MATHEMATICAL TOOLS IN PRODUCTION MANAGEMENT

by **Jean-Marie Proth and Herve P.Hillion**

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The book presents new trends in modern production systems as well as the mathematical tools used to solve the problems arising in these new environments. The authors probe the particular difficulties faced during production, highlight the exact nature of the problem and define the criteria to be considered when solving design or management issues. Extensive discussions are devoted to linear programming, as the authors apply this method to the types of industrial problems that can be best treated with this kind of mathematical approach. An in-depth examination of Markov chains is included to aid in the evaluation of stochastic discrete systems, while separate and significant attention is paid to data analysis. The volume appeared in the series Competitive Methods in Operations Research and Data Analysis.

CONTENTS : New Trends in Manufacturing Systems and Their Consequences: Main changes in the manufacturing environment; Towards flexibility, modularity and integration; Flexible Manufacturing Systems (FMS); Evaluation criteria of modern production systems; Production system life cycle. **Preliminary Design of Production Systems:** Static study; Dynamic study. **Linear Programming:** Linear programming formulations; LP-problems in production management; Conclusion. **Dynamic Programming:** Dynamic programming formulation; Dynamic inventory planning problem; Tasks scheduling. **Branch-and-Bound Techniques:** Branch-and-bound techniques; Algorithms and examples; Conclusions. **Markov Chains:** Formal Definition of a discrete parameter Markov chain; Chapman-Kolmogorov equations; Classification of states; Decomposition of the state space; Long-run properties of continuous parameter Markov chain; Birth and death processes; Pure birth processes. **Queueing Theory:** Structure of queueing theory; Terminology and notations; Elementary queueing models; Queueing networks; Model applicability. **Petri Nets:** Petri net theory; Petri net model of the job-shop; Model applicability. **Graph Theory:** Basic terminology and notations; The shortest path problem; The maximal flow problem; Conclusion. **Mathematical Analysis of Automated Systems: Two Examples:** Mathematical modelling and analysis; Transfer line with unreliable machines and transportation system; Closed-loop conveyor systems; **Index.**

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