

OPTIMIZING THE WELDING PARAMETERS OF FRICTION STIR WELDING BY USING RESULTANT FORCE AND DEFECTS FOR NYLON 6 MATERIAL

K. PANNEERSELVAM¹ & K. LENIN²

¹Assistant Professor, Department of Production Engineering, NIT, Trichy, Tamil Nadu, India

²Research Scholar, Department of Production Engineering, NIT, Trichy, Tamil Nadu, India

ABSTRACT

Nylon 6 is one of the thermoplastic materials that have a lot of engineering applications. Friction Stir Welding (FSW) is a solid-state method for joining metals. In this paper presents a successful FSW process to join non metals. Taguchi optimization methodology and analysis of variance (ANOVA) were used to study the effect of process parameters by this welding process.

In this investigation, an attempt was made to join the nylon 6 plate of 10 mm thickness with different FSW tool pin profiles (square, triangular, threaded and grooved with square pin profile) and different feeds such as 0.167, 0.333, 0.5 and, 0.667 mm/sec at a constant spindle speed of 1000 rpm.

During FSW, Forces acting on the tool along the three axes were measured and defects occurred in the joints were observed and analyzed for the process parameters optimization.

The main objective was to find the important factors which influence the welding process to achieve defect-free joint with minimum force acting on the tool. From this investigation, it is found that the joint fabricated using threaded pin profile tool at 0.167mm/sec needed minimum amount of resultant force and produced defect free welds.

KEYWORDS: ANOVA, Feed Rate, Nylon 6, Pin Profile, Taguchi