

Effect of cutting parameters on tool-chip interface temperature in an orthogonal turning process

ABSTRACT

The aim of this paper is to investigate the effect of cutting speed and uncut chip thickness on cutting performance. A Finite Element Method (FEM) based on the ABAQUS explicit software which involves Johnson-Cook material model and Coulombs friction law was used to simulate of High Speed Machining (HSM) of AISI 1045 steel. In this simulation work, feed rate ranging from 0.05 mm/rev to 0.13 mm/rev and cutting speed ranging from 200 m/min to 600 m/min at three different cutting speeds were investigated. From the simulation results it was observed that increasing feed rate and cutting speed lead to increase temperature and stress distribution at tool/chip interface. The results obtained from this study are highly essential to predict machining induced residual stresses and thermo-mechanical deformation related properties on the machined surface.

Keyword: Cutting speed; Feed rate; Finite element modeling