Advanced Corrosion Management Techniques to Reduce Cost and Risk in Our Built Environment

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CONCRETE PRESERVATION TECHNOLOGIES

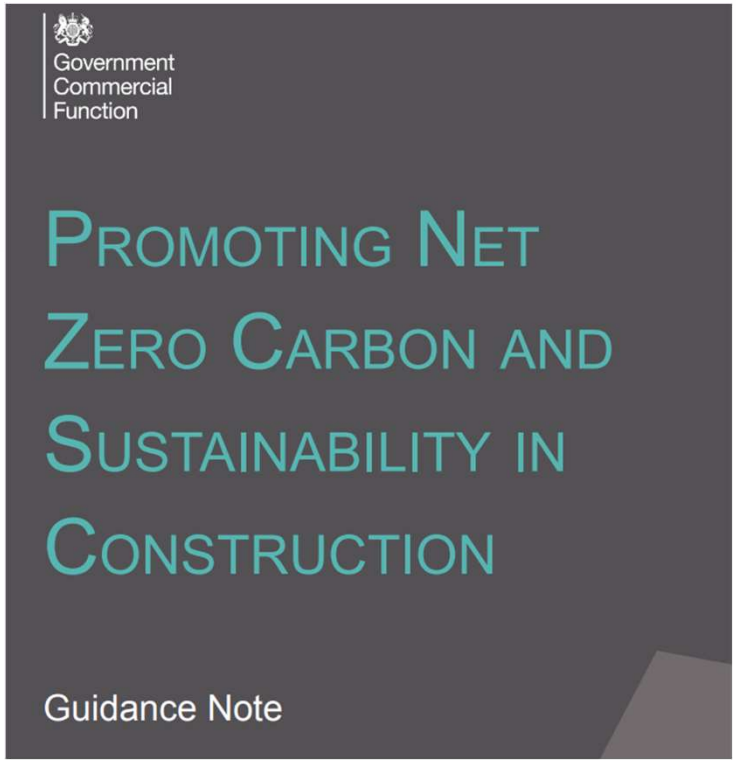
Tuesday 15th October 2024

Cost of Building New

60% of waste and 25% of CO_2 can be attributed to the construction industry in the UK according to 2022 government reports.

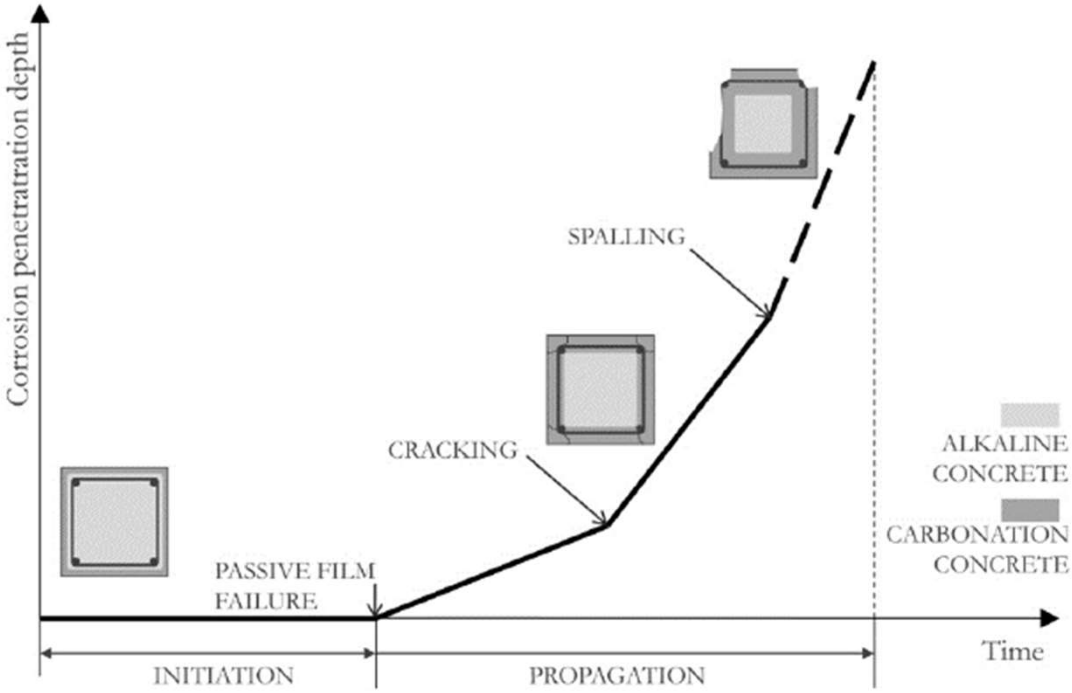
- Much of this is attributed to the production of cement and steel.

