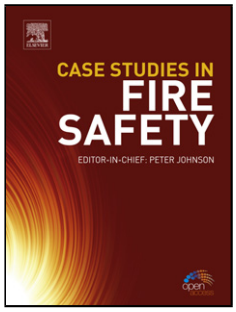

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Authors: Litao Chang, M. Grace Burke, Fabio Scenini

PII: S0010-938X(17)31708-0
DOI: https://doi.org/10.1016/j.corsci.2018.04.003
Reference: CS 7468

To appear in:

Received date: 15-9-2017
Revised date: 15-3-2018
Accepted date: 3-4-2018

Please cite this article as: Chang L, Burke MG, Scenini F, Stress Corrosion Crack Initiation in Machined Type 316L Austenitic Stainless Steel in Simulated Pressurized Water Reactor Primary Water, *Corrosion Science* (2010), https://doi.org/10.1016/j.corsci.2018.04.003

Stress Corrosion Crack Initiation in Machined Type 316L Austenitic Stainless Steel in Simulated Pressurized Water Reactor Primary Water

Litao Chang[1], M. Grace Burke[1], Fabio Scenini[1*]

[1]Materials Performance Centre, The University of Manchester, Manchester, UK M13 9PL

* Corresponding author

Highlights

- Machining promoted SCC on annealed 316SS in high temperature water
- SCC initiation was always associated with machining marks and did not occur in polished surfaces
- Porous inner oxide layer was identified as a main reason for the SCC initiation on the machined surface
- Residual stress induced from machining did not appear to play an important role on SCC initiation under SSRT
- Optimized machining parameters that compromise productivity and SCC resistant were identified

Abstract:

The effect of machining on stress corrosion crack initiation of annealed Type 316L stainless steel was investigated through accelerated testing in high-temperature hydrogenated water. It was observed that stress corrosion cracks only initiated on machined surfaces with machining marks perpendicular to the loading direction and a porous inner oxide layer was identified as an important factor contributing to crack initiation. Furthermore, most cracks stopped within the machining-induced near-surface ultrafine-grained layer and the machining-induced residual stresses did not