STUDIES IN PRODUCTION SYSTEMS
THROUGH
GEOMETRIC PROGRAMMING AND RELATED AREAS

by

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Thesis submitted to Indian Institute of Technology, Delhi,
for the award of the degree of
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DEDICATED TO MY PARENTS

CERTIFICATE

This is to certify that the thesis entitled STUDIES IN PRODUCTION SYSTEMS THROUGH GEOMETRIC PROGRAMMING AND RELATED AREAS being submitted by N.K. Jha, has been carried out under my supervision in conformity with the rules and regulations of the Indian Institute of Technology, Delhi.

I further certify that the thesis has attained the standard required for the award of the Degree of Doctor of Philosophy in Mechanical Engineering, of the Institute. The research report and results presented in the thesis have not been presented elsewhere for the award of any other degree.

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ABSTRACT

It is well known that there is a large number and variety of situations requiring decisions to be made for optimum design and operation of production systems.

In this thesis an attempt has been made to study and analyze some typical problems of production systems through geometric programming. Use has also been made of pseudo-Boolean programming and estimation theory. Modifications in the formulation and the mathematical techniques for solution have been introduced where necessary, in the analysis of certain problems.

The problem of selection of facilities under a given work load has been analyzed employing pseudo-Boolean programming. Under uncertain situation the same problem has been modelled on stochastic linear programming and solved through geometric programming.

The automatic (computerized) process planning of multitool turning and milling operation has been attempted. The optimization of above processes has been carried out through 'nonlinear mixed integer programming' in the thesis. The discrete nature of machine settings has also been taken into account.

A production planning problem in uncertain situation, where the production manager wants to know the extent of profit in advance of production, has also been analyzed and

and solution obtained through stochastic geometric programming.

An integrated production-inventory-sales and advertisement system has been proposed and parameters describing the system have been estimated through MAP filter algorithm. The dynamics of the system have been taken care of by formulating the problem as one of the optimal control.

The approach presented in the thesis through several typical examples, indicates that the techniques can be successfully employed to the analysis of a wide variety of production system problems.

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