

Cyclic Corrosion Testing

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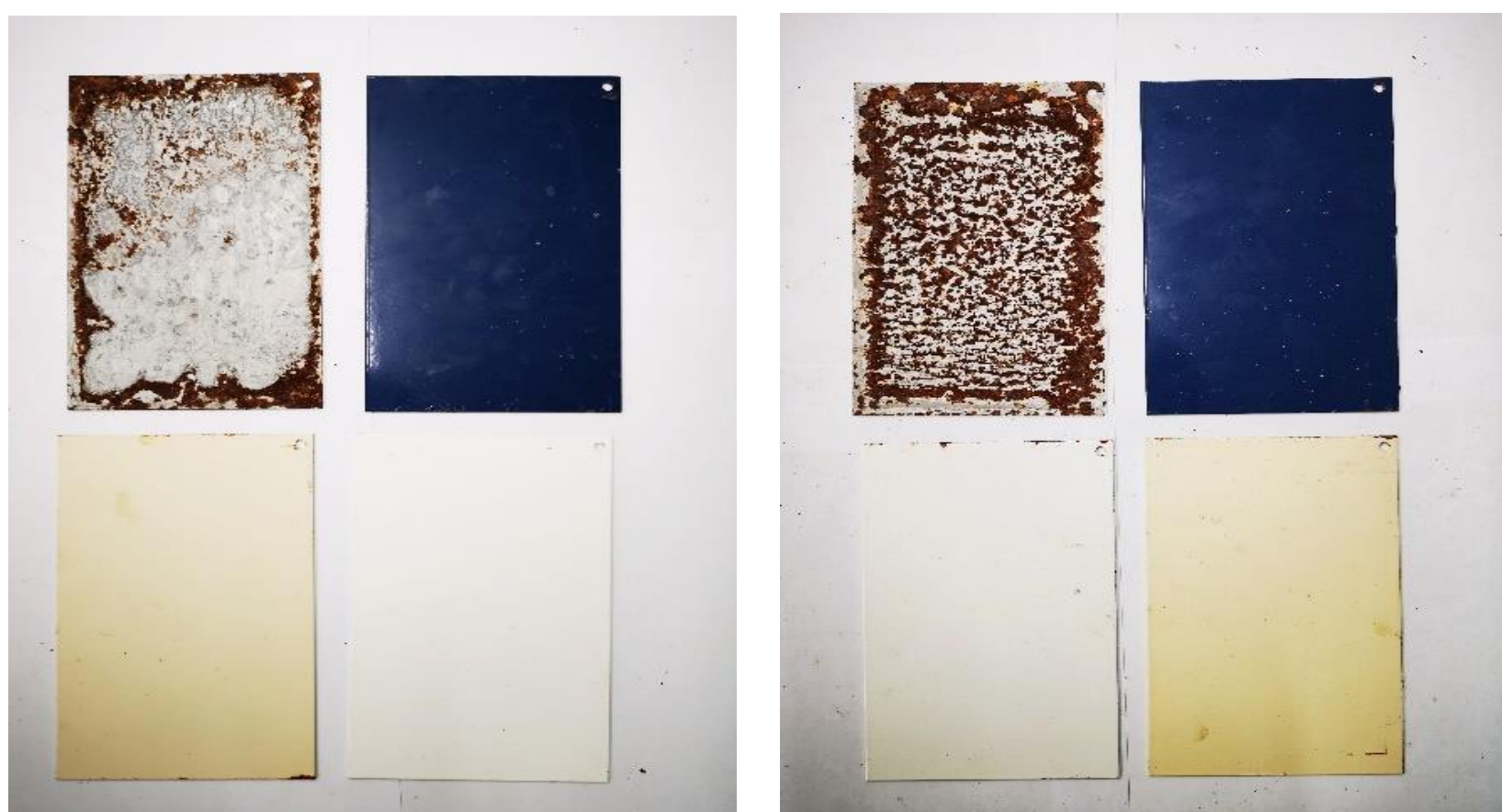
BEng Energy and Environmental Engineering

Introduction

Corrosion is a problem in many areas of industry and corrosion mitigation methods can carry a high cost

Aim of the project

To test a varied range of samples for the purpose of observing the rate of corrosion experienced by the material in order to set a benchmark of testing for the Safety Letterbox company.



