

## Investigation of Gas Tungsten Arc Welding Parameters on Residual Stress of Heat Affected Zone in Inconel X750 Super Alloy Welding Using Finite Element Method

**Authors :** Kimia Khoshdel Vajari, Saber Saffar

**Abstract :** Reducing the residual stresses caused by welding is desirable for the industry. The effect of welding sequence, as well as the effect of yield stress on the number of residual stresses generated in Inconel X750 superalloy sheets and beams, have been investigated. The finite element model used in this research is a three-dimensional thermal and mechanical model, and the type of analysis is indirect coupling. This analysis is done in two stages. First, thermal analysis is performed, and then the thermal changes of the first analysis are used as the applied load in the second analysis. ABAQUS has been used for modeling, and the Dflux subroutine has been used in the Fortran programming environment to move the arc and the molten pool. The results of this study show that the amount of tensile residual stress in symmetric, discontinuous, and symmetric-discontinuous welds is reduced to a maximum of 27%, 54%, and 37% compared to direct welding, respectively. The results also show that the amount of residual stresses created by welding increases linearly with increasing yield stress with a slope of 40%.

**Keywords :** residual stress, X750 superalloy, finite element, welding, thermal analysis

**Conference Title :** ICPEM 2022 : International Conference on Product Engineering and Manufacturing

**Conference Location :** Barcelona, Spain

**Conference Dates :** December 15-16, 2022