

# Management Model for Storage Areas of Automated Material Handling Systems in Semiconductor Fab

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## Abstract

300mm wafer fab is an extremely automation intensive factory. Furthermore, both process restrictions and the functions of the AMHS (Automated Material Handling System) storage buffer are increased significantly due to the rapid migration of wafer process development over the past years. As a result, the functions of the AMHS temporary storage area have also increased. In addition to the temporary storage of products, storage buffer is also necessary to fill the FOUP with nitrogen and be responsible for wafer merging and splitting functions. If AMHS storage buffer does not have a thorough management and control, it will affect the flow of on-site production and impact the efficiency of production badly.

In this work, a comprehensive management and control mechanism for the WIP storage buffer is proposed. It includes two major functions: OHB reallocation and real-time assignment of storage location. The reallocation of OHB is divided into two parts: with or without nitrogen filling function. OHB with nitrogen filling function is allocated to the type of continuously filled with nitrogen first. Based on the distribution of WIP, turnover rate of technology, penetration mechanism and queueing theory is applied to estimate the required capacity of OHB with continuously filled nitrogen. The remaining capacity is used as a refilling station. As for the OHB without nitrogen filling function, it is allocated to each workstation according to the distribution of WIP and the characteristics of the workstation. Regarding to the real-time assignment module, rule base is used and FOUP will be assigned to the main temporary storage area according to the results of original plan. However, if the main temporary storage area is full, a suitable backup temporary storage area will be searched accordingly. Production efficiency, avoiding re-movements and fully utilized of stocker's capacity are the major targets of assignment. It is hoped that through this comprehensive control mechanism, 300mm wafer fab can operate more effectively on AMHS, thereby enhancing the overall production efficiency.

**Keywords:** Wafer fabrication, Automated Material Handling System, WIP Storage Areas