

# **STUDY ON HARDNESS AND MICRO STRUCTURAL CHARACTERIZATION OF THE FRICTION STIR WELDED NYLON 6 PLATE**

**K. PANNEERSELVAM<sup>1</sup> & K. LENIN<sup>2</sup>**

<sup>1</sup>Assistant Professor, National Institute of Technology, Tamil Nadu, India

<sup>2</sup>Research Scholar, National Institute of Technology, Tamil Nadu, India

## **ABSTRACT**

Friction stir welding (FSW) is a solid-state method of joining thermoplastic materials. FSW process parameters such as tool rotation speed, welding speed, and tool pin profile etc play a major role in deciding the weld quality. In this study, an attempt has been made to understand the mechanism of FSW and the role of tool pin profile, rotation speed and welding speed in Nylon 6 plates. Experiments were performed at rotational speed of 600-1200 r/min, Welding speeds of 10-40 mm/min, and FSW tool pin profiles of Triangular, square, Threaded and Grooved pin profiles.

This has been done by understanding the material flow pattern in the weld regime. Optical microscopy was used to evaluate the microstructural characteristics and Rockwell hardness is observed in weld joints. Weld zone microstructure were investigated using different images of optical microscopy. The micro structure and Rockwell hardness of the welded region was created by Grooved pin profile with welding speed of 10 and 20 mm/min and rotation speed of 800 and 600 r/min identified as correct FSW parameters to avoid defects in Nylon 6 plates.

**KEYWORDS:** Feed, FSW, Hardness, Microstructure, Nylon 6, Pin Profile, Speed, Weld Zone