COMMINUTION STUDIES IN BALL MILL

by

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DEDICATED

TO

LORD JESUS CHRIST

C E R T I F I C A T E

This is to certify that the thesis entitled 'Comminution Studies in Ball Mill' being submitted by Mr.A.Devaswithin to the Indian Institute of Technology, Delhi for the award of the degree of Doctor of Philosophy is a record of the bonafide research work carried out by him. Mr.Devaswithin worked under my guidance for the submission of this thesis which is to my knowledge has reached the requisite standard.

The thesis or any part thereof has not been submitted to any university or institute for the award of any degree or diploma.

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ABSTRACT

The aim of this study is to identify the operating variables which affect the size distribution of comminution products of the ball mill, and to relate them with that of the size distribution of the products. A preliminary study was also taken up to predict the size degradation of the particles during impact on a flat surface.

The experimental conditions of the ball mill were planned as per factorial design. Statistical tests were conducted to identify the significant operating variables. A mathematical model based on selection and breakage distribution functions was used to relate the size distribution of the particles.

The study revealed that the variables ball size distribution, ball loading, particle loading and mill speed affect the product size distribution significantly. The selection and breakage parameters calculated using a back-calculation procedure matched well with that of the parameters estimated using other direct determination techniques. It was found that the breakage distribution parameters were independent of the operating conditions whereas the selection parameters were found to be affected by the operating variables. A second degree polynomial was used to relate the data. Using these relationships, the effects of the operating variables on the product size distribution were discussed.

Experiments were carried out to test the particle size degradation in an impacting system. It was found that the degradation in the impacting system can be represented using the comminution model.

C O N T E N T S