

**SMAW: the effects of currents and welding rod diameters on welded joint
ultimate tensile strength using the full factorial DOE**

ABSTRACT

This research was significant as it extensively studies the effects of current and rod diameter on SMAW welded joint. The Mild Steel (AISI 1018) was used as the base material to be welded using the E-6013 welding rod. The experiment was constructed according to the full factorial design of experiment (DOE). This project found that the current and rod diameter are the significant factors in affecting the ultimate tensile strength (UTS). New contribution from this research was that the rod diameter is more significant than the current in affecting the UTS of a welded joint. In addition, this research also contributed new finding by showing that the interaction between current and rod diameter as significant in affecting the UTS. This interaction was also found to be more significant than current but less significant than rod diameter in affecting the UTS of welded joint. In addition, this research showed that the tensile strength increases when the current is increased from 80A to 100A. However, the tensile strength decreased as the current is set between 110A to 130A. At the same time, the welding rod diameter of 2.5mm produced the highest tensile strength compared to 3.2mm and 4.0mm rod diameter. This research also optimised the experiment and found that the highest tensile strength obtained is 342.39 MPa, which is produced using 80A of welding current with 2.5mm rod diameter.