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4440 Warrensville Center Rd.
Cleveland, Ohio 44128

2004

Industrial & Marine Corrosion Research & Product Testing Group Sherwin-Williams Warrensville Ohio R&D Facility

The Sherwin-Williams Warrensville R&D facility is located ten miles southeast of downtown Cleveland. At this site, the Industrial & Marine Corrosion Research & Product Testing Group is responsible for the



development and implementation of new coatings property performance test methods for comprehensive testing of all Industrial & Marine products. This includes accelerated performance testing, physical property testing, chemical resistance information and electrochemical fingerprinting of corrosion performance properties.



Our high-performance Industrial & Marine coatings developed by our Research and Development facility in Chicago and the Corrosion Research & Product Testing Laboratory in Warrensville, provide comprehensive solutions specifically engineered for applications where extreme corrosion, abrasion or chemical protection is essential.

Accelerated Performance Testing

Coatings specifically designed for use in the Industrial & Marine market must withstand a variety of adverse, severe conditions. Because of this, product testing must be performed to simulate and even intensify some of the aggressive environments to which our coatings are exposed.



In order to assess the corrosion resistance and durability properties of coatings intended for atmospheric service, coated panels are exposed to a combined corrosion weathering accelerated test method as defined by ASTM D5894-96. The method was developed at Sherwin-Williams and includes alternate exposure to a UV/condensation Cycle (QUV cabinet) combined with wet/dry corrosion cycles (Q-fog or Prohesion Cabinet).



Physical Property Testing



Industrial & Marine coatings systems after applied to substrates can be subjected to damaging conditions during the construction or manufacturing process, transportation and throughout their service life. Because corrosion has many modes of attack, Industrial & Marine coatings are subjected to a wide array of physical testing to simulate these damaging conditions.



Chemical Immersion Testing

Considering that the vast number of chemicals that require some form of storage is virtually limitless, the need for developing coating systems that can withstand such aggressive environments is vital.

The Corrosion Testing laboratory has a chemical immersion-testing program to assess the chemical resistance properties of many of our Industrial & Marine products. Potential applications for coating systems tested in this program include tank linings as well as secondary containment.



The list of immersion commodities includes acids, bases, solvents, salt solutions, oils, etc. Specimens subjected to chemical immersion testing are periodically monitored and evaluated for physical changes such as blistering, etching, softening, delamination, cracking, and discoloration.

The product testing group is constantly challenged to incorporate new test methods, as well as develop new ones in order to meet the stringent demands of the industrial and marine coatings market.

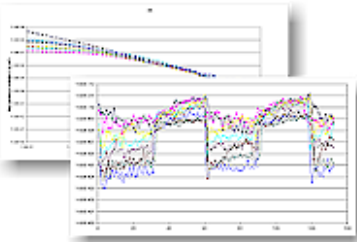
Electrochemistry Research

The goal of the Corrosion Research Laboratory is to further our understanding of the mechanisms by which coatings provide corrosion control. An in depth knowledge of corrosion related phenomena is vital for optimizing the formulations of Sherwin-Williams coatings.



To study these phenomena, the laboratory utilizes some of the most advanced electrochemical techniques available such as Electrochemical Impedance Spectroscopy (EIS) and Electrochemical Noise Monitoring (ENM), along with many more traditional DC techniques.

State of the art corrosion measurement systems from Solartron and Gamry Instruments as well as laboratory fabricated equipment provide a means for carrying out the testing. Central to the program is the ongoing development of new, experimental electrochemical test methods, which will allow us to assess more rapidly and accurately the performance of Sherwin-Williams coatings.



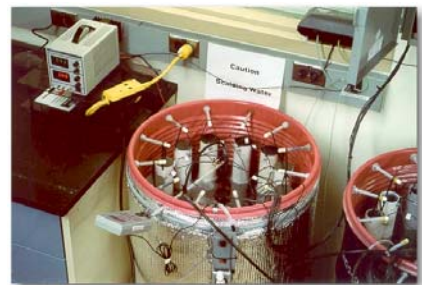
Other areas currently under investigation include cathodic protection measurement techniques, electrochemical monitoring of accelerated weathering testing in the presence of synthetic acid rain water electrolytes, marine anti-foulant technologies, and the effects of substrate contamination. Through these and other studies coatings are being developed which will protect a variety of substrates from the adverse effects of corrosion and keep Sherwin-Williams at the forefront of corrosion protection technology.

