



T Level Technical Qualification in Science

Occupational specialism assessment (OSA)

Metrology Sciences

Assignment 2

Assignment brief

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Contents

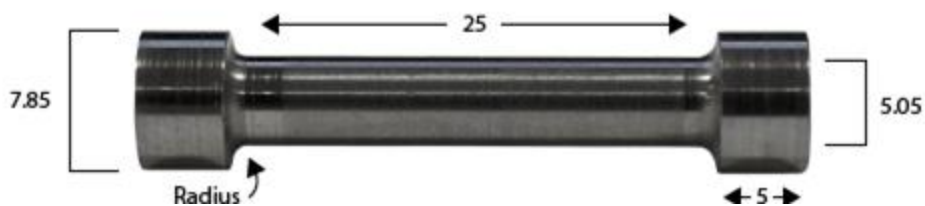
Task 1: writing a metrology plan	3
Scenario	3
Task.....	3
Task 2: conducting metrology measurements and basic repairs	4
Scenario	4
Task.....	4
Task 3: interpreting metrology measurement results	6
Scenario	6
Task.....	6
Document information	7
Change History Record.....	7

Task 1: writing a metrology plan

Scenario

The company you work for need to produce large volumes of simple steel machined parts, produced by CNC turning machines. They operate a Six Sigma lean manufacturing system and are testing CNC machining centres using statistical process control to establish which machines are compliant for these parts. The parts are tensile test specimens to BS EN ISO 6892 for Hounsfield/TQ tensometers.

You will be provided with a sample (minimum 25) of 100 parts from a production run on the same machine using the same materials and tooling. All measurements are in millimetres.



Task

From the above drawing, create a working instruction detailing your plan. Your plan should include:

- how you will inspect every critical feature
- your sampling method to ensure all aspects are recorded
- the data collection method selected
- creation of a suitable uncertainty budget
- how you will ensure calibration of equipment selected
- appropriate tooling and equipment selection, with justification, taking into consideration the relative uncertainty of measurement of the equipment selected for each measurement
- how you will ensure environmental factors are dealt with
- how you will be minimising the impact of hazards and complying with relevant health and safety law and legislation
- any other relevant inclusions

(29 marks – 9 marks assigned to the uncertainty calculation)
(2 hours 30 minutes)

Task 2: conducting metrology measurements and basic repairs

Scenario

Your plan has been accepted by the company and is now used as the working instructions for measuring these parts. You have received the first batch of manufactured components to measure.

Task

Measure a sample (minimum 25) of the 100 parts supplied, using one of the methods planned.

Record all results in a suitable format.

Repair all possible errors or damage in equipment and produced parts.

While undertaking the measurement of each part, you should ensure the accuracy of your instruments by checking, maintaining, repairing and recalibrating them as you proceed.

Errors, faults and breakages beyond the reasonable expertise of the operator to repair or otherwise beyond standard operating procedures (SOPs) should be quarantined as per company policy.

You must complete the following:

- prepare your sample and tooling appropriately
- maintain equipment throughout the process
- record all data, making notes as appropriate, especially if you need to undertake unplanned activity
- update the plan if additional activity is required
- quarantine or dispose of faulty equipment beyond your scope

(36 marks)
(2 hours 30 minutes)

Before the task

The assessor must:

- remind the student that all health and safety procedures must be followed during the assessment
- ask the student to locate all relevant safety equipment, risk assessment and/or relevant health and safety procedures specific to the individual work area

After the task

The assessor must complete the assessor checklist prior to marking the rest of the task. All essential criteria must be checked and signed by the assessor.

In the event a student performs a task in an unsafe manner, the assessor may stop the assessment, and the student will not be able to complete the assessment at this time. An unsafe manner is any action that may cause

harm to the student or anyone else within the same environment, or any action that may damage any equipment being used.

Task 3: interpreting metrology measurement results

Scenario

You have completed the inspection of a sample of manufactured components. You must report on your findings to provide feedback on the current manufacturing process.

Task

Using the datasets created and tabulated from task 2, you should select 3 key features. For each of these features you must complete the following:

- determine the mean, mode and the standard deviation (SD) for each selected feature
- plot the standard bell curve normal distribution for each selected feature
- determine the 6 SD (1, 2 and 3 sigma) tolerance for each selected feature

Produce a report on the capability of the production method based on all of your results from task 2.

Your report should include:

- key data relating to accuracy of the machining process
- any errors encountered
- any recommendations for future improvement in the process that will help increase the accuracy of the results, with justification
- any other relevant inclusions

(39 marks)
(2 hours)

Document information

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Change History Record

Version	Description of change	Approval	Date of Issue
v1.0	Post approval, updated for publication.		January 2021
v1.1	NCFE rebrand.		September 2021