



Optimization of IBM's Semiconductor Supply Chain

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Abstract

Operations Research and Management Science (OR/MS) methods are used extensively for decision support of production planning in IBM's Microelectronics Division. The division consists of several manufacturing plants including wafer fabrications plants, test plants, and ceramic substrate plants which are geographically dispersed around the world. Division central planning systems for coordinating the production at each of the plants and interplant logistics throughout the division require the solution of very large-scale supply chain optimization problems. This talk will cover several topics related to supply chain optimization. First, a general overview will be given of the semiconductor manufacturing process including: basic stages of manufacturing semiconductor devices, a description of the current state of automation in the industry, and material flows through the supply chain. Next, a brief summary of several OR/MS problems in the industry will be provided. The talk will then focus on the discussion of OR/MS modeling specific to supply chain optimization. The practical application of linear programming and heuristics to optimization of extended enterprise supply chains in semiconductor manufacturing is discussed. Some structural properties of the model are explained and decomposition methods for handling the resulting large-scale linear programming problems are described. Finally, some examples of heuristics developed for discrete optimization aspects of the problem will be presented. The talk will conclude with a discussion of future directions.

Biography

Brian Denton is a Senior Engineer in the Advanced Planning Systems department in IBM's Technology Group. Since joining IBM in 2001 he has been involved in the design and development of planning and scheduling systems for large scale supply-chain optimization problems in semiconductor and data storage device manufacturing industries. Prior to joining IBM he has worked on OR/MS applications to health care industry and in the steel manufacturing industry. His research interests are in the application and development of solution methodology for large-scale optimization problems arising in industry applications. He has a joint B.Sc. in Physics and Chemistry, an M.Sc. in Physics, and a Ph.D. in Management Science from McMaster University.

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