SEMBIT3-25 - SQA Unit F9J4 04
Carrying out measurement systems analysis (MSA)

Overview

This unit covers the competences required for carrying out measurement systems analysis (MSA). It involves selecting an appropriate measurement system on which to carry out the analysis, and obtaining all the necessary data in order to carry out the measurement systems analysis. You will be expected to apply the principles and processes of measurement system analysis, which will include such things as completing a calibration study on a gauge, conducting a gauge linearity study, completing either an attribute or a variable gauge repeatability and reproducibility study, conducting a metrology study on a measurement system which includes either a variable or attribute gauge repeatability and reproducibility study.

You will be required to carry out the analysis using the appropriate techniques, and to record the results of the analysis in the appropriate format. From this information, you will need to determine the percentage gauge repeatability and reproducibility of the measurement system under study, and to produce a detail report suggesting ways in which the measurement system might be improved.

Your responsibilities will require you to comply with organisational policy and procedures for the activities undertaken, and to report any problems with the activities that you cannot solve, or that are outside your responsibility, to the relevant authority. You will need to ensure that all the necessary documentation is completed accurately and legibly. You will be expected to take full responsibility for your own actions within the activity, and for the quality and accuracy of the work that you produce.

Your underpinning knowledge will provide a good understanding of measurement systems analysis, and will provide an informed approach to the techniques and procedures used. You will need to understand the principles and application of MSA, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying safe working practices will be a key issue throughout.

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Performance criteria

You must be able to:

- P1 work safely at all times, complying with health and safety and other relevant regulations and guidelines
- P2 select an appropriate measurement system on which to carry out the analysis
- P3 obtain all the necessary data in order to carry out the measurement systems analysis
- P4 carry out the analysis, using the appropriate techniques
- P5 record the results of the analysis in the appropriate format
- P6 determine the percentage gauge repeatability and reproducibility of the measurement system under study, and suggest ways of improving the measurement system
- P7 produce a measurement systems analysis report, detailing ways of improving the measurement system under study

SEMBIT3-25 - SQA Unit F9J4 04
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Knowledge and understanding

You need to know and understand:

K1 the health and safety requirements of the area in which you are carrying out the measurement systems analysis

K2 why we should study our measurement systems

K3 how to select a measurement system for analysis

K4 the possible sources of measurement systems variation

K5 the use of measurement systems analysis, and how it can be used in a Six Sigma improvement project

K6 how to conduct a variable and a attribute repeatability and reproducibility study

K7 the terminology used in measurement system analysis (such as bias, linearity, stability, accuracy, repeatability, discrimination, resolution, reproducibility)

K8 how to conduct a measurement systems analysis study

K9 how to calculate gauge repeatability and reproducibility

K10 how to calculate gauge precision and tolerance

K11 industry rules for repeatability and reproducibility results

K12 the extent of your own authority within the project, and to whom you should report in the event of problems that you cannot resolve

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Additional Information

Scope/range related to performance criteria

You must be able to:

1. carry out a measurement system analysis, which includes **three** from the following:
   - 1.1. completing a calibration study on a gauge
   - 1.2. conducting a gauge linearity study
   - 1.3. completing either an attribute or a variable gauge repeatability and reproducibility study
   - 1.4. conducting a metrology study on a measurement system which includes either a variable or attribute gauge repeatability and reproducibility study
2. determine the type of measurement system variation, to include **two** of the following:
   - 2.1. bias
   - 2.2. linearity
   - 2.3. stability
   - 2.4. accuracy
   - 2.5. repeatability
   - 2.6. reproducibility

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