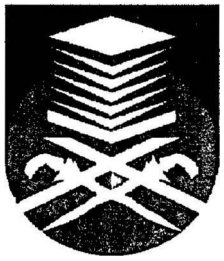

STUDYING THE INFLUENCE OF VARYING ROOT OPENING OF JOINT DESIGN ON THE WELD STRENGTH

AKRAMIN BIN MOHD ZUHUDI
(2001499239)

A thesis submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering (Hons) (Mechanical)

Faculty of Mechanical Engineering
Universiti Teknologi MARA (UiTM)

DECEMBER 2005

ACKNOWLEDGEMENT

Firstly, in the name of the Almighty I would like to express my thankful for His guidance and generosity in giving me the strength and courage to complete this thesis successfully in order to fulfill the requirement for the award of Bachelor of Engineering (Hons.) in Mechanical Engineering.

To my project advisor, Associate Professor Sunhaji Kiyai Abas, I would like to express my appreciation for his sincerity and positive advice, help, patience and encouragement in the duration of the report preparation from the beginning until its completion. His knowledge and enthusiasms was an essential ingredient in this thesis. I am particularly grateful that he is willing to take me as his student, despite his other numerous responsibilities.

In expressing my appreciation and thanks I will not forget Mr. Farid, the technician for the Welding Laboratory, Mr. Ziyadi, the technician for the Strength of Material Laboratory, Mr. Adam, the technician for Mechanical Engineering Workshop, Mr. Johari and Mr. Fazly, the technicians for the Sheet Metal Laboratory and Mr. Razman, the technician for the Structural Engineering Laboratory of Civil Engineering for their continuously help in preparing the equipment, and warm encouragement for the duration of this project. I would also like to thank all my lecturers at the Universiti Teknologi Mara (UiTM) for the valuable knowledge that I obtained during my studies. There are many kind-hearted people at UiTM whose time, energy and effort are greatly appreciated.

Finally, I would like to extend our heartiest thanks to my parents, family, friends and everyone that participated directly or indirectly in their effort, support, and ideas throughout my project completion.

ABSTRACT

A study was performed to accumulate data on the effects of increasing root opening of weld joint design on the mechanical properties of the welded parts. Experiments were conducted using Gas Metal Arc Welding with 100% CO_2 as shielding gas. Low current is used so that less amount of metal is used and less heat affecting the weld joint. The welding was applied on mild steel plates thickness of 8.9 mm and various root openings of single V-groove butt joint. The welded specimens were tested to obtain their strength by using tensile test. The ductility of the weld was also studied using guided bend test. The results and characteristics of all specimens were studied and analyzed using these two destructive testing procedures.

In order to complete this project, literature review has been done to get the understanding and to get familiar with a new joint design based on feedback from weld strength. All the information is taken from the internet, books and journal. Literature review process is a continuous process until the thesis is completed. The equipment needed such as tensile test machine and bend test machine is studied before the project development is started. During the project development, the plates to be welded were prepared in compliance with the standards as well as other requirements. After the preparation, all these plates were welded by the welder as instructed in the Welding Procedure Specification (WPS). Then, the welded plates were prepared for testing. The testing entailed non-destructive testing and destructive testing. Finally, the results of all the conducted tests were compiled and analyzed.

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

1.0 Introduction

This chapter introducing the objective, literature review, problem statement and methodology of the research.

1.1 Research Background

A joint design is selected due to its influenced on the cost of preparing the joint, the accessibility of the weld, its adaptability for the product being designed and the type of loading the weld is required to withstand. The basic joint configurations which are applicable for shielded metal-arc, gas metal-arc and submerged-arc welding are mainly grooved and fillet. Each group incorporates several variations to provide for different service requirements.

The importance in selecting a joint design is one of critical parts to ensure the reliability and durability of structure. Another aspect in today's industry is the low cost coupled with the best quality. If the joint design is wrongly selected, it will create safety problems by lowering structural strength and may increase the cost.

This project will look into the influence of varying root opening of joint design on the weld strength. Currently, the studies on influence of varying root opening already exist but the scopes of studies are different from one another. This project