

## Material Flow Modeling in Friction Stir Welding of AA6061-T6 Alloy and Study of the Effect of Process Parameters

**Authors :** B. SahaRoy, T. Medhi, S. C. Saha

**Abstract :** To understand the friction stir welding process, it is very important to know the nature of the material flow in and around the tool. The process is a combination of both thermal as well as mechanical work i.e it is a coupled thermo-mechanical process. Numerical simulations are very much essential in order to obtain a complete knowledge of the process as well as the physics underlying it. In the present work a model based approach is adopted in order to study material flow. A thermo-mechanical based CFD model is developed using a Finite Element package, Comsol Multiphysics. The fluid flow analysis is done. The model simultaneously predicts shear strain fields, shear strain rates and shear stress over the entire workpiece for the given conditions. The flow fields generated by the streamline plot give an idea of the material flow. The variation of dynamic viscosity, velocity field and shear strain fields with various welding parameters is studied. Finally the result obtained from the above mentioned conditions is discussed elaborately and concluded.

**Keywords :** AA6061-T6, CFD modelling, friction stir welding, material flow

**Conference Title :** ICASMA 2015 : International Conference on Applied Simulation, Modelling and Analysis

**Conference Location :** Venice, Italy

**Conference Dates :** June 22-23, 2015