The cost of new builds in both CO_2 and budget is much greater than the refitting and rehabilitation of existing infrastructure.



Corrosion is a Major Factor Limiting Service Life

- Reinforced concrete makes up much of our built environment.
- Over time corrosion of the reinforcement initiates.
- Corrosion issues accelerate unless they are managed correctly
- Corrosion of steel is often a dominant factor that determines service life.



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Delays to Essential Repairs Cause Further Issues

Roof leaks, damage to concrete cover and corrosion often have accelerating costs if left unchecked.

Much of the UK public infrastructure is struggling with tight budgets.

Intervention is required for many mid-century structures.

Current Repair Strategies are Often Lacking

A man who could afford fifty dollars had a pair of boots that'd still be keeping his feet dry in ten years' time, while the poor man who could only afford cheap boots would have spent a hundred dollars on boots in the same time and would still have wet feet.

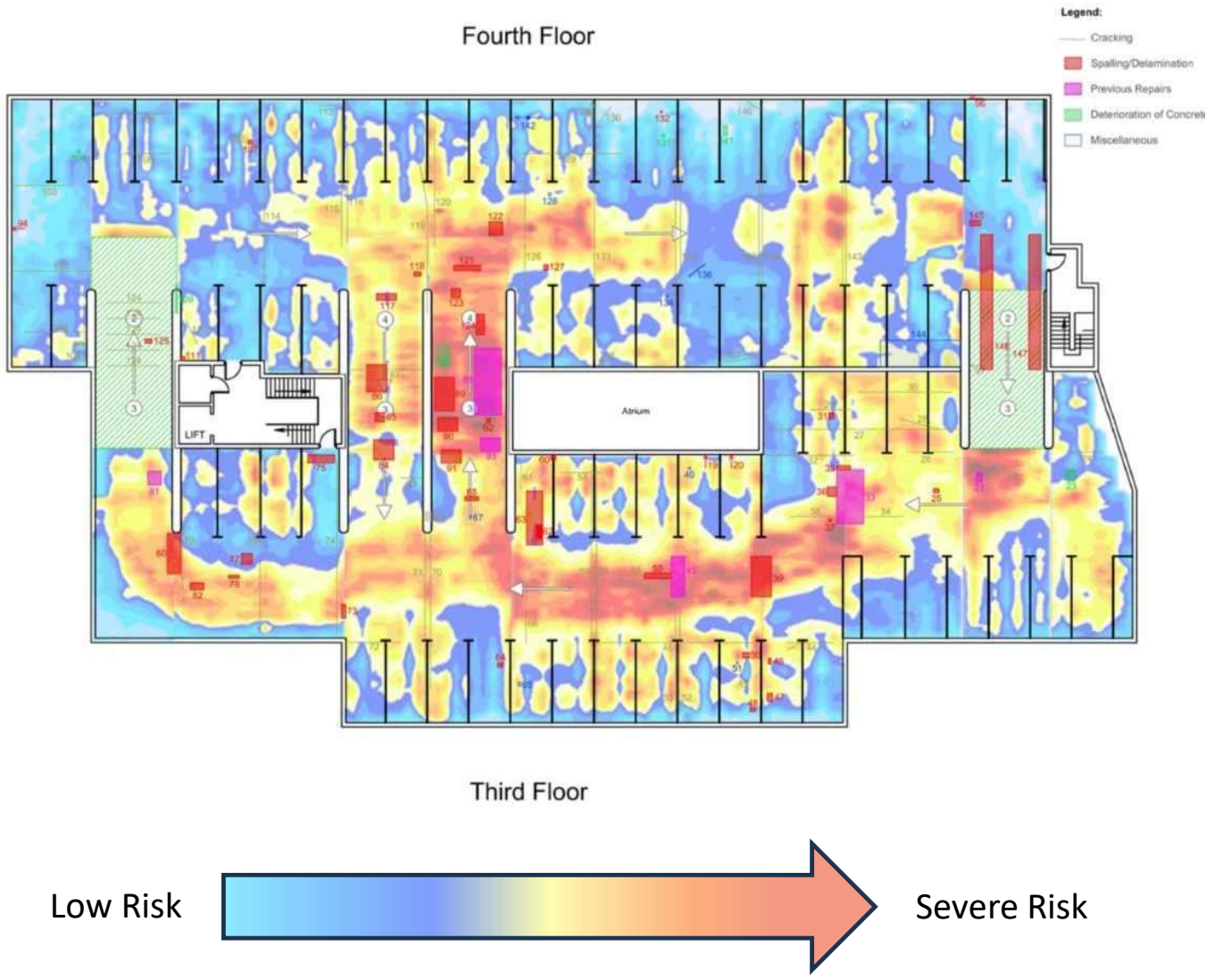
- Sir Terry Pratchett

Corrosion Surveys

The UK is world-leading in corrosion surveying and management expertise.

Electrochemical surveys can pinpoint corrosion issues.

This leads to cost savings as corrosion management can be localised and tailored to the problem.

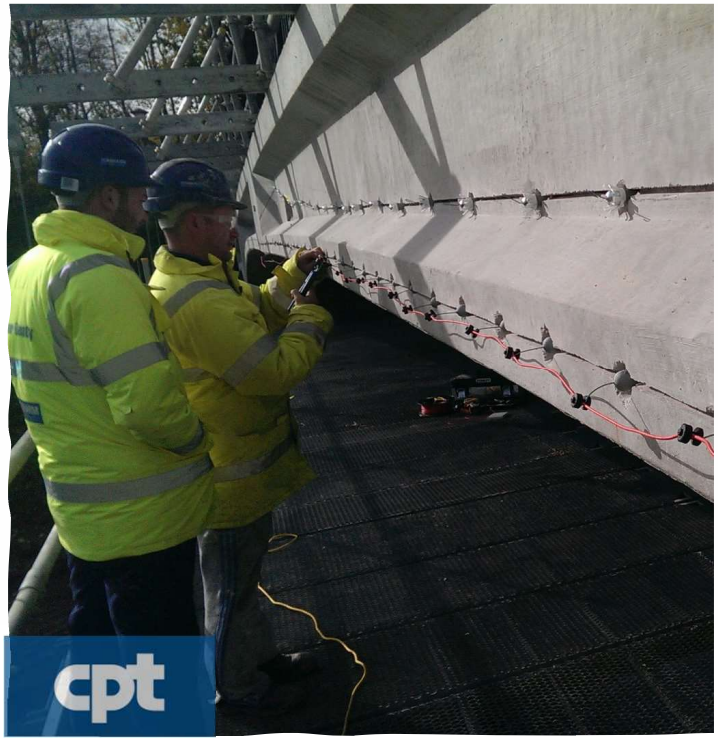


Corrosion Management

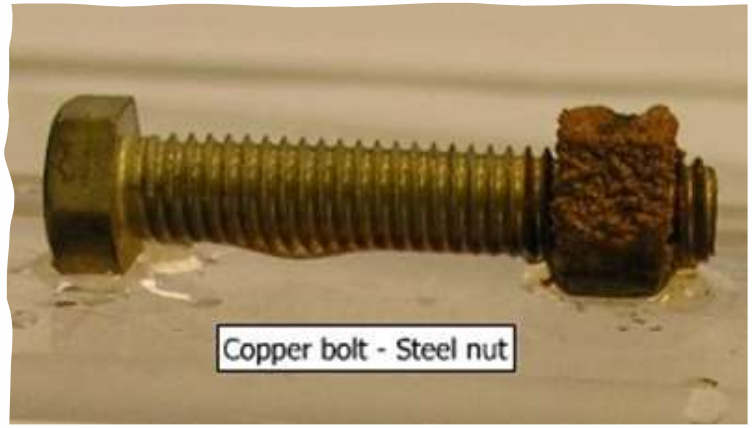
Galvanic and Hybrid corrosion management techniques are British inventions, with UK manufacturers protecting structures globally.

Many of these techniques have decades of data backing up their use and are largely maintenance-free once installed.

These systems increase the life of structures and reduce repair costs, as well as the disruption caused by routine maintenance.



