

Nominations for 2003 honors and awards are open until Dec. 1. For a nomination form or to submit a candidate, contact Bonnie Cameron at (770) 449-0461, ext. 105, or bcameron@iienet.org.

PROFILE OF A WINNER

Math in manufacturing

Industrial engineer's work is impacting factory design

When researcher Stanley Gershwin set out to study manufacturing systems, he had no idea his work would earn him two of IIE's prestigious awards in the same year. Gershwin won the *IIE Transactions Award* in design and manufacturing and the Outstanding IIE Publication Award for 2002.

The associate director of the Massachusetts Institute of Technology Laboratory for Manufacturing and Productivity, Gershwin develops quantitative models that calculate the performance of a system.

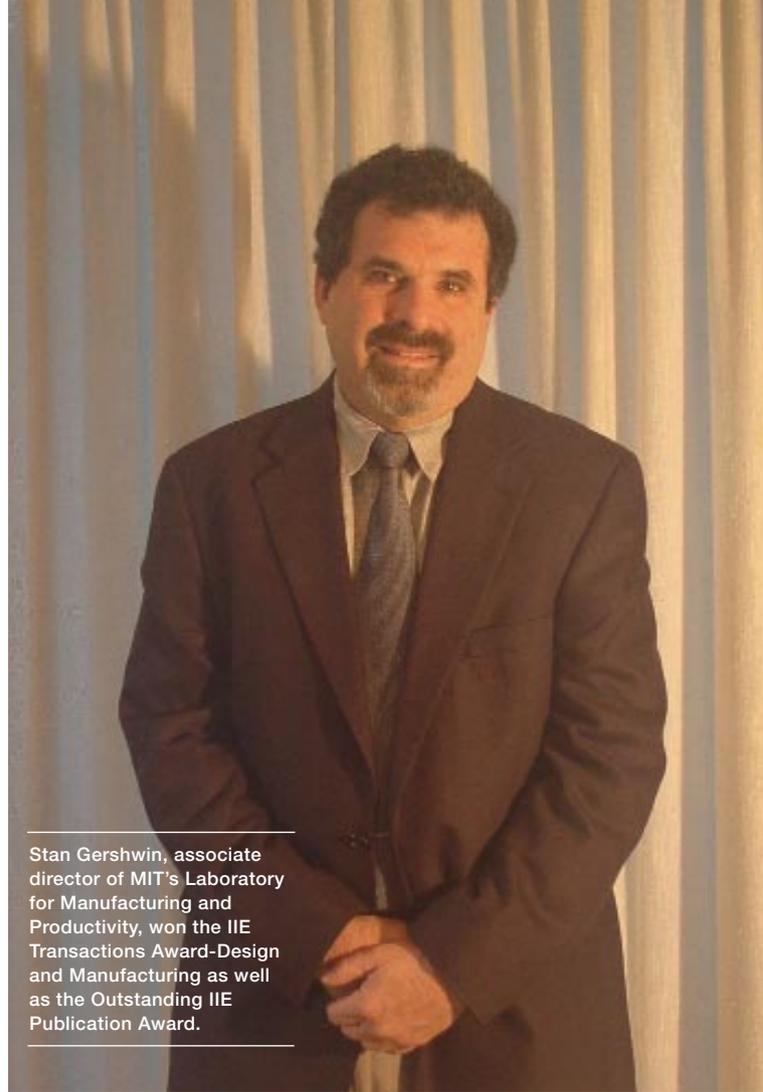
"The goal of my research is to develop the kind of models of factories that are analogous to what electrical engineers have for circuit diagrams," Gershwin said. "I'd like to be able to draw a schematic diagram of a factory showing the material flow with symbols that represent machines and buffers and include the operation times and reliability."

Gershwin doesn't envision his analytical methods replacing simulation modeling entirely but augmenting the tools available for designing and modifying systems. While simulation provides detailed analysis, it is often slow. In the beginning stages of a project, all the details necessary to make simulation models accurate aren't always available. With quicker analytical models, engineers could develop an overview of the system to decide about inventory levels and other issues, using simulation later in the process to refine the solution.

Gershwin's award-winning paper, titled "Design and Operation of Manufacturing Systems — The Control Point Policy," is a culmination of his research. It explores performance evaluation and real-time decision making for manufacturing systems.

Gershwin has dedicated more than 30 years to the investigation of factory variables, but relating the issues was no small feat.

"It was always clear to me that one could not deal properly with either issue without also treating the other, and [it was] a great



Stan Gershwin, associate director of MIT's Laboratory for Manufacturing and Productivity, won the IIE Transactions Award-Design and Manufacturing as well as the Outstanding IIE Publication Award.

source of frustration to me that I did not know how to do this," he said.

Collecting research funding was only one of the challenges Gershwin faced. In addition, collecting accurate data proved difficult.

According to Gershwin, reliability data is hard to gather because machines don't fail on a schedule, and when they do, it's for random lengths of time. Therefore, it takes a large amount of data to analyze and devise solutions. With the time and capital required for projects, defining the issue under analysis is even more important.

Gershwin graduated from Columbia University with a bachelor's degree in engineering mathematics. He continued his education at Harvard University, where he earned his M.A. and Ph.D. in applied mathematics. Following graduation, Gershwin worked for Bell Telephone Laboratories studying telephone hardware capacity.

When an opportunity to return to Cambridge, Mass., arose, Gershwin saw it as an opportunity to return to his roots.

"I've always been a mathematician at heart," Gershwin said. At the Draper Laboratory, Gershwin worked with companies such as Fiat exploring problems in manufacturing and transportation. Since then, Gershwin has been working on his research at various universities while simultaneously teaching and writing a book.

IIE isn't the only one taking notice of Gershwin's achievements. He explained, "This work is starting to have some impact on how people run factories."