Productivity Improvements through Range Management Dispatching in 300mm Wafer Manufacturing

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This abstract describes the formulation and implementation of a Range Management system for lot dispatching in an automated 300mm fab. The Range Management system was implemented in IBM's 300mm fab located in E. Fishkill, NY. The fab processes a diverse mix of low and high volume production technologies in conjunction with processing development hardware for future technologies. The implementation of an equitable dispatching system is required to move production and development wafers through the fab at comparable cycle times which results in improved productivity and reduced variability in customer deliverables.

The key components of the dispatching system include grouping of similar routes into flows and subsequently dividing each flow into equal cycle time ranges. All WIP within each range is within one day of completing the range and moving to the next range. Range targets are set for each range considering the amount of WIP in the current range and in the next range. The goal is to dispatch WIP in a way so as to reduce the variability of WIP across the ranges. Based on the targets for each range, the dispatching algorithm identifies each lot that needs to exit a range and prioritizes the lots. The range priority considers a combination of factors, such as delta to range target and entry time into the operation, to create a unique combination string priority, for each lot in the fab. The range priority is calculated across all technologies and provides a common parameter that is used in dispatching. The lots are reprioritized every half an hour to adjust for changes in WIP. The range priority system is implemented in RTD (Real Time Dispatcher) and is also used with ILOG scheduling software.

Since the implementation of the Range dispatching system the closed lot cycle time has reduced by 33% and the distribution of cycle time has improved by 2.5x. The reduced cycle time has greatly improved productivity and yield learning.