RATE-CONTROLLING PROCESSES DURING ENVIRONMENT-SENSITIVE CRACK PROPAGATION IN ALUMINUM

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Key Words: Stress corrosion cracking, crack branching,

Recent experimental findings are challenging today's conventional view on the rate-controlling processes during environment-sensitive crack growth in aluminum alloys when exposed to moist air and aqueous environments. X-ray computed tomography has revealed the detailed crack morphology of several stress corrosion cracks in 7000 series alloys and this has shown that the complexity of the mesoscale is incredibly important to understand the links between the gross morphology of the crack and the crack front/tip. We will show the large local variation that exists in the crack morphology. At the same time we will show how average measurements of crack velocity and crack opening displacement remain surprisingly uniform across the width of the crack. Discussion will follow in an effort to quantify the effect of Keffective compared to Kapplied and to provide a rationalization of these findings with respect to previously published theories.