

# NEXT GENERATION LITHOGRAPHY AND THE MANUFACTURING FACILITY

*Shawn O'Rourke, Del E. Webb School of Construction, Arizona State University*

*Allan D. Chasey, Del E. Webb School of Construction, Arizona State University*

## ***Abstract***

To keep pace with Moore's law and the International Technology Roadmap for Semiconductors (ITRS), semiconductor manufacturers will have to utilize equipment with capabilities that go beyond that of today's 193nm optical lithography. The next generation of optical lithography is expected to be 157nm. While some new challenges are presented with each new generation of optical lithography, they are historically familiar issues. What lies beyond the use of 157nm lithography is unknown territory. The implementation of a next generation lithography (NGL) will have undetermined impacts upon the facility.

To date, much has been written about the NGL of choice. The industry seems to be leaning towards taking a path of 248nm-193nm-157nm-extreme ultra-violet lithography (EUVL). Some effort has also been given to surveying the industry in regards to when they believe they will utilize each NGL with no clear consensus. Furthermore, little attention has been paid to the facility impacts from these NGL's. An examination of the lithography demands laid out in the ITRS, along with the proposed lithography solutions at each node, allows the facility personnel to determine what manufacturing processes they need to be prepared to accommodate at each node. Facility impacts need to be determined for each process so that the facilities may be prepared. Issues concerning new process chemicals, safety, footprint, height, weight, and vibration criteria are all key

issues in facility design. These impacts have the ability to affect the construction process which is often part of the product-to-market time segment for new products. Delays in constructing the manufacturing facility could lead to a significant loss in market share.

The research objectives are to identify future process technologies, determine when these technologies will be introduced into the facility, and determine what impacts this will have upon the facility. The purpose of this paper is to identify impacts to facility design and construction stemming from the eventual implementation of new process technologies, specifically the next generation lithography.