

MSE SEMINAR

September 22, 2017

113 McBryde Hall

3:30 – 4:30 PM

Refreshments at 3:00 PM

Erik Cothron

Graduate Student

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“Investigation of the Effects of Flow-Conditioner Induced Microturbulence on the Erosion-Corrosion of Al 2024 Tubes”

ABSTRACT

Perforated plate flow conditioners have been used in various piping systems with the goal of mitigating distortions in the fluid flow profile. These devices have been shown to reduce swirling in the flow and in the flow profile asymmetry seen downstream from 90° turns, s-bends, and other disturbances inside of the pipe. These perforated plates accomplish this goal by acting as multiple nozzles in a single plane which force the fluid through the device at high speeds, resulting in the fluid jetting out of the downstream end. While this process is beneficial for removing flow distortions, the change in the degree of microturbulence at constant Reynolds number which has the potential to cause significant erosion-corrosion. The process of erosion-corrosion occurs when the fluid flow rate is high enough to strip away the protective passivation layer of the pipe wall. Once this breakaway velocity is reached, pipe degradation, wall thinning, and eventually failure can occur. The goal of this thesis is to study the corrosion rates downstream a perforated plate flow conditioner at a variety of speeds to find the oxide breakaway velocity Al 2024-T3 samples placed immediately downstream the conditioner. In doing so, we can develop an understanding of how flow conditioners may affect erosion corrosion of piping structures.

BIOSKETCH

Erik Cothron is a Masters student in Dr. Hendricks' corrosion group working on the Virginia Tech High Turbulence Corrosion Loop. He graduated from Virginia Tech in 2016 with a Bachelor's of Science in Materials Science and Engineering, with a concentration in nuclear materials. He is currently pursuing his MS, along with a graduate certificate in nuclear engineering through the Virginia Tech Nuclear Science and Engineering department. He has worked with Dr. Foster's Advanced Materials Group on isolating cellulose nanocrystals from tunicates, and he is currently a MSE student ambassador.