Proceedings of the International Conference on Industrial Engineering and Operations Management
Paris, France, July 26-27, 2018

Semiconductor Manufacturing Planning under Demand, Production and Process Yields Uncertainties

Eghbal Rashidi
Leavey School of Business
Santa Clara University
Santa Clara, CA 95053, USA
erashidi@scu.edu

Scott Mason
Department of Industrial Engineering
Clemson University
Clemson, SC 29634, USA
mason@clemson.edu

Abstract

We present a three-stage stochastic programming approach for semiconductor manufacturing planning under demand and production yield uncertainty. The production processes are considered to follow a *push policy* in the Front-End, and a *pull policy* in the Back-End; with the Die Bank being the *decoupling point*. Outsourcing of production and process for each processing stage (e.g., fabrication, sort, assembly, and test) are explicitly modeled in our proposed optimization model. The decisions of the model include the amount of production start and whether or not to subcontract. We apply our model to a test case from a large US-based microelectronic manufacturer. The computational results reveal that the proposed stochastic programming model produces solutions that are significantly better than the solutions provided by the deterministic-equivalent expected value approach.

Keywords
Semiconductor supply chain; stochastic programming; resource planning; supply chain management.

Biographies

Eghbal Rashidi is a faculty member of the Operations Management and Information Systems Department, Leavey School of Business, at Santa Clara University. He received his Ph.D. in industrial and systems engineering from Mississippi State University in 2016. He then worked as a postdoctoral research fellow at Clemson University. His research interests include network optimization, stochastic optimization, multilevel optimization, and integer programming. In particular, he is motivated by applications of operations research in supply chain management, transportation, homeland security, and scheduling. His research has been published in journals such as Naval Research Logistics, IISE Transactions, European Journal of Operational Research, Transportation Research Part E, and International Journal of Advanced Manufacturing Technology. He is an active member of INFORMS, and he received the INFORMS Judith Liebman Award in 2015.

Scott J Mason is the inaugural endowed chain in supply chain optimization and logistics in the Industrial Engineering Department at Clemson Unviersity. After working full time in the semiconductor industry, he began his academic career in the Department of Industrial Engineering at the University of Arkansas. At Arkansas, he served as Chair of Graduate Studies for nine years and as Associate Department Head for six years. He advised numerous undergraduate Honors and Master's theses, as well as doctoral dissertations in the areas of applied operations research and large-scale systems modeling, optimization, and algorithms. Dr. Mason is active in industrial engineering professional societies and brings excellent visibility to Clemson through his experience as a Technical

Vice President of Networking, Annual Conference General Co-Chair, and Senior Vice President of Continuing Education for the Institute of Industrial and Systems Engineers.