Galvanic Anodes



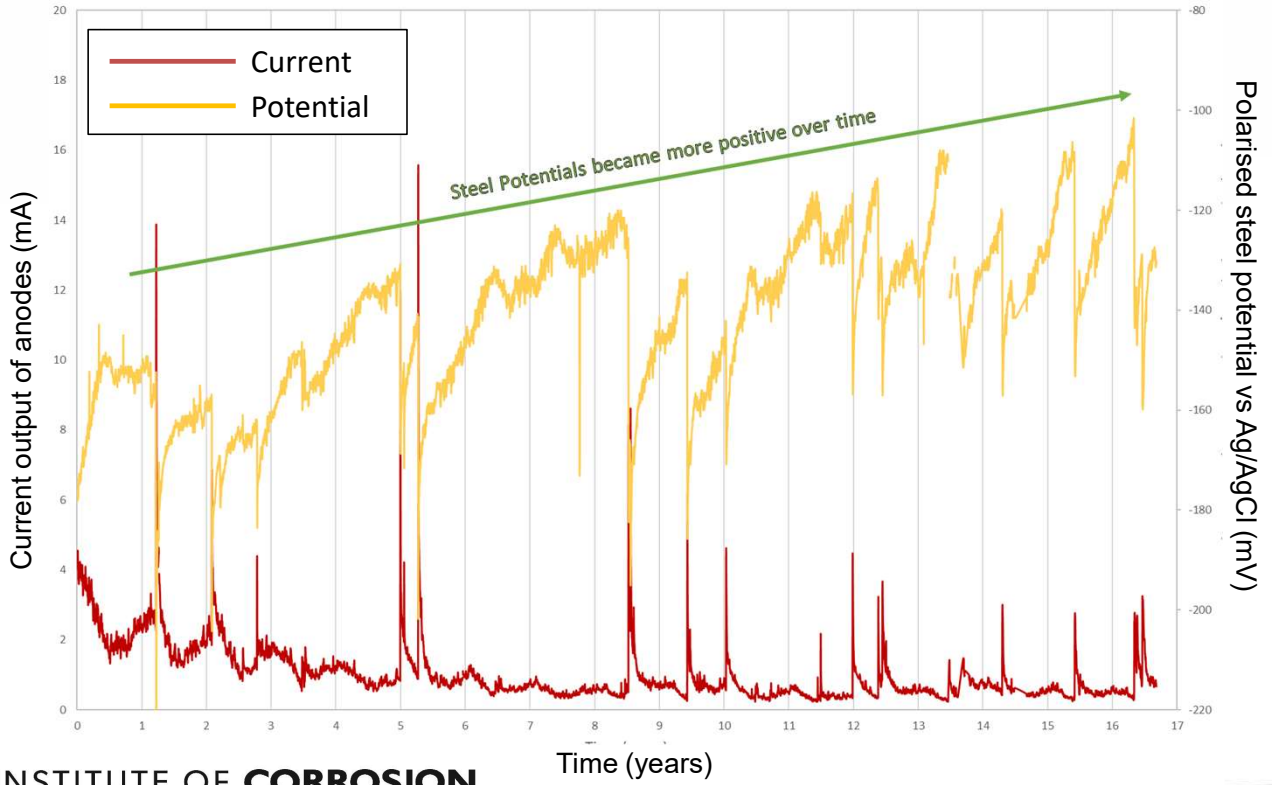
Sir Humphrey Davey in 1824 discovered that two dissimilar metals in the presence of moisture create an electric current that corrodes the less noble metal to protect the more noble metal.

This same electrochemistry has been adapted with modern chemistry, engineering and materials science to protect reinforced concrete structures.

This industry is now well developed with decades of experience and real-world data supporting their use.

Self-Regulating Protection

- First Hybrid Galvanic Protection.
  - Impressed phase followed by galvanic protection
- Flooding of the river caused increased risk
- De-icing salts used in the roadway above allow aggressive chloride ion ingress
- Around 18 years of maintenance-free protection
  - Approximately 7% of the anodes have been consumed
  - On track to surpass the 25-year design life by some margin.
- Extending the service life of the elements

