

Abstract

In the fusion welding still encountered difficulties when conducting large diameter heavy metal cylinders. Solid weld is a solution of large diameter cylindrical material. By friction welding type friction welding method suitable for the connection of different types of metal aluminum 6061 T6 with 304 stainless steel and can be done more complex. The connecting process uses swivel speed parameters, frictional pressure, friction time, upset pressure, and upset time. The effect of length of upset time on the mechanical properties of the joints needs to be known further in order to obtain a good and efficient process and result of the connection. The purpose of this research is to know the mechanical properties in welding results.

The material is formed according to JIS Z 2201 standard with a diameter of 14 mm. Aluminum is rotated at 1000 rpm and stainless steel at rest and then pushed with 35 MPa pressure until friction occurs at the interface of both materials with a friction time of 4 seconds. After the stop rotation given upset pressure of 130 MPa. The parameter varied is the upset time. The study was conducted 10 times with variation of wrought time ranging from 4 seconds, 6 seconds, 8 seconds, 10 seconds, 12 seconds, 14 seconds, 16 seconds, 18 seconds, 20 seconds and 22 seconds. Results of welding in tensile test, microstructure test and hardness test.

Based on the results of research that has been done, it is known that the effect of upset time variation does not have much influence on tensile test results. The tensile strength is highest on the 18-second upset time variation of 237 MPa and the lowest 12-second upset time variation of 208 MPa. The microstructure and hardness value of 304 stainless steel did not change, and the change occurred only on aluminum 6061 T6 in the weld area and HAZ area with a hardness value of 51.9 VHN which decreased when compared to the hardness of the base metal of 79.0 VHN.

Keywords: Welding, upset time, mechanical properties.