

ABSTRACT

Dissimilar joint is a new technology but often faces problems related to fatigue and fracture. Therefore, the research is conducted to investigate the capacity extension between two different materials. All specimens are produced in rod shape with diameter of 12mm. There are two types of materials used; stainless steel 316L and mild steel A36. Three different combinations comprising 316L - 316L steel, A36 - A36 steel and 316L - A36 steel are made using Tungsten Inert Gas (TIG) welding. Fatigue test is operated against specimen that have one notch with 3mm in depth at welding areas and base material area with fixed ratio, $R=-1$ and value $\Delta\sigma=199.9\text{MPa}$. The results show that tensile strength for similar joint of 316L steel was the highest. Number of Vickers hardness indicates that base material for 316L steel has the highest value of 247.2Hv. The result also shows that dissimilar joint produced the highest cycles of 650.905×10^3 cycles for $\sigma=199.9\text{MPa}$ with the early crack occurred at base material. Vibration which occurred during specimen start to fracture is analyzed. It shows that when speed of revolution is increased, amplitude and velocity are also increased. The fracture specimen surface is observed to have swollen (dimples) and small holes (micro-voids).

Keywords: A36 steel; 316L steel; TIG welding; microstructures; mechanical testing