

## OP 406

### Friction stir welding of additively manufactured advanced aluminum alloys

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Friction stir welding (FSW) is a promising solution for joining additively manufactured (AM) advanced aluminum alloys, which often pose challenges to traditional welding methods due to their peculiar properties. This study investigates the use of FSW as a welding technique for advanced AM aluminum alloys such as Scalmalloy® and A20X, which can fulfill the requests for high-performance applications for several fields, including aerospace, energy, and transportation industries.

The research investigates the influence of FSW parameters on the mechanical properties and weld quality of Scalmalloy® and A20X welds. Techniques such as microscopy, tensile testing, fatigue analysis, and X-ray tomographic analyses have been employed to assess joint performance and microstructural features.

Findings reveal that optimized FSW parameters lead to significant weld strength and ductility, only slightly lower than those of as-printed Scalmalloy® and A20X. Microstructural examinations show refined grains and enhanced homogeneity in the weld zones, indicating good performance in service conditions. These results confirm FSW effectiveness in producing sound joints of AM advanced Scalmalloy® and A20X alloys and highlight its potential for wider industrial adoption. This investigation contributes to the understanding of FSW in advanced assembly, offering valuable insights for future application and development.