ABSTRACT

Generally aluminium welding process is done by fusion welding such as MIG and TIG welding, but with both of this methods there are possibility of defect formation such as porosity, crack, and prone to deformation during the cooling and solidification of weld metal. So to overcome the shortcomings of both MIG and TIG welding process, friction stir welding method is used as an alternative welding process. Friction stir welding process is done by using a milling machine PM 1 ½ HU type and it’s performed on 4 mm thickness aluminum alloy 5083 plate. The process parameters using fixed RPM at 1084 and four variations of tool travel speed by 20 mm/min; 25 mm/min; 36 mm/min and 43 mm/min. Analysis of the results of welding include the type and size of the defect and the magnitude of the temperature on the weld joint surface. From the experimental results it’s known that there was incomplete penetration (IP), joint remnant, weld flash and surface irregularities on all specimens. The use of parameter travel speed 20 mm/min will result in the highest temperature and the smallest IP discontinuity is 185.95 °C and 0.58 mm. While the use of parameter travel speed 43 mm/min will result in the lowest temperature and the largest IP discontinuity is 160.63 °C and 1.07 mm. From Vicker’s micro hardness testing it’s found that the HAZ and TMAZ hardness lower than weld nugget hardness as a result of welding temperatures exposure that alter the microstructure and grain size during the welding process.

Key Word : Defect, Friction stir welding (FSW), metallurgy, tool travel speed, and weld joint temperature