Behavior Simulation Polyamide 6 (PA6) During Friction Stir Welding and Comparison with Experimental Results

H. Aghajani Derazkola¹, M. Hosseinzadeh², M. Elyasi³

1- Young Researchers and Elites club, Science and Research Branch, Islamic Azad University, Tehran, Iran.
2- Department of Mechanical Engineering, Islamic Azad University of Ayatollah Amoli Branch, Amol, Iran.
3- Department of Mechanical Engineering, BabolNoshiravani University of Technology, Babol, Iran.

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* hamed.aghajani@srbiau.ac.ir
Abstract
In this study, the effects of linear speed and rotational speed of the friction stir welding tool was investigated on the heat generation and distribution of heat, the material flow and weld defect formation of the Polyamide 6 (PA6) workpiece. The commercial CFD Fluent 6.4 software package was used to the simulation of the process with computational fluid dynamic technique. The output results of the simulation showed higher proportion of rotational speed to the tool linear speed, the material flow in front of the friction stir welding tool became more and the dimension of the welding stir zone became bigger. The maximum simulating generated heat was 220 centigrade degrees and the maximum head and material flow were observed at the advancing side of the join surface. The obtained simulation results were compared with other researchers’ experimental results and the simulation outputs displayed acceptable agreement with experimental results.

Keywords: Friction stir welding, Computational fluid dynamic, Thermal simulation, Material flow, Polyamide 6 (PA6).