SEMEEE308

Monitoring and analysing data from semiconductor processes

Overview

This standard identifies the competences you need to monitor and analyse data from semiconductor manufacturing processes, in accordance with approved procedures. You will be required to access the appropriate specifications, to check that they are of the latest issue and to extract all necessary information, in order to monitor and analyse data from a wafer fabrication or die assembly and test process. You will be expected to use approved organisational procedures to collect and analyse the semiconductor process data and to present this in an approved format. You will also be expected to produce reports of your monitoring and analysis of data (which may include functional D°, process yield, process capability (Cpk), cycle time), which was collected using appropriate tools and methods (such as statistical process control (SPC) and failure mode and effect analysis (FMEA)).

Your responsibilities will require you to comply with organisational policy and procedures for the monitoring and analysing semiconductor processes and to report any problems with these activities that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work with a minimum of supervision, taking personal responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work and will provide an informed approach to applying monitoring/analysis procedures to semiconductor manufacturing processes. You will understand the organisational requirements and procedures for monitoring and analysing data and their application and you will know about the specific semiconductor process being monitored, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

You will understand the safety precautions required when working in a semiconductor-processing environment and with the equipment that is used. You will be required to demonstrate safe working practices throughout and will understand the responsibility you owe to yourself and others in the workplace.

Performance criteria

You must be able to:

P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

P2 ensure the test data for the analysis is available

P3 resolve any inconsistencies in the data

P4 analyse the data using approved methods and procedures

P5 check that the data analysis is accurate, thorough and takes account of the test conditions

P6 compare the analysis against the product or asset specification and identify any faults or variations from specification

P7 deal with problems within your control and report those that cannot be solved

P8 complete and store all relevant documentation in accordance with organisational requirements

P9 leave the work area in a safe condition on completion of the activities, as per organisational requirements

Knowledge and understanding

You need to know and understand:

K1 how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

K2 the importance of wearing the appropriate personal protective equipment (PPE), and of keeping the work area clean and tidy

K3 how to obtain the authority to enter the relevant work areas and any specific permit-to-work procedures that are used

K4 how to obtain and use specifications for the product, assets or processes being monitored/analysed

K5 the basic operating principles of other semiconductor processes and how they relate to the particular area in the process being monitored and analysed

K6 related processes in other areas of a semiconductor facility undertaking wafer processing and die assembly/test processes

K7 the tools, methods and techniques used to monitor and analyse semiconductor processes and how to use them for the process being monitored and analysed

K8 how to explain the terms and how to calculate mean, median, mode, standard deviation, range and variance

K9 how to explain and calculate process capability (Cp and Cpk)

K10 the meaning of a failure mode, failure effect or failure cause

K11 the rating scale used in potential failure modes and effects projects (to include the severity rating scale, the occurrence rating scale and the detection rating scale)

K12 how to calculate and use risk priority numbers (RPN)

K13 how to carry out a design of experiment project and the tools and techniques used

K14 where to obtain the data required to carry out the design of experiment

K15 how to calculate the sample size to be used in the design of experiment

K16 explain meant by Alpha risk and Beta risk

K17 the formats and levels of detail required for recording and preparing reports for the relevant categories of data being monitored/analysed

K18 the methods for the presentation of data

K19 how and why experiments are designed and implemented and by whom

K20 the issues that can occur with the data monitoring and collection activities and how they can be avoided

K21 the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

K22 how to access, use and maintain information to comply with organisational requirements and legislation

Scope/range related to performance criteria

1. Monitor and analyse data, by carrying out all of the following activities:
    1.1 use the correct issue of drawings, job instructions and specifications
    1.2 adhere to health and safety regulations, systems and procedures to realise a safe system of work follow clean room/work area protocols
    1.3 carry out all activities in line with organisational procedures
    1.4 store records of the data analysis in accordance with appropriate procedures
2. Monitor and analyse data for one of the following wafer processing or die assembly/test area processes:
    2.1 photolithography
    2.2 final inspection/probe
    2.3 mould
    2.4 etching (wet/dry)
    2.5 wafer saw
    2.6 trim/form
    2.7 diffusion
    2.8 die fix
    2.9 debled mark/plate
    2.10 deposition
    2.11 wire bond
    2.12 test
    2.13 implantation
    2.14 other process (specify)
3. Use monitoring and analysis methods and procedures which satisfy all of the following:
    3.1 quality requirements (such as statistical process control (SPC), failure mode effect analysis (FMEA))
    3.2 the frequency of the monitoring and analysis required
    3.3 the aspects, characteristics and complexity of data being monitored/analysed (such as functional D°, process yield, process capability (Cpk), cycle time)
    3.4 applying various designed experiments
4. Prepare reports for monitoring/analysis purposes, which include three of the following:
    4.1 customer reports
    4.2 design of experiments
    4.3 manufacturing data
    4.4 process control data
    4.5 quality control data

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