

- **Project Title:** Using Simulation Modeling for Predicting the Performance of New AMHS Generation Technology in Semiconductor Wafer Fabs

Investigator: Jesse Jimenez

Department: Ingram School of Engineering

Project Summary:

The goal of this research was to study the tradeoffs between conveyor based and vehicle based automated material handling systems (AMHS). The idea was to compare the performance between these technologies in a virtual fabrication environment that replicates increasing wafer throughput requirements, as will be observed in the next generation of wafer fabs. Other factors under consideration include the conveyor speed, vehicle speed, number of vehicles, breakdowns, loading times, etc. An intrabay simulation model with five stations was developed in AutoMod. The results of the simulations indicate that conveyor systems show lower delivery time and greater storage capacity than vehicle systems.

The PI of this proposal was able to form a research team in AMHS research. The team includes faculty members from Texas A&M, University of Central Florida, and University of Puerto Rico-Mayaguez. This research topic was extended to the development of analytical based and simulation based models of conveyor systems. A conference article was submitted to the 2008 Winter Simulation Conference, and a proposal was submitted to the Materials Handling and Facilities Logistics program (sponsored by the Material Handling Industry of America). This research has also received advisory information from ASYST Technologies and Middlesex, two important AMHS manufacturers.

One undergraduate student and one graduate student were involved in this project. Both students gained experience in simulation modeling and analysis of AMHS. They presented the results of their research in the 2007 Undergraduate Research Conference at Texas State and in the 2008 INFORMS Southwest Research Conference at College Station, Tx.

Presentations:

Serna-Fuentes, J., Qui, L., Jimenez, and J.A. April 18, 2008. Simulation Analysis of OHT/CFT Performance in Semiconductor Wafer Fabs. INFORMS Southwest Regional Conference. College Station, TX.

External Grant Applied:

Nazzal, D., Carlo, H., Jimenez, J.A., and Johnson, A. May 15, 2008.
Comparative Study of Conveyors and Vehicle Material Handling in
Semiconductor Wafer Fabs. Submitted to the 2008 Material Handling and
Facilities Logistics Research. Funding agencies: Material Handling Industry of
America. Total Requested Amount: \$49,998.00

Student Number: 2