SEMEEE312

Monitoring and analysing data from electronic circuit manufacturing processes

Overview

This standard identifies the competences you need to monitor and analyse data from manufacturing processes associated with the fabrication and assembly of electronic circuitry, based on printed board, thick, thin or flexible film technologies, in accordance with approved procedures. In particular, you will be expected to satisfy a range of generalised activity support requirements, such as observing permit-to-work procedures, following any clean work area protocols, selecting and using suitable analytical tools, recording data and preparing reports.

You will be expected to use approved organisational procedures to monitor, collect, analyse and report on your interpreted findings from at least one of the areas of circuitry processing activity outlined. 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 of electronics manufacturing activities 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 full 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 data monitoring and analysis procedures. You will understand the organisational needs for such data and will know about the relevant circuit processing techniques, 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 an electronic circuit manufacturing environment and with the associated equipment. 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 test data on which to conduct 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 and 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 what constitutes a hazardous voltage and how to reduce the risks of a phase to earth shock

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

K5 how circuitry and its features are specified and the limitations of the different types of materials used

K6 the basic operation of the associated processes and process equipment and how they relate to the particular area of the process being monitored and analysed

K7 the issues that can arise in the processing of the types of circuitry involved

K8 the monitoring/analysis tools, methods and techniques used by the organisation for the relevant work and how to implement them in the given work areas

K9 the terms and how to calculate mean, median, mode, standard deviation, range and variance

K10 how to calculate process capability (Cp and Cpk)

K11 the meaning of a failure mode, failure effect or failure cause

K12 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

K13 how to calculate and use risk priority numbers (RPN)

K14 how to carry out a design of experiment project and the tools and techniques used

K15 where to obtain the data required to carry out the design of experiment

K16 how to calculate the sample size to be used in the design of experiment

K17 what is meant by Alpha risk and Beta risk

K18 the issues that can occur with the monitoring and analysis activities and how they can be avoided

K19 the formats for recording and preparing reports for the relevant categories of data being monitored/analysed and the levels of detail required including handover and batch control

K20 suitable methods for data presentation

K21 how to obtain the authority to enter the relevant work areas and any specific permit-to-work procedures that are used

K22 the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

K23 how to access, use and maintain information to comply with organisational requirements and legislation

Scope/range related to knowledge and understanding

1. Comply with all of the following support requirements during the data monitoring and analysis 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
    1.3 follow clean work area protocols, where appropriate
    1.4 carry out all activities in line with organisational procedures
    1.5 create and store records of monitoring and analysing data, in accordance with appropriate procedures
2. Monitor and analyse data for one of the following manufacturing processes:
    2.1 printed circuit boards
    2.2 screen printing
    2.3 circuit cleaning
    2.4 thin film circuits
    2.5 component masking
    2.6 hand soldering
    2.7 thick film circuits
    2.8 auto-insertion/placement
    2.9 laser trimming
    2.10 flexible film circuits
    2.11 flow/re-flow soldering
    2.12 glazing
    2.13 wirebonding
    2.14 encapsulation techniques
3. Use monitoring and analysis methods and procedures that satisfy all of the following:
    3.1 quality requirements (such as statistical process control (SPC), failure mode effect analysis (FMEA))
    3.2 the required frequency of the monitoring and analysis
    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 and store records of findings covering three of the following categories:
    4.1 customer reports
    4.2 designed experiment
    4.3 manufacturing data
    4.4 process control data
    4.5 quality control data

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