

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND STUDY

Carbon steel and stainless steel are the most metal that used in the manufacturing world field. Carbon steel has used worldwide in manufacturing industry, because of their properties that is malleable, have a good strength, can be bent, and also anti-corrosion. Carbon steel also used in the oil and gas industry for piping because of it has high end durability. The other metal that use frequently in the world of industry is, stainless steel. That is because, stainless steel is anti-corrosion and dirt, easy to handle, and ideal for many applications. Both metal is used worldwide and absolutely have experience in the joining process like welding.

Welding is a technique to join two or more types of metals. Welding is operation in which two or more parts are united by means of heat or pressure or both, in such a way that there is continuity in the nature of the metal between these parts. There is much type of welding like, laser welding, spot welding, arc welding, TIG welding and the most used in manufacturing industry is MIG welding.

Metal Inert Gas welding (MIG welding) is a welding process that uses shielding gas to cover the arc. The arc is between a weld metal and filler wire .This process is not using the application of a pressure. In this welding process, the parameter is very important. Parameter like voltage, current and wire feed rate can give huge influence in the welding result. Therefore this research focus on the torch distances parameter.

The torch distance is the distance between the tip of the filler wire and the metal face. This research is to study the effect of torch distance on the weldability of the dissimilar metal using MIG welding process. Weldability is the capability of a material

to be welded under the imposed fabrication conditions into a specific, suitably designed structure and to perform satisfactorily in the intended service. In other word, weldability is a term used to determine whether easy or not to weld some metal. To test the weldability, several test need to conduct, like, Charpy's test, tensile test and the microstructure analysis. It is easy to weld the metal if the weldability is high.

1.2 PROBLEM STATEMENT

Welding dissimilar metal is difficult because of the difference compositions that lead to difference chemical properties. The dissimilar welding will form intermetallic compound. Therefore to make a good compound, two metals with filler wire should have mutual solubility. (Cary & Helzer, 2005). Dissimilar metals have different chemistries, so they have different physical properties such as melting temperature. Many who have involved with joining metal with different melt temperature experience frustration. The difficulties was arise when someone try to melt metal together at same weld temperature. For example mild steel and stainless steel, obviously in nature these materials have different melting point. Besides that, to get the good welding result, the parameters also give the influence. The joining of two dissimilar metals fail due to wrong parameter. If the parameter like torch distance too far and too close, the dissimilar joint will not successfully.

1.3 OBJECTIVE

- To investigate the effect of MIG torch distance on weldability of dissimilar welding
- To evaluate weld properties through the Hardness, Tensile, and Microstructure analysis

1.4 SCOPE

Here, scope act as the guidance that permits this research is doing without loss the focusing. It is capable to bring the project to their objective without run out by doing work that not relate to the objective. Welding process has done using MIG welding machine. The controlled parameter such Voltage, Wire feed, current and Gas flow rate

was selected which respect to the welding standard and machine capability. The main parameter that needs to study for this research is the torch distance. Material used is mild steel and (AISI 304) stainless steel with both thickness 3 mm. the joint design was single groove butt joint with flat position by MIG welding filler wire (ER308). Specimen was prepared according to AWS and ASTM respectively to study the mechanical properties such state in the objective. Other variables are not mention here become a limitation of this project scope. To choose the right parameter, the design of experiment used is Taguchi Method. Then, the data is collect and analyze by using ANOVA.