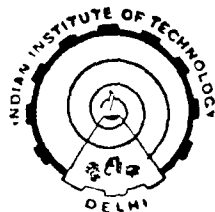


**APPLICATIONS OF MULTICRITERIA DECISION MAKING
TECHNIQUES FOR JOINT OPTIMIZATION OF DRESSING
AND SURFACE GRINDING CONDITIONS**

by
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the degree of
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C E R T I F I C A T E

This is to certify that the thesis entitled 'APPLICATIONS OF MULTICRITERIA DECISION MAKING TECHNIQUES FOR JOINT OPTIMIZATION OF DRESSING AND SURFACE GRINDING CONDITIONS' being submitted by Mr. A.P. Verma to the Indian Institute of Technology, Delhi, for the award of the degree of Doctor of Philosophy in Mechanical Engineering is a record of bonafide research work carried out by him. He has worked under our guidance and supervision and has fulfilled the requirements for the submission of this thesis which to our knowledge, has reached the requisite standard.

The results contained in this thesis have not been submitted, in part or in full, to any other University or Institute for the award of any degree or diploma.


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ABSTRACT

A review of the literature dealing with the optimization of the grinding process has been presented.

Data were generated by experimentation based on principle of design of experiments. The data are used to establish relationships between controllable variables viz. work-speed, wheel-speed, depth of cut, dressing depth and dressing lead and the performance criteria namely, surface roughness, residual stress index, hardness, compliance, metal removal rate, specific grinding energy and visual surface quality index. For this purpose, a first and higher order power function models were proposed for each objective function which were transformed into a set of linear equations by logarithmic transformation and the coefficients and exponents were determined by multiple linear regression.

Different policies/priority structures are developed for various practical situations.

Integrated models have been developed for optimization of dressing and grinding variables, independently and jointly, using multicriteria decision making techniques of Goal Programming, Interval Goal Programming and Fuzzy Linear Programming. Statistical analysis is given. Sensitivity studies are carried out. The optimization refers to constrained optimization within the upper and lower limits selected for various controllable variables.

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