Atmospheric Corrosion Tech Exchange Summary

Highlights featuring the current state of atmospheric corrosion and mitigation strategies

June 2025

Corrosion experts from across industries recently came together to discuss the current state of atmospheric corrosion, its challenges, and the advances being made to predict and prevent corrosion damage. This inaugural virtual technical exchange, hosted by Pierre Morel and Fritz Friedersdorf of Acuity Corrosion Technology, featured presentations from industry experts across naval, automotive, aerospace, and modeling sectors, while offering valuable insights about unique field experiences and cutting-edge solutions.

Dr. Steven Kopitzke, Naval Air Warfare Center – Aircraft Division Corrosion, Operational Chemicals & Analytical Chemistry Team Lead

Access the presentation here:
https://acuitycorrosion.com/wp-content/uploads/2025/07/Luna-Labs-Sensor-Symposium.pdf

Dr. Kopitzke presented work focused on environmental severity assessment using corrosion sensors. His team surveyed 27 unique locations across the U.S. for a full calendar year, comparing new sensor technology to legacy mass loss methods. They examined aluminum alloys and stainless steel using both mass loss coupons and Acuity LS sensors.

Key findings included:

- Strong correlations between sensor data and mass loss measurements
- Development of a principal component analysis scoring system for environmental severity
- Identification of seasonal trends and diurnal corrosion processes
- Ability to detect episodic events affecting corrosion such as hurricanes
- Differences between weather station data and actual sensor environment conditions

Tommaso Coricelli, Toyota Motors Europe
R&D Materials Engineer

Coricelli presented Toyota's project to map corrosion across Europe using sensors mounted on R&D vehicles. This initiative aimed to ensure consistent quality across Toyota's European markets by understanding diverse environmental conditions affecting corrosion.

The project involved:

- Installing sensors in vehicle front wheel wells to capture road splash and contamination
- Collecting data for one-year experiments across multiple countries
- Combining sensor data with location tracking and weather forecasting data
- Training prediction models using machine learning techniques

Results showed Acuity LS providing reliable measurement levels, signal stability, recovery behavior, and correlation with reference data. The team is working toward a comprehensive European corrosion map to support decision-making and predict climate change impacts on corrosion.

Maria Cardoso, Northrop Grumman
Materials and Process Engineer
Access the presentation here:
https://acuitycorrosion.com/wp-content/uploads/2025/07/25-1017-Approved_Acuity-Virtual-Technical-Exchange-Meeting.pdf

Cardoso discussed Northrop Grumman's systematic approach to implementing Acuity LS sensors for aerospace applications.

David Sinopoli, Airbus Helicopters
Materials and Process Engineer

Sinopoli presented work conducted in collaboration with the Netherlands Navy using Acuity sensors on helicopters and ships. The study focused on understanding the aggressive marine environment that helicopters encounter, particularly during rescue operations where they operate in static conditions close to the sea surface.

Key findings included:

- Helicopters accumulate 200 milligrams per square meter per day of salt deposits during rescue missions near sea surfaces
- Sensors successfully captured day/night cycles and clearly identified when ships transitioned from port to open ocean conditions using psychrometric analysis
- Identification of different hygroscopic effects between sodium chloride and magnesium chloride, with magnesium chloride being particularly difficult to dry and affecting sensor response based on contamination levels
- Strong correlation between conductance measurements and polarization resistance data, validating the sensor's ability to assess wet/dry surface conditions

The work demonstrated the potential for sensors to guide maintenance decisions, such as determining when washing procedures have effectively removed contamination when visual inspection might suggest cleaning was complete.

Tom Curtin, CMI BEASY
Director, Structural Integrity Modeling & Analysis

Curtin presented BEASY's approach to connecting atmospheric corrosion sensor data with physics-based modeling through the development of a "digital twin" system.

Key developments include:

- Creation of surrogate models using finite element analysis of Acuity LS sensor components
- Development of response surfaces linking conductance, galvanic current, film thickness, and solution concentration
- Integration of sensor measurements with modeling to derive "environmental spectra" for different locations
- Validation studies showing good agreement between predicted and measured corrosion rates across multiple test sites
- Application to real components beyond just sensor validation

Future work encompasses:

- Advanced coating degradation modeling
- Pitting and crevice corrosion analysis
- Integration of corrosion damage effects into structural models
- Physics-based approaches for coating water absorption and degradation

Pierre Morel, Luna Labs
Acuity Corrosion Technology

Morel provided an overview of the current Acuity product portfolio, including new cloud-based software solutions, remote monitoring capabilities, and expanded networking options for mobile asset applications.

Acuity LS: continuous on-board monitoring of a full suite of environmental and corrosivity parameters

Acuity ES: continuous record of corrosivity and environmental parameters for assessing materials performance

Acuity CR: autonomous record of corrosion rates and environmental severity for assessing protective properties of coatings and the corrosion performance of engineering alloys

C-DAT: seamlessly integrates with Acuity sensors to deliver secure, cloud-based storage, automated analysis, and powerful visuals

Conclusion

This inaugural virtual tech exchange revealed remarkable progress in atmospheric corrosion monitoring and its potential across naval, automotive, and aerospace applications. The field is rapidly evolving, with all speakers agreeing that the shift from traditional time-based maintenance to condition-based approaches promises to reshape how corrosion monitoring is managed.

This inaugural tech exchange was just the beginning. To build on the event's momentum, we need your input. Take our quick survey to help us create topics and a format that best meet the needs of the corrosion community

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