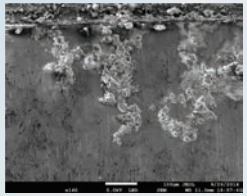
M2A
MATERIALS AND MANUFACTURING ACADEMY

# Developing Future Corrosion Resistant Coatings for Food Cans

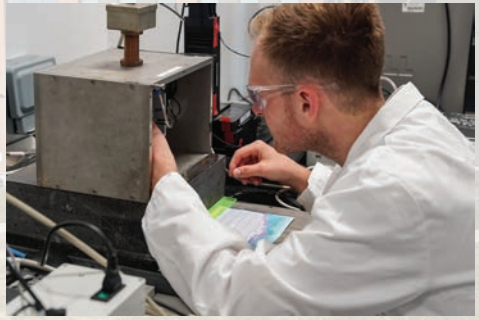
- JAMES EDY

Although the humble 'tin can' is seen by many as a consumable that is simply tossed into the recycling, much research has gone into the coatings to ensure that the contents are delivered in a fresh and safe condition. Although the system hasn't seen major change in decades, the coating is going through some major changes that will see millions of cans produced with new updated coatings, all with the main aim of the consumer experiencing no difference what so ever. So why is there such a change afoot? The answer is the REACH legislation that has identified the requirement to phase out the use of hexavalent chromium (VI). Up until now the packaging sector has not seen such a major change since the 1960's when Electrolytically Chromium Coated Steel (ECCS) was developed as a result of rapidly increasing tin prices. ECCS is now being phased out due to the use of Cr (VI) in the manufacturing process. Much work has been done to identify alternative materials for its replacement such as titanium and zirconium however the most promising coating is indeed still chromium, albeit the trivalent variant Cr(III).

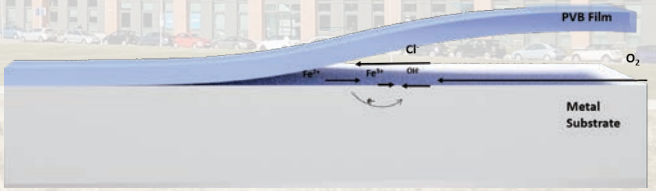


Tata Steel have been developing a new coating referred to as Trivalent Chromium Coating Technology that uses a plating bath containing Cr(III) ions that offers a solution to the challenge of replacing ECCS. There is a perfectly good reason why ECCS has not been replaced since the 1960's – it works extremely well, both from a corrosion perspective but also as a substrate for lacquers to adhere to due to its chromium/hydrated chromium oxide structure.

Tata Steel have been sponsoring Swansea University Researcher James Edy to assist in the development and characterisation of the coatings with a particular emphasis on corrosion, an expertise offered by the materials engineering group. James has been carrying out testing, utilising the advanced scanning techniques available at Swansea University, to identify how the coating performs under two main corrosion mechanisms; cathodic disbondment of organic coatings and filiform corrosion – both known problems that could plague the new coating. The research has focussed on a number of Cr(III) coating variations, in particular chromium and chromium oxide levels. His research has turned out many interesting findings and has identified that a critical level of both components is required to produce a coating that can offer comparable performance to ECCS.



This information is now being used by Tata Steel to make changes to their processing parameters to hone their coating to meet the requirements identified by James as the product is scaled up from lab scale to full production – a market potential of hundreds of thousand tonnes/ year. Without such advanced testing and the knowledge from the corrosion group, the end product could have been significantly different and arguably less corrosion resistant. The success of the project has led to Tata sponsoring further EngD's as they continue their work developing the new




**Ultimately, over the coming years you will most probably open a can that has been influenced by the research carried out at Swansea University.**

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