

Corrosion data acquisition in the wake of artificial intelligence

Miha Hren^a, Tadeja Kosec^a and Andraž Legat^a

^a *Slovenian National Building and Civil Engineering Institute, Dimičeva 12, 1000 Ljubljana, Slovenia*

E-mail: miha.hren@zag.si

In recent years, great progress has been made in popularizing the use of artificial intelligence (AI) among the general population. Image recognition, text generation and speech transcription are just some of the more well-known examples where deep learning is being used to identify and predict objects in different types of data. Regardless of the application, there was a common requirement that made these breakthroughs possible: large data sets with accurate data were needed to train the AI models.

In the field of corrosion, machine learning is often used to predict the corrosion behavior of materials based on their underlying microstructural properties, electrochemical properties, geometry and environmental conditions. Coelho et al.¹ recently reviewed the use of machine learning for corrosion prediction in many areas, such as atmospheric corrosion, marine corrosion, pipeline corrosion, inhibitors and reinforcement corrosion. They concluded that expanding the types of input variables is likely to improve the performance of the models and that accurate and reliable modelling requires large amounts of training data (especially for deep learning), which is currently not available in most corrosion areas.

To overcome these problems and make corrosion research a more promising field for machine learning, the philosophy of how to collect corrosion data must change. Experimental setups need to become more modular, scalable, cost-effective and consistent, and they need to take into account multiple properties that are monitored simultaneously. The aim of this presentation is to introduce an alternative method of corrosion data acquisition that provides larger amounts of reasonably accurate and consistent data for machine learning applications. A potential solution will be presented that incorporates low-cost, off-the-shelf components with multiple sensors to monitor different corrosion parameters simultaneously.

1. Coelho L. B., Zhang D., Van Ingelgem Y., Steckelmacher D., Nowé A., Terryn H., *npj Materials Degradation*, **2022**, vol 6, 1–16.