PREDICTION OF DYNAMIC PARAMETERS IN TURNING PROCESS OF AISI4340 STEEL WITH TUNGSTEN CARBIDE TOOL BY USING FEM ANALYSIS

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ABSTRACT:

With the increasing demand for quality, highly reliable and economical machined components, the manufacturing industry must find innovative methods for producing precision components. To meet such demand, manufactures are seeking way to improve the manufacturing methodologies, by predicting the dynamic parameters with analytical models and finite element simulation. The present work deals with the prediction of dynamic parameters such as cutting forces, temperatures, flow stress and strain rate at secondary shear zone and normal stress, normal force component, maximum stress, strain rate, strain, coefficient of friction, shear flow stress in the chip at tool chip interface in turning. For the suitable analytical models are highly essential to predict the dynamic parameters. In the present work Oxley's model, JC model and tool chip interface model are used to predict dynamic parameters. The parameters such as stress, strain and temperature are calculated by Oxley's model using orthogonal experimental values. And flow stress is determined by JC model using the values obtained from Oxley's model. Flow stress values are obtained from Johnson Cook model are validated with the flow stress values obtained from tensile test. Finally FEM simulations have been performed using 3D-Deform software. The flow stress, strain and strain rates are obtained from 3DDeform software are compared with analytical model results comparison is satisfactory.

KEY WORDS: Dynamic parameters, Oxley's model, JC model and tool chip interface model.