

-SQA- SCOTTISH QUALIFICATIONS AUTHORITY

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION

GENERAL INFORMATION

-Module Number-	2270884	-Session-1994-95
-Superclass-	WD	
-Title-	INSPECTION: PRINCIPLES OF NON-DESTRUCTIVE TESTING (x¹/l₂)	

-DESCRIPTION-

GENERAL COMPETENCE FOR UNIT: Understanding the principles and general applications of the main methods of non-destructive testing.

OUTCOMES

1. identify the reasons for inspection and non-destructive testing;
2. explain the principles of non-destructive testing;
3. prepare an exemplar technique for a selected NDT method making appropriate use of standards/specifications which determine inspection and quality acceptance criteria;
4. comply with regulations, procedures and safe working practices specified for the use of NDT methods in workshops and laboratories.

CREDIT VALUE: 0.5 NC Credit

ACCESS STATEMENT: Access to this unit is at the discretion of the centre, though it is preferred that the candidate has achieved 64050 Introduction to Materials.

For further information contact: Committee and Administration Unit, SQA, Hanover House, 24 Douglas Street, Glasgow G2 7NQ.

Additional copies of this unit may be purchased from SQA (Sales and Despatch section). At the time of publication, the cost is £1.50 (minimum order £5).

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION**STATEMENT OF STANDARDS****UNIT NUMBER:** 2270884**UNIT TITLE:** INSPECTION: PRINCIPLES OF NON-DESTRUCTIVE TESTING

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

OUTCOME

1. IDENTIFY THE REASONS FOR INSPECTION AND NON-DESTRUCTIVE TESTING

PERFORMANCE CRITERIA

- (a) Identification of the reasons given for inspection and non-destructive testing is correct and relates to quality assurance.
- (b) Identification of the inter-relationships between the goals of efficiency, safety and quality at an acceptable cost is clear and concise.

RANGE STATEMENT

Workmanship standards; fitness-for-purpose standards; quality assurance.

Quality levels and verification; failure prevention; rework; cost factors.

EVIDENCE REQUIREMENTS

Written and/or oral evidence that the candidate understands the reasons for inspection and non-destructive testing.

OUTCOME

2. EXPLAIN THE PRINCIPLES OF NON-DESTRUCTIVE TESTING

PERFORMANCE CRITERIA

- (a) Explanation of the principles of non-destructive testing for the detection of surface breaking flaws is correct.
- (b) Explanation of the principles of non-destructive testing for the detection of sub-surface flaws is correct.

RANGE STATEMENT

Surface breaking flaws - NDT methods: visual; penetrant; magnetic particle; eddy current.

Sub-surface flaws - NDT methods: radiography; ultrasonic.

EVIDENCE REQUIREMENTS

Performance evidence on a selected component/product using visual examination, one NDT method for the detection of surface breaking flaws and one NDT method for the detection of sub-surface flaws.

Supplementary oral/written questioning to determine that the principles of the named NDT methods, in the range statement are correctly understood.

OUTCOME

3. PREPARE AN EXEMPLAR TECHNIQUE FOR A SELECTED NDT METHOD MAKING APPROPRIATE USE OF STANDARDS/SPECIFICATIONS WHICH DETERMINE INSPECTION AND QUALITY ACCEPTANCE CRITERIA

PERFORMANCE CRITERIA

- (a) Identification of technique factors for either the penetrant or magnetic particle inspection methods is correct in accordance with appropriate standards.
- (b) Preparation of the technique for the selected NDT method is correct in terms of the selected component/product.

RANGE STATEMENT

Technique factors: surface condition; consumables; equipment; calibration; test parameters; inspection; acceptance criteria; post inspection; cleaning.

Technique sheet: inspection stages; drawing of component/product; related information.

EVIDENCE REQUIREMENTS

Performance evidence that the non-destructive test on the component/product, preferably that used for Outcome 2, to the prepared technique is satisfactory. Spoken or written explanation of the application of the NDT technique.

OUTCOME

4. COMPLY WITH REGULATIONS, PROCEDURES AND SAFE WORKING PRACTICES SPECIFIED FOR THE USE OF NDT METHODS IN WORKSHOPS AND LABORATORIES

PERFORMANCE CRITERIA

- (a) Applications of working practices are safe and in accordance with Health and Safety regulations.
- (b) Applications of all necessary safety clothing and protective accessories are correct.
- (c) Explanation of the safety aspects in the use of ionising radiations, X and gamma is correct.

RANGE STATEMENT

Working practices: visual; magnetic particle; penetrants; ultrasonic NDT.

Safety clothing: overalls; footwear; safety glasses; other appropriate accessories.

Ionising radiations: X and gamma methods of NDT; safety criteria.

EVIDENCE REQUIREMENTS

Performance evidence that practical application of NDT methods, (visual, magnetic particle, penetrant and ultrasonic) are carried out safely and in accordance with health and safety regulations.

Written and/or oral evidence that the candidate understands the safety criteria that must be observed when using ionising radiations.

ASSESSMENT

In order to achieve this unit, candidates are required to present sufficient evidence that they have met all the performance criteria for each outcome within the range specified. Details of these requirements are given for each outcome. The assessment instruments used should follow the general guidance offered by the SQA assessment model and an integrative approach to assessment is encouraged. (See references at the end of support notes).

