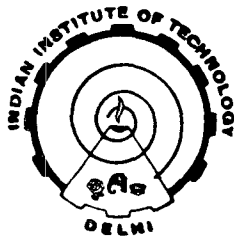


**STUDIES ON THE REDRESS LIFE OF THE  
GRINDING WHEEL AND OPTIMIZATION OF  
THE WET SURFACE GRINDING PROCESS**

by

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*A THESIS SUBMITTED  
IN FULFILMENT OF THE REQUIREMENTS  
FOR THE AWARD OF THE DEGREE OF  
**DOCTOR OF PHILOSOPHY***



Department of Mechanical Engineering  
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## CERTIFICATE

This is to certify that the thesis entitled 'STUDIES ON THE REDRESS LIFE OF THE GRINDING WHEEL AND OPTIMIZATION OF THE WET SURFACE GRINDING PROCESS', being submitted by Mr. A. Chandra Sekhara Kumar to the Indian Institute of Technology, Delhi, for the award of the degree of Doctor of Philosophy is a record of bonafide research work carried out by him. He has worked under my guidance and supervision and has fulfilled the requirements for the submission of this thesis, which to my knowledge, has reached the requisite standard. The results contained in this thesis have not been submitted, in part or full, to any other University or Institute for the award of any degree or diploma.



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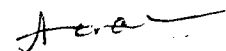
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(A.C.S. KUMAR)

## ABSTRACT

The redress life of a grinding wheel influences the grinding performance significantly. A review of the relevant literature indicates the need to develop comprehensive mathematical models for the wheel redress life considering the pertinent variables of the grinding process. The grinding fluid employed is an important parameter in the optimization of the process and as such the development of a suitable methodology for the selection of the appropriate grinding fluid is called for.

The wheel redress life in surface grinding is modelled in terms of the selected controllable variables including the grinding fluid, by the Group Method of Data Handling (GMDH) technique. The data required for this are generated by suitable experimentation. Various criteria involving the limits on radial wheel wear, grinding ratio, surface roughness, and the grinding forces are considered individually to determine the stage at which the wheel is to be redressed. The wheel life models so developed are analysed to determine the relative influence of the input variables on the redress life. Further, these models are employed to assess the relative performance of the grinding fluids.

The influence of different fluids on the optimal values of the grinding and the dressing variables in surface grinding is investigated. The optimization model employed for this purpose is developed by the Goal Programming technique. The required data are generated by experimentation based on the principle of design of experiments. The analysis of the results of the optimization model leads to the selection of the appropriate grinding fluid.

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