

Capacity planning with sequential time constraints under various control policies in the back-end of wafer fabrications

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Abstract

To ensure final product yield, engineers have to set up queue time limits for particular sequential machines during wafer processing; we name these as 'sequential time constraints' (STCs). This issue can be observed at the back-end of the copper interconnect process. Moreover, wafers can only be scrapped or given a mark, but cannot be reworked, when queue time limits are exceeded at these stages. To eradicate difficulties with STCs, capacity planning must be addressed. This study presents a capacity determination model employing the GI/G/m queuing model to eliminate the difficulties caused by STCs. The probability that waiting time exceeds queue time constraints under a certain capacity level can be calculated by proposed model. Hence, we can get the required capacity that can achieve the probability target set in advance. Furthermore, the inferences of different control policies on capacity planning are discussed. The proposed model is also adjusted to calculate the effects and determine required capacity under various policies. The simulation experiments support that the proposed could resolve the issues of STCs effectively. Moreover, under various control rules, the experiments results indicate that different capacity level may not be required, but varied performance will be performed.

Keyword : capacity planning; sequential time constraints; queuing model; simulation; wafer fabrication