

ABSTRACT

Friction stir welding (FSW) is one method of joining a material that utilizes pin tool friction and shoulder. One of the materials used is nylon 6. Nylon 6 is widely used in industry because it has high tension and lightweight. the shape of the pin tool affects the results of the material joining process from the mechanical properties and macrostructure. This study was conducted to determine the effect of the pin tool shape on the mechanical properties and macrostructure of nylon 6 material using the friction stir welding method.

The material used in this study is a nylon 6 sheet with a length of 115 mm, a width of 100 mm and a thickness of 4 mm. The joining process is carried out at 2350 rpm rotating speed, 6 mm / minute feed rate, and 4.8 mm depth of plunge. The pin tools used include cylinders, threaded cylinders, and threaded cone. In this study, 3 tests were carried out, such as tensile testing, hardness testing, and macrostructure testing.

The results of the study showed that the use of the pin tool cylinder got the best results, where the welding results looked more evenly distributed and there were not many defects. Due to the heat input that is not too high which causes the material to melt homogeneously. For the value of the highest tensile strength obtained 17,22 MPa with a strain value of 31,85%. While the value of tensile strength on the base material was obtained 18,95 MPa and the strain value was 171,5 %, where for the highest tensile strength the welding result was 90,87 % of the base material. Based on the results obtained above, the recommended pin tool is a cylindrical pin tool. Because the joining results are obtained with good mechanical properties and a flat surface.

Keywords : *Friction Stir Welding, Feed Rate, Stir Zone, Nylon 6*