

**Applying Mathematical Programming for Master Production
Scheduling in Multi-site Semiconductor Manufacturing
- A Case Study of Company V**

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ABSTRACT

This study takes the master production scheduling of a well-known semiconductor manufacturing company in Taiwan as a case study. The master production scheduling determines the output quantity and product mix of each month in the future based on customer orders and capacity allocation, and then the master production scheduling is adjusted according to the capacity utilization status through production planning engineers, so as to improve the capacity utilization and avoid delivery delay. Currently, adjustments are made by experienced planners in the case company, but due to multi-site considerations, the operation time is quite time-consuming. Therefore, a multi-objective mixed integer programming model is constructed to solve this problem, and the optimization objective is to maximize the output, profit, and capacity utilization, respectively, which can provide different versions for decision-makers to use. In this study, Python Programming language and Gurobi Optimizer were used for modeling, and the real data were used for solving. The results indicate that the proposed method can efficiently produce the master production scheduling, and meet the customer order demand. It can improve the overall benefit of planning operations.

Keywords: Multi-objective, Mathematical programming, Master production scheduling, Wafer manufacturing, Multi-site