

***Title:***

**Three-dimensional simulation of a single pass hot rolling of carbon steel: Case of instabilities in steady state region**

***Abstract :***

The nature of instabilities in the steady -state region in region in region in the the form form of of high amplitudes or peaks during hot rolling can be an indication of the problems in the roll mill stand. The aim of this study is to predict study is to predict the variation in load, stress, strain, torque and power the influence these parameters can have during the deformation of workpiece in roll gap. To achieve this aim, finite element modelling (FEM) was used in the simulation of a single pass hot rolling of AISI 1016 carbon steel. The results indicate that, large amplitude in the stresses, strains and torque variationsand can result in vibrations in the mill stands compared to the steady state point values. This can also result in inhomogeneity in the microstructural properties of the rolled workpiece . Inaccuracies in the geometry of the rolled products too may arise. Elastic deformation occurred during the critical strain ( $\epsilon_c$ ) until the peak strain ( $\epsilon_p$ ) was reached after which steady state rolling (plastic deformation) commenced. Inhomogeneity in the rolled product also occurred during the reduction of the workpiece and this can lead to mill breakdowns. lead to mill breakdowns.lead to mill breakdowns. The results obtained are in agreement with the existing literature. Suggestions regarding Suggestions regarding improvement to the mills ement to optimise the process to optimise are also presented .