Cathodic Disbondment

How good a coating looks is not necessarily an indicator of durability or performance. A coating system should be able to perform well just after application and for a long time into the future. The performance life of many coating systems is critical, especially when the coating application is combined with other protective measures such as cathodic protection.



Cathodic protection is a technique commonly used to protect coated steel structures in both industrial and marine applications through the use of electrical current. While beneficial to the steel substrate, this protective current can cause delamination, or disbondment of the coating. A wide array of cathodic disbondment tests is available at the Warrensville Industrial & Marine laboratory to ensure proper performance of our coatings in these situations. From common industry test methods to the fabrication of high temperature testing tanks the Sherwin-Williams Industrial and Marine group meets the challenge.



Applications



Proper product application is critical for optimum product performance. Sherwin-Williams Industrial & Marine coatings are designed to meet many demanding service environments. Understanding the product line and developing user friendly application procedures is a key role for our application specialists.

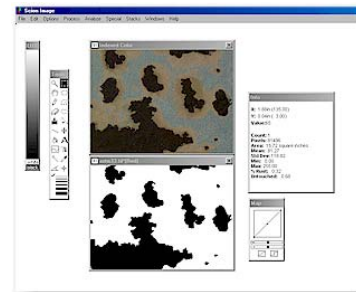
Extensive equipment knowledge and application experience coupled with proper mixing, reduction and film thickness a play a vital role in the product testing process.

Image Analysis Techniques

Several optical image analysis techniques are currently being developed to assist in the evaluation of exposure panels. Panel evaluation requires quantitative measurements of degrees of rusting, scribe-creep and blistering.



While many of these routine evaluations can be made with the sharp eye of a highly skilled technician, not everyone will evaluate panels the same way. Correspondingly, not every exposure panel will look like the comparative ASTM sample standard. By applying specific pixel thresholding techniques through binary conversion, exposure panels can now be scanned digitally, converted to a binary form and analyzed. Giving precise ratings, unaffected by subjective judgment.



By automating the process in which exposure panels are evaluated, the degree of inconsistency between technicians can be reduced while simultaneously improving the degree of accuracy.

IMAGE - Database

The Information Management and Graphics Engine - IMAGE, is an integral part of the comprehensive Sherwin-Williams Industrial & Marine national products testing program. The database not only has the capability to store raw test data but also to store and render exposure images as well. Users can access data and images from a laptop computer from a remote location - providing immediate access to necessary information.



Not only will the database permit the user to filter the data by multiple parameters simultaneously by using the "Build a

Query" function, it also permits them to view and print exposure images, graphs, charts and provides a choice of printing more than a dozen pre-formatted reports.



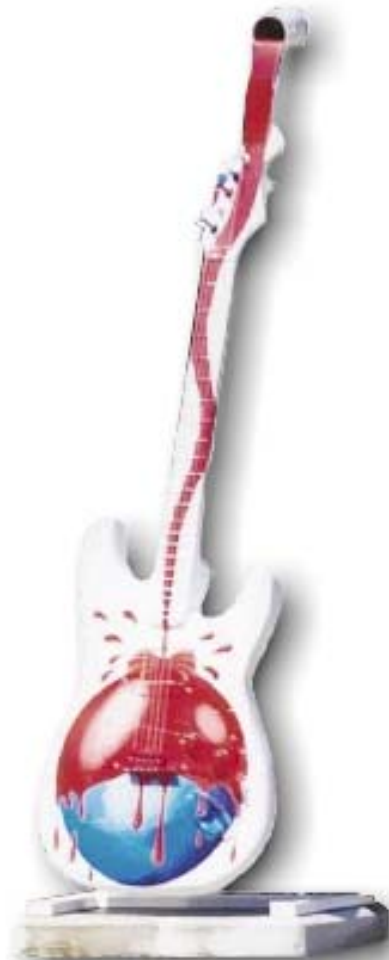


Sherwin-Williams Industrial & Marine

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Publication Highlights

- D.A. Eden, M. Hoffman and B.S. Skerry
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- B.S. Skerry
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