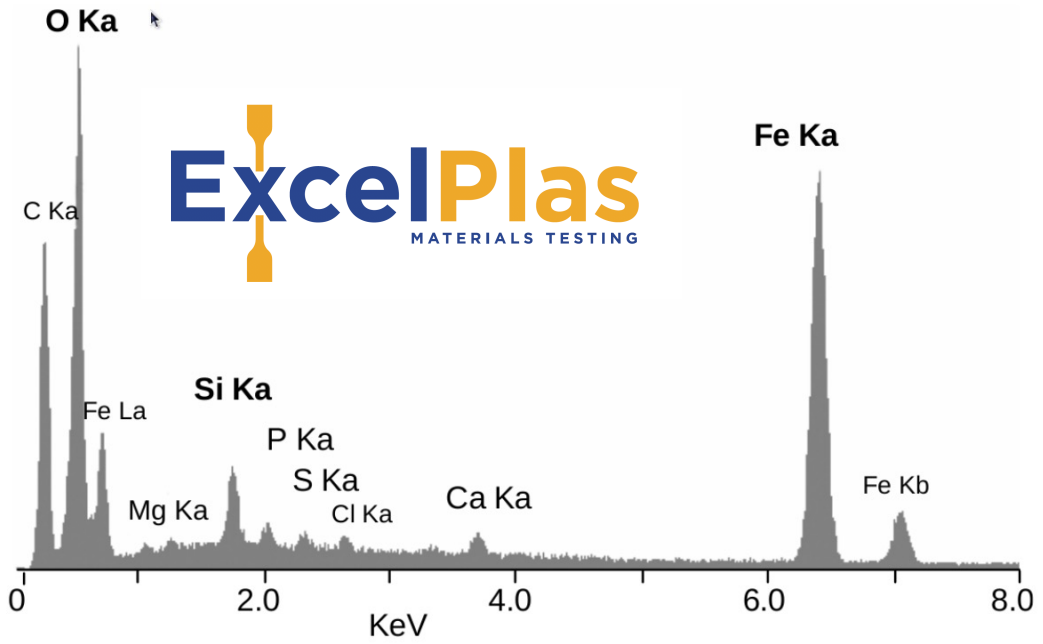
- Fourier Transform Infrared Spectroscopy (FTIR) Analysis of Paints
- Visible Spectroscopy, Chromatography
- Coatings and Cathodic Protection Studies
- Scanning Electron Microscopy & EDS Analysis of Paints
- Physical Testing of Paints: Tensile and Flexural Testing ASTM D 638 & ASTM D790
- Characterization and Cross Section Microscopy of paint samples collected from project site.
- Failure Analysis Root Cause Determination





ENVIRONMENTAL EXPOSURE TESTS

Accelerated exposure testing can be complemented with electrochemical impedance spectroscopy (EIS). In the EIS technique, capacitance and electrical properties of the coating are measured as a function of time. If the impedance ratio does not change as a function of time, then one can, with high degree of confidence, conclude that the coating is not altered and performs very well under actual service conditions.



ANALYSIS OF EVIDENCE

All information is gathered and analyzed to form a determination on the mode and probable cause of the failure. Identification of the mode and cause of failure provide the source for recommendations for corrective action. A final report including all relevant data, analyses, and recommendations are compiled and presented to the client. In litigation investigations, the client may not be interested in the recommendations section of the report.

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