



MATERIALS AND MANUFACTURING ACADEMY

## Case Studies

# Environmentally Friendly Corrosion Inhibitors

## The Problem

Hexavalent chromate will be banned from use by September 2017 by REACH legislation, and as hexavalent chromate is the cheapest and most effective corrosion inhibitor, it is of high importance to the steel industry to find a cheap and effective solution.



The chrome-free project is heavily influenced by the need of industry to find a solution before September 2017.

Researcher Paddy Dodds investigated the problem.

## The Research

**The approach taken by the project was not to follow other research into finding another sparingly soluble salt corrosion inhibitor, but to investigate 'smart release' inhibitors.**

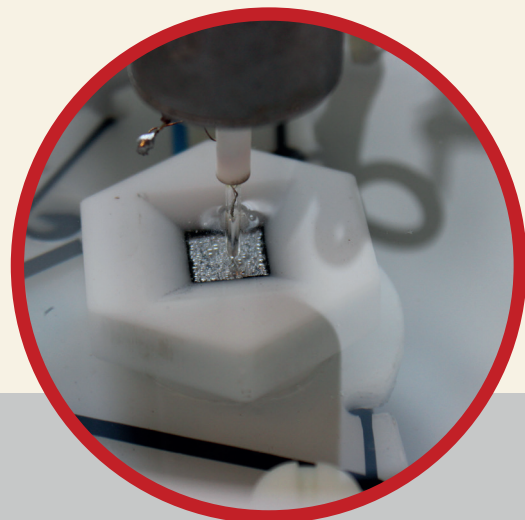
### What are "smart release" inhibitors?

"Smart release" inhibitors are a new class of inhibitor systems that allow different inhibiting ions to be used in a coating system, where previously they would not be compatible.

The equipment at Swansea University and the expertise in the area of coatings and corrosion, meant that during the doctorate, Tata Steel Europe Colors had the capability to quickly analyse corrosion inhibitors.

The specialist equipment like the Scanning Kelvin Probe and Scanning Vibrating Electrode Technique, as well as all the D.C. chemistry electrochemical techniques, meant that instead of 1000 Hrs Salt spray test, the new inhibitors could be analysed within 24 hours.

This led to a large scale investigation into many different inhibitor systems, identifying the systems providing excellent inhibition. Further to these investigations, the contact with BASF through the CDT allowed the high performing systems in the lab tests to be put into coating systems to be analysed in accelerated tests.



## The Impact

The quick turn around of the investigation, led to the inhibitor being tested in a Tata Steel Europe Colors chrome-free coating system. The project was put forward for an international Tata Innovista award and made it to the finals in Mumbai.

The project made it through to the final 78 teams from 2,783 entries, recognising the innovation made. Tata Steel Europe had two teams within the final and ours was one of them. Tata allowed myself to attend as a special measure, as it would normally only be open to Tata employees, but it recognised the collaboration between Tata and Swansea University.

**A piece about the competition on the Tata website gives details of the entries and finalists:**

'2,783 entries from 65 Tata companies in 18 countries. Of these, 110 teams presented their cases in the seven regional rounds across the globe – London, Washington DC, Singapore, Delhi, Bengaluru, Jamshedpur and Mumbai.

Seventy-eight chosen projects at these regional rounds made it to the final in Mumbai and were judged by a panel of 19 internal and external jury members.'

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