Sample range treated (left), un-treated (right)

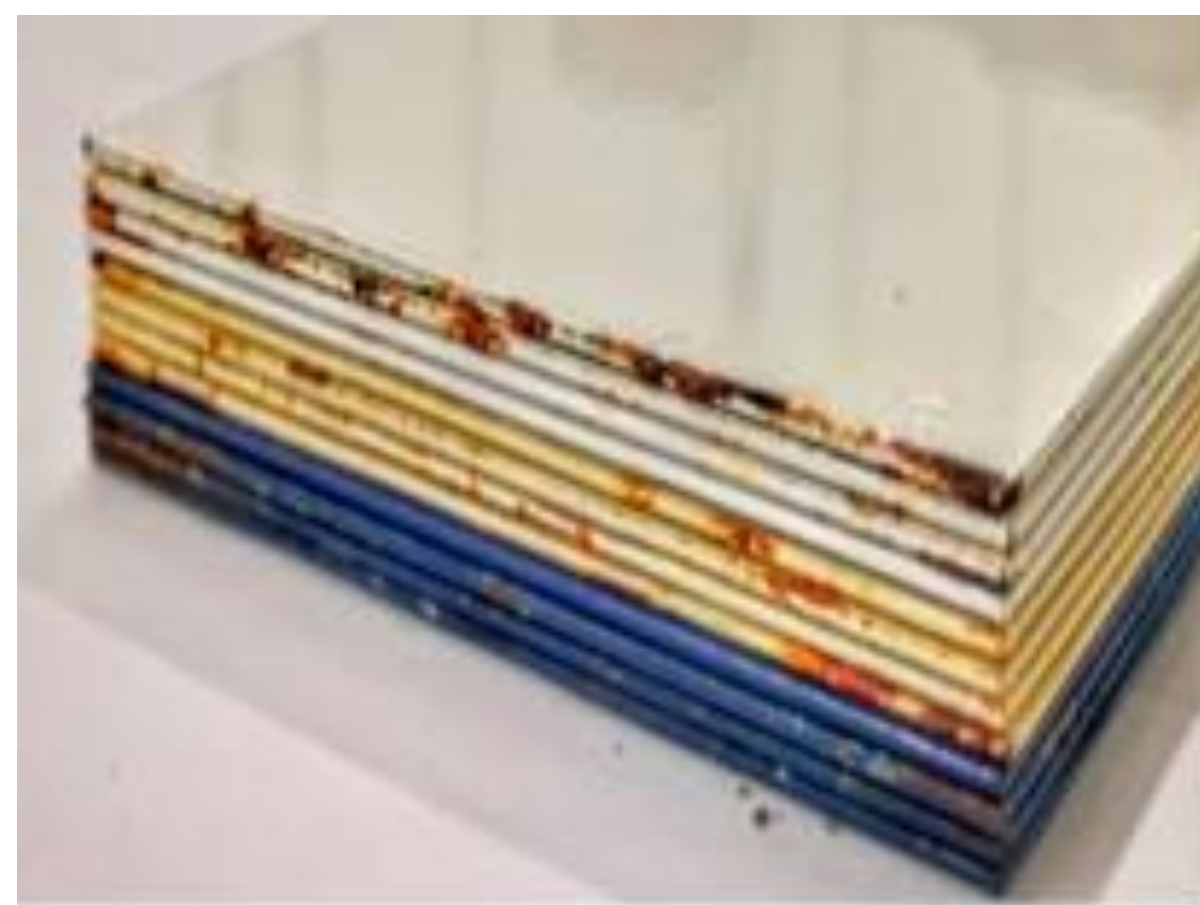
Cyclic Corrosion test used to observe the oxidation reaction experienced by the samples using a 1.5% sodium chloride solution by weight

Japanese Automotive Cyclic Corrosion Tests: CCT-4

10 minutes Salt fog application at 35°C
155 minutes Dry Off at 60°C
75 minutes Humidity at 60°C, 95% RH
160 minutes Dry Off at 60°C
80 minutes Humidity at 60°C, 95% RH

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(Micom Labs, 2019)



Example of cut edge corrosion treated (left) un-treated (right)

Self-healing mechanisms

Smart protective coatings

Mechanical damage generates defects in the coating, spontaneously inducing the release of the stored polymerizable healing mechanisms. The incorporation of microcapsules could reduce the adhesion of the primer to the metals and it has been recommended to place the microcapsules in a separate layer on top of the primer

