



Contribution ID: 606

Type: **Invited Oral**

M2Or1A-03: [Invited] A comparison of high 4 K strength structural alloys, with consideration for the fatigue and fracture toughness properties

Tuesday 11 July 2023 10:10 (20 minutes)

Nitronic alloys are attractive because they have both good room temperature and cryogenic temperature properties. Austenitic alloys 304 and 316 usually have better ductility and toughness at cryogenic temperatures but they can have low tensile strength at room temperature than Nitronic alloys. US-ITER chose Nitronic 50 for the ITER central solenoid tie plates because they needed good room temperature yield strength to pre-stress the coils at room temperature as well as good low temperature strength and toughness. The cons for Nitronic alloys are they are usually more expensive and they are a more complex alloy with more alloying elements. During fabrication and manufacturing extra care must be taken to ensure the final product with the desired/published properties. A review of past applications where Nitronic alloys were chosen and some case histories where problems were encountered will be presented.

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Session Classification: M2Or1A: Special Session: High Strength Materials