

## A Corrosion Prediction Model and Corrosion Sensors for Corrosion Management

**Presenter:** Dr. David Dixon, BAE Systems, Samlesbury, United Kingdom

**Co Authors:** S. J. Harris, BAE Systems, Samlesbury, United Kingdom  
I. S. Cole  
B. R. W. Hinton, DSTO Aeronautical and Maritime Research Laboratory,  
Australia  
M. C. Hebborn, BAE Systems, Samlesbury, United Kingdom  
S. Furman  
A. E. Hughes, CSIRO, Div. of Manufacturing and Infrastructure Technology,  
Australia  
A. Trueman  
G. McAdam  
P. C. Morgan  
A. J. Stonham, BAE Systems, Salisbury, Australia  
C. Bowdren  
S. R. Church, BAE Systems, Samlesbury, United Kingdom  
C. C. Figgures, BAE Systems, Samlesbury, United Kingdom

**Abstract:** Corrosion prevention and remediation have a significant impact on the costs of air vehicles and these costs need to be considered through the entire lifecycle of the platform, including design, manufacture and operation. This poster outlines two programmes aimed at improving corrosion design and management: the first is a corrosion prediction modelling (CPM) methodology and the second is a corrosion sensor programme. Each may have benefits as independent approaches but greater benefits may be achieved by integration.

The CPM project is developing a prediction method for aluminum structures with a protective scheme consisting of a conversion coating, primer and topcoat. Starting from a cracked or damaged paint film the method will predict the first visible signs of corrosion based on the operational conditions (excluding stress) experienced by the airframe. By taking user inputs that are tailored for several levels of expertise, the model calculates a microclimate and then predicts the onset and growth of corrosion pitting in the presence of corrosion-inducing and corrosion-inhibiting species. The output is presented as a life prediction for several specific sections of the airframe. The model could be used for asset management, inspection planning and materials selection and design.

The corrosion sensors can act independently to the predictive model but the methodology developed for the model could be used to interpret sensor output or the sensors could feed corrosivity or climate data directly into the model. The integration of modelling and sensors is at an early stage but some possible approaches are presented.