

Joining of PEEK plates by friction stir welding process

J.Vinodh Jose

National Institute of Technology, Tiruchirappalli, India
vinodh_jose@rediffmail.com

K.Panneerselvam

National Institute of Technology, Tiruchirappalli, India

ABSTRACT

Friction Stir Welding (FSW), a solid state welding process primarily meant for joining metals and alloys is also used in the joining of polymers. Researchers have carried out FSW on Nylon 6, High density polyethylene (HDPE), Medium density polyethylene (MDPE), Ultra high molecular weight polyethylene (UHMW-PE), Polyvinyl chloride (PVC), Acrylonitrile butadiene styrene (ABS), Polymethyl methacrylate (PMMA) and Polypropylene (PP).

However, the joining of Polyether ether ketone (PEEK), which is a high strength and high temperature thermoplastic material used in aerospace, automotive, chemical processing industries and medical applications has not been carried out extensively using FSW. PEEK is a semi-crystalline polymer with a glass transition temperature of 143°C, melting point of 343°C and tensile strength around 100 MPa.

This research paper is aimed at joining of PEEK plates using FSW process with tool speed and tool feed rate as input process parameters. FSW process is carried out by modifying the milling machine with a specially made suitable fixture for holding the two plates to be welded. PEEK material (100% virgin) of 5.5 mm thickness is used as the workpiece for the joining process. Experiments are conducted using a mild steel cylindrical tool of 6 mm probe diameter, 20 mm shoulder diameter and 5 mm probe length and the butt joints are analysed and characterized and the results of the investigation are elaborated in this paper.

Keywords: FSW; PEEK;

International Conference on Advances in Minerals, Metals, Materials, Manufacturing and Modelling