

OPTIMIZATION STRENGTH OF TIG WELDING JOINTS BETWEEN A356 ALUMINUM AND 6061 ALUMINUM TO SUPPORT UNY BIKE PRODUCTION

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ABSTRACT

Bicycles are one of the manual means of transportation and are now turning their functions to sports equipment that are in demand by the public. Aluminum bicycle prototypes have been made between UNY and IKM to produce manual bicycles with the "Inobike UNY" brand. The problem that arises from the development of the Inobike UNY bicycle product is the very limited supporting data for product testing, especially regarding the strength of cast Aluminum and welded joints for the requirements for submitting SNI standardization.

The research method applied is experimentation with welding current variable to obtain the best welding parameter data based on the quality of the welded joint. The specific objectives of this research are: a) Investigating the large influence of heat input on the connection of Aluminum A356 and Aluminum 6061 materials on tensile strength, bending resistance, hardness and impact resistance, b) Obtaining data on the maximum strength of the bicycle frame load.

The results showed that the heat input 229 J/mm and 271 J/mm had tensile strength above 150 MPa and yield strength above 140 MPa, and the tensile test fracture was located in the parent metal so that it met the acceptance criteria. The results of the bending test showed that all the specimens did not meet the criteria for passing the AWS standard test because in the root bend test there was a weld joint fracture. The lowest impact toughness of 0.27 J/mm² occurs at the lowest heat input, namely I35A. The highest hardness is located in the HAZ region between Aluminum A356 and the weld metal because aluminum A356 in this area undergoes heat treatment but is followed by embrittlement. The simulation of the strength of the bicycle frame with aluminum A356 material joined by welding aluminum 6061 is able to withstand a load of 150 kg referring to the connection yield strength of 165 MPa. Based on the tensile test of the welded joint, it is known that the test yield strength is 142 MPa so that the maximum allowable load for the bicycle frame drops to 129 kg.

Kata Kunci: *Aluminum, TIG welding, inobike UNY*