Applying fuzzy failure mode and effects analysis on the process of semiconductor foundry

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ABSTRACT

The process of semiconductor is considered complex as a large of manpower and cost are required. In this case, how to effectively control and advance the yield of wafers that most important issue at present. Previous studies were rather insufficient on the yield of wafer process as they focused on the issues of equipment maintenance and human dispatch. This study aims to find the key factors of wafer yield failure by failure mode and effects analysis (FMEA). Traditional calculations in FMEA are existed in many problems depended on the experiences of engineers as well as specific quantizing values were insufficient that resulted in significant difference between research results and actual processes. Many experts proposed revisions for the calculations in failure mode; however, the probabilities of occurrence were not evaluated with practical values. This concept of Fuzzy Theory with quantizing values in actual processes with process modifications and improvements. Research findings on traditional calculation sequencing of risk priority number (RPN), proposed in the fourth revision of FMEA, failed to definitely identify improvement-priority sequence after the case studies. This study re-calculates and further sorts by replacing severity and in-detection in failure mode with Fuzzy linguistic variables and obtaining occurrence from the yield transformation in wafer process, In this case, the research results are more complete and are able to accurately distinguish the priority sequencing of key failures.

Keywords : failure modefailure mode and effects analysis, Fuzzy theory, semiconductor

Table of Contents

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