Corrosion inhibitors

Embedded corrosion inhibitors directly mixed with coating materials. Inhibitor-based coatings account for a majority of all reported self-healing coatings for corrosion protection.
(Fan Zhanga, 2018)

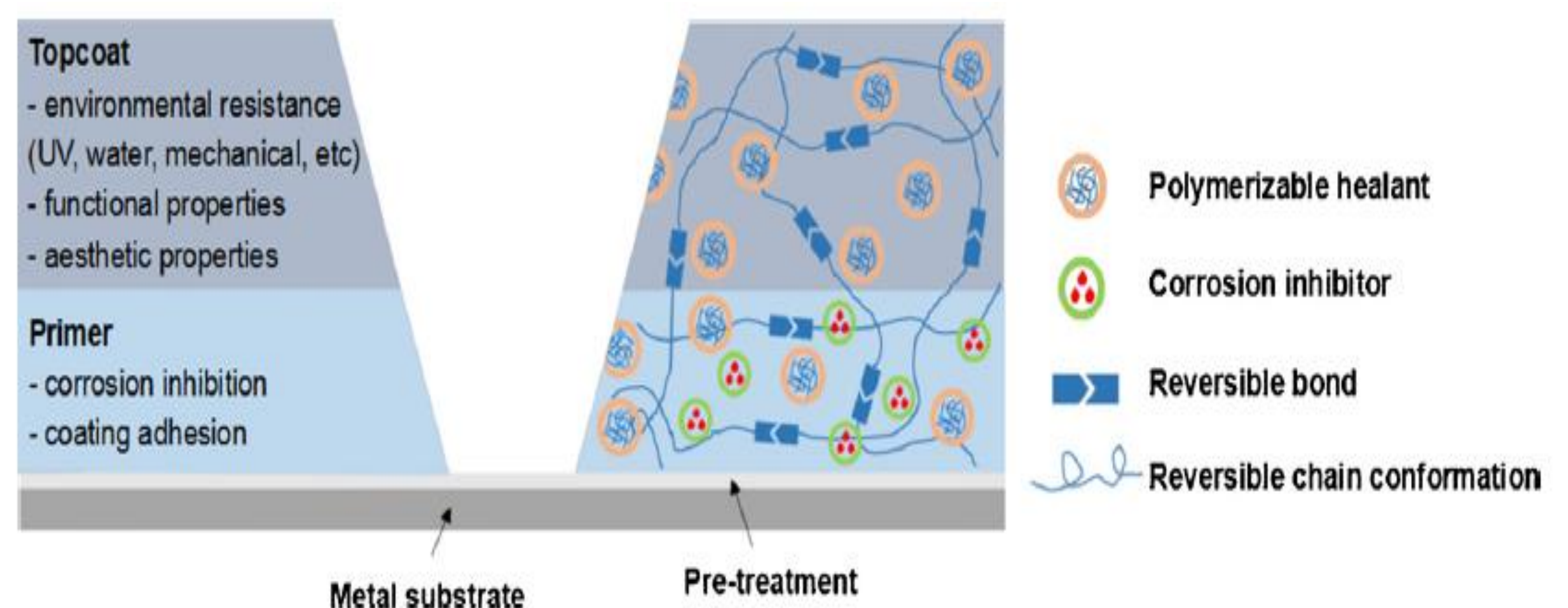


Image provided by: Institute for Advanced Materials and Technology, Beijing

Conclusions

- Most of the corrosion forms at the edges of the sample.
- Cut edge corrosion can form underneath organic (paint) coating
- Non painted samples experience a higher rate of corrosion
- Painted samples do exhibit a small amount of corrosion and delamination at the edges of the sample
- Little difference in the amount of corrosion experienced by samples of different colour pigmentation
- Small amount of delamination at the edges of the sample that had undergone oxidation

Acknowledgements

Safety Letterbox

Mark Hacker

Alison Orrells

UWTSD Technicians

Andrew Tibbott

Dave Cooper

References

- Fan Zhanga, P. J. M. P. D. Z. Y. H. G. L. X. L., 2018. Self-healing mechanisms in smart protective coatings: A review. *Elsevier*
- Micom Labs, 2019. *CCT-4 Japanese Automotive Cyclic Corrosion Testing*, s.l.: s.n.