

STUDY THE EFFECT OF WELDING PROCESS ON MECHANICAL AND
MICROSTRUCTURE PROPERTIES OF AA5083
ALUMINIUM ALLOY JOINTS

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2012

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AND MICROSTRUCTURE PROPERTIES OF AA5083
ALUMINIUM ALLOY JOINTS**

By

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**Research Report submitted in partial fulfillment of the requirement for
the Degree of Bachelor of Applied Science (Maritime Technology)**

**DEPARTMENT OF MARITIME TECHNOLOGY
FACULTY OF MARITIME STUDIES AND MARINE SCIENCE
UNIVERSITI MALAYSIA TERENGGANU**

2012



**DEPARTMENT OF MARITIME TECHNOLOGY
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UNIVERSITI MALAYSIA TERENGGANU**

**DECLARATION AND VERIFICATION REPORT
FINAL YEAR RESEARCH PROJECT**

It is hereby declared and verified that this research report entitled:

A STUDY EFFECT OF WELDING PROCESS ON MECHANICAL AND MICROSTRUCTURE PROPERTIES OF AA5083 ALUMINIUM ALLOY by **MUHAMMAD AZMI BIN KAMARUDIN**, Matric No. **UK 17540** have been examined and all errors identified have been corrected. This report is submitted to the Department of Maritime Technology as partial fulfillment towards obtaining the **BACHELOR DEGREE OF APPLIED SCIENCE (MARITIME TECHNOLOGY)**, Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu.

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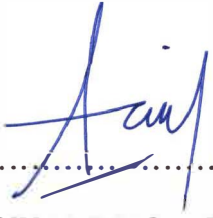
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DECLARATION

I hereby declare that this thesis entitled A Study Effect of Welding Process on Mechanical and Microstructure Properties of AA5083 Aluminium Alloy Joints is the result of my own research except as cited in the references.

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ACKNOWLEDGEMENT

Assalamualaikum w.b.t

I would like to express my gratitude to all those who gave me the possibility to complete this thesis. I want to thank the Laboratory of Maritime Technology University Malaysia Terengganu and Laboratory of Faculty Science and Technology University Malaysia Terengganu for giving me permission to commence this thesis in the first instance and to do the necessary experimental work.

I am deeply indebted to my supervisor Mr. Che Wan Mohd Noor bin Che Wan Othman and Dr Ahmad Faisal bin Mohamad Ayob whose help, stimulating suggestions and encouragement helped me to complete this research in time and writing of this thesis.

I am particularly grateful to Mr Khairul Azam, Project Manager from MSET Engineering Sdn. Bhd. who inspired and provided of the aluminum plates for the testing. Also I would like to thanks to Mr Azam bin Endot, welder from Kay Marine Sdn Bhd because had been successful to prepared the specimens.

Especially, I would like to give my special thanks to my parents Mr. Kamarudin bin Khalid and Mrs. Mek Fetimah binti Omar whose patient love enabled me to complete this thesis.

Last, but certainly not least, I wish to express my sincere appreciation to the staffs of Laboratory of Maritime Technology especially Mr Zulkarnain bin Yahya, Mr Wan Mohd Yusof bin Wan Hassan and Mr Mohamad Arif bin Abdul razak who helps me to conduct the test using the testing machine.

THANK YOU

A Study Effect of Welding Process on Mechanical and Microstructure Properties of AA5083 Aluminium Alloy Joints

ABSTRACT

The preset investigation is aimed to study the effect of welding processes such as MIG and TIG on mechanical and microstructure properties of AA5083 aluminium alloy. The preferred welding processes of this alloy are frequently tungsten inert gas (TIG) and metal inert gas (MIG) due to their comparatively easier applicability and better economy. In this alloy, the weld fusion zones typically exhibit coarse columnar grains because of the prevailing thermal conditions during weld metal solidification. This often causes inferior weld mechanical properties and poor resistance to hot cracking. Three sets of aluminium alloy plates with 6 mm thickness had been used as the base material for preparing single pass butt welded joints. The filler metal used for joining the plate is ER5356 for TIG and MTL 5183 for MIG of grade aluminium alloy. In the present work, tensile strength, hardness strength, bend strength, metallographic examination, Scanning Electron Microscopy (SEM) examination and salt spray test of the GMAW and GTAW joints have been evaluated, and the results are compared. From this investigation, it is found that TIG joints of AA5083 aluminium alloy showed superior mechanical properties compared with GMAW joints, and this is mainly due to the formation of finer microstructure in the weld zone.

Kajian Kesan Proses Kimpalan Dalam Paduan Sifat Mekanik dan Mikrostruktur Aluminium Aloi (AA5083)

ABSTRAK

Kajian yang ditetapkan bertujuan untuk mengkaji kesan proses kimpalan seperti kimpalan MIG dan TIG terhadap sifat-sifat mekanik dan struktur mikro pada aluminium aloi AA5083. Pemilihan proses kimpalan yang kerap digunakan adalah tungsten gas lengai (TIG) dan logam gas lengai (MIG) disebabkan ia mudah digunakan dan lebih ekonomi. Dalam aloi, zon kimpalan pelakuran (FZ) biasanya menunjukkan imej bijirin kolumnar yang kasar kerana wujud haba semasa pemejalan kimpalan logam. Ini disebabkan ciri-ciri kimpalan mekanikal yang kurang baik dan rintangan yang rendah pada keretakan yang tinggi. Tiga set plat aluminium aloi dengan ketebalan 6 mm telah digunakan sebagai bahan asas untuk menyediakan satu sambungan kimpalan temu. Logam pengisi yang digunakan untuk sambungan plat ialah gred ER5356 untuk kimpalan TIG dan MTL 5183 untuk kimpalan MIG. Dalam beberapa ujian yang dilakukan seperti ujian tegangan, ujian kekerasan, ujian lenturan, pemeriksaan metalografi, pemeriksaan ujian Pengimbas Mikroskop Elektron (SEM) dan ujian pengaratan pada sambungan MIG dan TIG telah dinilai dan keputusannya dibandingkan. Berdasarkan kajian ini, didapati bahawa sambungan kimpalan TIG pada aluminium aloi AA5083 mempunyai ciri-ciri mekanikal yang tinggi dan terbaik berbanding sambungan kimpalan MIG dan ini disebabkan oleh pembentukan mikrostruktur lebih halus pada zon kimpalan.