

UNIVERSITI TEKNOLOGI MARA

**EFFECTS OF JOINT DESIGNS ON
FRACTURE TOUGHNESS OF THE BUTT
WELDS ALUMINIUM ALLOY 5052**

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of the requirements for the degree of
Master of Science


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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of the Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

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ABSTRACT

This research was carried out to analysis the chemical composition, fracture mechanism and mechanical properties of the butt weld aluminium alloy 5052 that made with different joint design. Another aim was to correlate the impact strength and fracture toughness of the butt welds AA5052. The study was focused on experimental methodology. The results of the study were that the weld metal has a coarse grain structure which is harder compared with the HAZ that has a grain growth structure. The fracture surface of weld metal exhibit ductile fracture, while the HAZ implies mixed mode ductile fracture. The chemical weight percentage, ductility, tensile strength, fracture toughness and impact strength of the entire butt weld are dependable on the groove and bevel angle of the welded joint design. However, joint design does not influence the hardness of the entire butt welds AA5052 but influenced by the heat input of the welding. The correlation between impact toughness and fracture toughness was developed, however further works need to be conducted in order to obtain proper data for the correlation. The principal conclusion was that joint design has a significant effect on the chemical weight percentage and mechanical properties of the butt welds AA5052. However further works need to be conducted on the correlation between impact strength and fracture toughness.

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