CHAPTER 1

INTRODUCTION

1.1 Background

Dissimilar metal joining offers the potential to utilize the advantages of different materials often providing a whole structure with unique mechanical property. Recently dissimilar welding of metallic alloy sheet has gotten attention due to its manufacturing cost and working operation reduction ability. Aluminum can reduce the weight of structural parts for its lightweight and stainless steel has a high strength and excellent corrosion resistance. Even so, the process yields the brittle intermetallic reaction phase formation on the weld joint and the cracks propagate across the matrix of the grains. So, this project looks into the effect of heat treatment on the quality of the weld joint and defect that may occur during the heat treatment process of steel-aluminum sheets. The mechanical properties of the specimens are also investigated.

1.2 Problem Statement

This project focuses on joining two different materials by using TIG welding. The method that is selected is tailor welded blanks but a few problems are predicted when joining the material. Since the materials used are stainless steel and aluminum, when steel and aluminum are welded together, steel sheets tend not to melt and join well with the aluminum sheets. This is due to the heat created by the welding process does not exceed the melting point of steel. This in turn will decrease the mechanical properties of the joint area. In order to improve the joining of these materials in the joint area, one method where the steel sheets are pre-heated to a higher temperature from ambient temperature before the welding process is proposed with various current.

1.3 Objective

The project objectives are:

- To investigate the effect of heat treatment on the weld joints quality, and
- To determine the mechanical properties of the steel-aluminum weld joint.

1.4 Scope

The scopes for this project are:

i. Fabrication of steel- aluminum welded sheets
ii. Investigation of the heat treatment (preheat) effect on weld joint quality by using tensile test and Vickers hardness test, and
iii. Investigation of the specimen's microstructure using optical microstructure.