Accurate records should be made of the assessment instruments used showing how evidence is generated for each outcome and giving marking schemes and/or checklists, etc. Records of candidates' achievements should be kept. These records will be available for external verification.

SPECIAL NEEDS

In certain cases, modified outcomes and range statements can be proposed for certification. See references at end of support notes.

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NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION**SUPPORT NOTES**

UNIT NUMBER: 2270884

UNIT TITLE: INSPECTION: PRINCIPLES OF NON-DESTRUCTIVE TESTING

SUPPORT NOTES: This part of the unit specification is offered as guidance. None of the sections of the support notes is mandatory.

NOTIONAL DESIGN LENGTH: SQA allocates a notional design length to a unit on the basis of time estimated for achievement of the stated standards by a candidate whose starting point is as described in the access statement. The notional design length for this unit is 20 hours. The use of notional design length for programme design and timetabling is advisory only.

PURPOSE SQA publishes summaries of units for easy reference, publicity purposes, centre handbooks, etc. The summary statement for this unit is as follows:

This unit will enable you to develop your understanding of inspection and non-destructive testing methods and processes. On completion of this unit you will be able to compare these methods with a view to selection on the basis of application, cost and quality of information.

CONTENT/CONTEXT Corresponding to Outcomes 1-4:

- 1-4. All outcomes should be taught in the context of the lecture room and the workshop. The workshop should be equipped with the NDT methods covered in the unit.
1. The principles should be taught in the lecture room and supported by demonstrations in the workshop. Reference should be made to the consequences of failure of engineering materials, components and structures and the role of inspection and non-destructive testing in their prevention. In this respect inspection and non-destructive testing should be seen as a key link in the quality chain. Case study evidence could be used.
2. The principles should be taught in the lecture room and supported by demonstrations in the workshop.

Demonstrations should show the importance of, and applicability to, the detection of surface breaking flaws and sub-surface flaws in component/products.

The principles of each NDT method could be developed to underpin the applications area and so the advantages and limitations.

3. The preparation of an exemplar technique while noting overall procedural criteria should be workshop based with due account being taken of the stages in the inspection, the importance of each stage, safety aspects and related British Standards.

The technique should be applied to a component/product, preferably one already used for Outcome 2, to demonstrate its capability.

4. Reference to Health and Safety Regulations and British Standards will be a core part of the formal lectures to support this outcome. It is recognised that the "practical element" will be a core part of Outcomes 2 and 3 and so there is opportunity for the assessment process to be integrated to support the application methodology of non-destructive testing.

APPROACHES TO GENERATING EVIDENCE A combination of formal lecture, candidate-centred learning and practical work is recommended. The use of assignments during which the candidate's observations on demonstrations by the tutor/trainer or technician should be used to measure the candidate's progress in evaluating non-destructive testing information. These assignments should be used together with written evidence to evaluate the candidate's progress and achievements. Likewise the candidate's performance can be measured by practical work.

Where the candidate is unsuccessful in achieving an outcome, provision should be made for remediation and re-assessment.

ASSESSMENT PROCEDURES Centres may use the Instruments of Assessment which are considered by tutors/trainers to be the most appropriate. Examples of Instruments of Assessment which could be used are as follows:

Outcome 1 Multiple choice answer questions or short written/verbal explanations, as appropriate, to justify selection of each answer could be used to determine the candidate's knowledge of the reasons for inspection and non-destructive testing. The assessment could consist of ten questions, five for each performance criterion.

Outcome 2 Multiple choice answer questions or short written/verbal explanations as appropriate to justify the selection of each answer could be used to determine the candidate's knowledge of the principles of non-destructive testing. Five questions could relate to methods best suited for surface breaking flaws and five questions to methods best suited for sub-surface flaws.

One written assignment on a practical situation requiring the candidate to demonstrate familiarity and understanding with penetrant and/or magnetic particle inspection and ultrasonic examination.

Outcome 3 The preparation of a technique within the context of a procedure by the candidate could form the key aspect of this assessment. It is suggested that this be for either penetrant or magnetic particle inspection and takes into account the appropriate British Standards. It would be appropriate for the integration of the assessment process to use the component/produce used for the NDT method to satisfy Outcome 2.

Outcome 4 Multiple choice answer questions or short written/verbal explanations to justify the selections of each answer could be used to determine the candidate's knowledge of safe working practices. Ten questions are recommended for this purpose.

The assessment should be supported by observation by the tutor/trainer of the candidate's method of working in the practical situation. A checklist might be used for this purpose.

PROGRESSION This module contributes to the SVQ level III, Joining Materials by Welding.

RECOGNITION Many SQA units are recognised for entry/recruitment purposes. For up-to-date information see the SQA guide 'Recognised and Recommended Groupings'.

REFERENCES

1. Guide to unit writing.
2. For a fuller discussion on assessment issues, please refer to SQA's Guide to Assessment.
3. Procedures for special needs statements are set out in SQA's guide 'Students with Special Needs'.
4. Information for centres on SQA's operating procedures is contained in SQA's Guide to Procedures.
5. For details of other SQA publications, please consult SQA's publications list.

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