

Abstract Submitted
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Applying statistics of random processes to prediction of weathering degradation and service life¹ STUART CROLL, BRIAN HINDERLITER, North Dakota State University — Predicting the service lifetime of any material is very important. One of the difficulties is relating individual, nanoscale, degradation events to the eventual deterioration in performance, which samples material properties at vastly larger scales. The Central Limit theorem provides an asymptotic approximation to the kinetics of how coating topology, or bulk morphology, changes after long term degradation during weathering. Results may then be translated, via well-known models, into the deterioration of properties such as reflectance, fracture strength, surface wetting, color etc. Thus service lifetime may be related to material structure. There is potential for using properties that permit non-destructive monitoring, e.g. reflectance, to predict other properties that would necessitate destructive evaluation, e.g. fracture strength. In addition, this approach may have much broader application to other situations where an eventual condition is the result of repeated, random events.

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