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Coating degradation and rust creep assessment - A comparison between a destructive method according to ISO 12944 and selected non-destructive methods

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Organic coatings have been widely applied for the protection of marine structures from corrosion. Usually, the coating systems for the marine environment are specified to last more than 20 years. However, degradation of the coating system starts already as it is commissioned and repair and maintenance are usually needed before the planned service lifetime of the structure. Rust creep is one of the most important criteria for the prequalification of an anti-corrosive coating system for offshore applications, as established in ISO 12944-9. This evaluation method is destructive in nature which means that one panel only gives one reading of rust creep because the coating beyond the rust area must be removed. Non-destructive methods allow for the evaluation of coating performance in a more efficient and cost-effective way where the same coated panel can be tested over time so that the early changes/breakdowns of the coatings and the propagation of the rust creep can be detected and monitored, which will lead to a better understanding of the mechanism behind. In this present work, three methods based on ISO 12944-9, optical 3D Profilometry and Scanning Acoustic Microscopy (SAM) for the rust creep assessment are compared and results show that the optical 3D Profilometry and SAM can act as the non-destructive test methods providing more efficient and accurate rust creep evaluation.