

ANALYSIS OF BORING BAR VIBRATIONS'

by

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## ABSTRACT

The work in this thesis is concerned with an analysis of the boring bar vibrations, which, for slender bars, are known to be associated with rapid tool wear and unsatisfactory surface quality. A continuous system analysis is proposed for the cantilever boring bar, taking a dynamic cutting force model. The dynamic response of the beam is obtained through the application of Lagrange's equations to the energies formulated with the help of assumed modes. These general equations have been simplified and solved for different cases. The predictions agree well with the experimental observations of PERA.

An axisymmetric sandwich boring bar is analysed for free vibrations and loss factors were computed numerically from the eigen value formulation in the complex domain.

Experiments were conducted during boring operation and the chatter behaviour was recorded and analysed. These have been compared with the analytical predictions.

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Further experiments were conducted for a comparative study of the chatter behaviour of various types of boring bars under identical working conditions. Experiments were also conducted to study the workpiece surface quality as affected by the boring tool vibrations.

On the basis of these results and the proposed theory, it is possible to make a rational choice of the parameters for the boring operation.

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