

Optimized Reticle Management Used To Decrease the Impact of Strictly Dedicated Photo Lithography Tools

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Since its transition from microprocessor to Flash memory production, Fab25 in Austin, TX, has significantly increased wafers starts and the number of products that it produces. With the increased WIP, product mix, and rate at which new products are introduced into the factory, it was essential to increase the flexibility of available capacity. This was primarily a challenge in the Photolithography area, where strict product and layer dedications are induced by critical dimension, overlay tolerances, resist restrictions, and tool capability. In order to maximize operational flexibility without violating any of these constraints, a load-balancing method was needed to determine optimal tool dedications. Reticle and reticle pod setup, availability, and tracking confounded the problem in the Litho area. In response to this, a reticle management system was designed and implemented to overcome these challenges.

The reticle management system attempts to maximize output of the desired product mix with a minimal number of reticle and reticle pod moves. With multiple reticles stored in a reticle pod, it is preferable that all the reticles in the pod share common characteristics such as resist, track recipe, and tool dedication. It is also necessary to ensure that the sum of all activities required from the reticles in a pod does not exceed one tool's worth of capacity for those reticles. Fab25 has a system in place to forecast WIP movement and required activities for a given period of time. This system provides the necessary data to perform the load-balancing calculations. The reticle management system uses this data in addition to tool qualification information to determine the optimal location for each reticle and store that as the reticle's desired pod. This information is then communicated to a dedicated reticle operator. A similar calculation is performed on a shift basis. Determining what specific reticle and/or pod moves should be made requires tracking of current reticle and pod locations. Reticle tracking methods, such as auto logging of reticles when read by a stepper, bar coding of reticle pods, and strategically placed reticles and pod storage units in the fab, facilitates identifying and logging this information into a database. Comparing the desired locations of reticles and reticle pods to their current locations allows for easy reporting of what reticle and reticle pod moves are needed to maximize output of the area. All of this information is compiled into one report that is easily visible to the manufacturing floor. The report simply tells the operator where and when to put a reticle pod on a tool.

Any litho-constrained factory must effectively manage their reticles and maintain operational flexibility if they want to maximize output. The focus on operational flexibility and development of a reticle management system in Fab25 solved these problems and has been a major contributor to the increase in Fab25 Litho tool productivity.