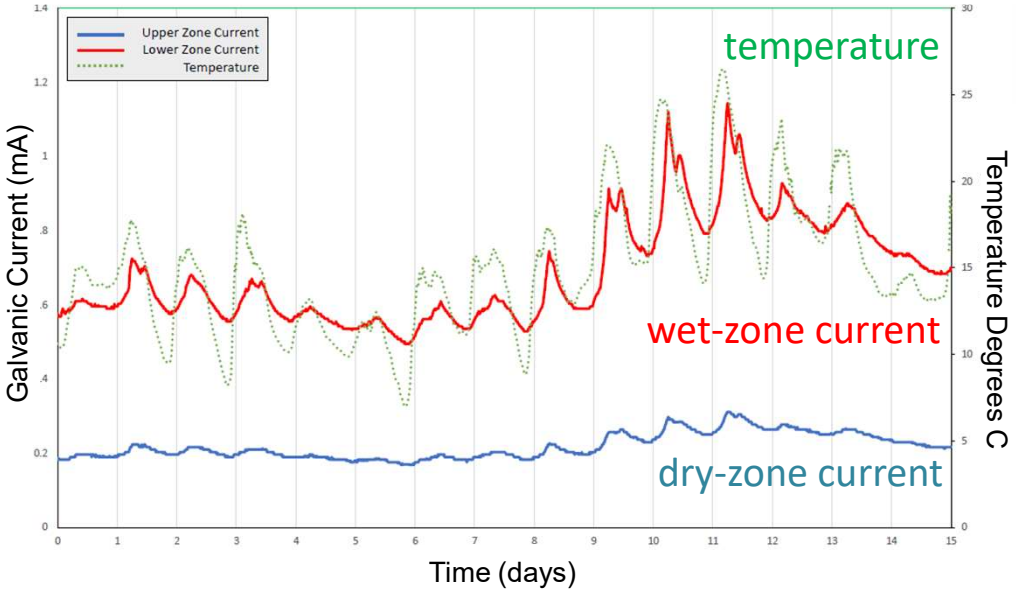


Climate Risk

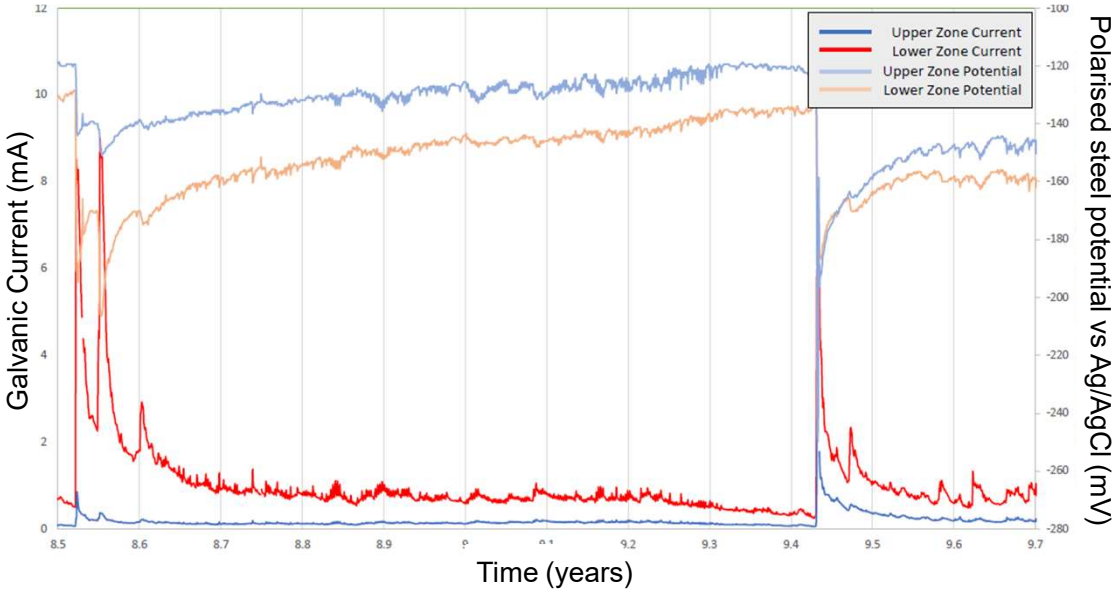
Bright Blue think tank expressed concerns over the readiness of our structures in the face of a changing climate.

Zinc-based galvanic systems react to increased temperature and moisture giving more protection during periods of heightened risk.

Anode response to temperature



Anode response to moisture/flooding



Corrosion in RAAC

Reinforced Aerated Autoclaved Concrete (RAAC) is vulnerable to reinforcement corrosion.

Advancements in technology have allowed for RAAC-specific survey methods and anodes to be developed.

These anodes are now protecting thousands of vulnerable elements within the NHS

Corrosion in RAAC

Installation of RAACGuard Anodes

INSTITUTE OF CORROSION

P & S C

Thank you for your time.

For more information on corrosion or RAAC concrete:
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