-SQA- SCOTTISH QUALIFICATIONS AUTHORITY

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION

GENERAL INFORMATION

-Module Number- **2260304** **-Session- 1994-95**

-Superclass- **VF**

-Title- **INTRODUCTION TO CAD/CAM ($x^1/_2$)**

-DESCRIPTION-

GENERAL COMPETENCE FOR UNIT: Identifying the integration between CAD and CAM.

OUTCOMES

1. identify the major elements of a CAD/CAM system;
2. produce CAD data for a given component;
3. transfer data from CAD to CAM;
4. produce CAM data for a given component.

CREDIT VALUE: 0.5 NC Credit

ACCESS STATEMENT: No formal entry qualifications.

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: 2260304

UNIT TITLE: INTRODUCTION TO CAD/CAM

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 MAJOR ELEMENTS OF A CAD/CAM SYSTEM

PERFORMANCE CRITERIA

(a) Each of the elements of a CAD station is correctly identified.
(b) Each of the elements of a CAM station is correctly identified.

RANGE STATEMENT

Elements: CPU; VDU; keyboard; mouse/digitiser; software; plotter/printer; post processor(s); cnc machine(s).

EVIDENCE REQUIREMENTS

Oral or written evidence of the candidate's ability to identify all the elements in the range statement.

Supplementary oral evidence to ensure the candidate differentiates between the CAD and CAM system.

OUTCOME

2. PRODUCE CAD DATA FOR A GIVEN COMPONENT

PERFORMANCE CRITERIA

(a) Each of the elements within the range statement can be produced correctly.
(b) The shape of the given component is produced correctly using any combination of elements in the range statement.
(c) Using the data generated, an accurate hard copy is produced of the given component.

RANGE STATEMENT

Elements: grids; layers; lines; circles; arcs; fillets; erase; trim; dimensions.

Equipment: CAD station; printer/plotter.

EVIDENCE REQUIREMENTS

Performance evidence of the candidate's ability to produce a plot/print of given component.

OUTCOME

3. TRANSFER DATA FROM CAD TO CAM

PERFORMANCE CRITERIA

(a) CAD data is correctly processed into a suitable data exchange format.
(b) CAD data is transferred into CAM software correctly using a suitable transfer medium.

RANGE STATEMENT

The range is fully covered within the performance criteria.

EVIDENCE REQUIREMENTS

Performance evidence of the candidate's ability to process CAD data into any one of the following formats - DXF, DXB, IGES or any other suitable data exchange format.

Performance evidence of the candidate's ability to transfer CAD data into CAM software using any of the following mediums - internal software, RS 232 or floppy disc.

OUTCOME

4. PRODUCE CAM DATA FOR A GIVEN COMPONENT

PERFORMANCE CRITERIA

(a) Correct equipment and process parameters are selected.
(b) Correct paths are defined.
(c) CAM data is correctly post processed.
(d) CNC programme is proved correct by using a suitable method.

RANGE STATEMENT

Information: simple tool library; process data sheets.

Equipment: post processor; CNC machine.

EVIDENCE REQUIREMENTS

Performance evidence of the candidate's ability to produce the CNC programme using correct tools, feeds and speeds to produce the required product.

Performance evidence of the candidate's ability to prove that the CNC programme is correct by using one of the following methods - single steps, dry run, machining, tracing profile or computer simulation of tool path.

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.

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION

SUPPORT NOTES

UNIT NUMBER: 2260304

UNIT TITLE: INTRODUCTION TO CAD/CAM

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 NC units for easy reference, publicity purposes, centre handbooks, etc. The summary statement for this unit is as follows:

This module will introduce you to the correct procedures for transferring data created on CAD to a CAM system thus establishing the integration between CAD and CAM.

You will also be given instructions to enable drawing of a typical component using a CAD system and interrogate the data created using a CAM system to enable the manufacture of the component.

CONTENT/CONTEXT The candidate should achieve the level of competence required to establish a link through CAD to CAM by the interpretation of the various elements required to enable manufacture of a simple engineering product.

Many of the procedures can be simulated and demonstrated where appropriate through computerised applications.

Corresponding to Outcomes 1-4:

1. The candidate should be able to identify the difference between CAD and CAM and know the different stages from design to manufacture apportioned to each. It is recommended that restricted response questions be set to cover all the performance criteria.

2. The candidate should be given within the range statement simple instructions on the use of the CAD package.

   Then using a simple component specification, draw the component and produce a hard copy.

3. Using product example the candidate should be involved in deciding what information should be selected for data transfer from CAD to CAM. Then using selected data, transfer from CAD to CAM.

4. With the application of a recognised CAM package the candidate should be able to accurately reproduce the component by any method within the range statement.

   This should emphasise the accuracy capabilities of the CAM application in reproducing the component.

   Where appropriate equipment and parameters can comprise cutting tools, feeds and speeds, nozzle to plate height, gas pressures, lead in, kerb setting, cut on, cut off, nesting, material strength, spring back, bending allowance, stroke length and speed.

APPROACHES TO GENERATING EVIDENCE This module should be carried out in a situation where the candidates have hands-on experience of both software packages which could be directly used by manufacturers. Procedures in the use of both CAD and CAM should be established. Products from a wide range should be selected and used to develop understanding of the packages.

The use of structured worksheets should be a central support of the delivery and assessment of this module. The knowledge requirement of the module would be best assessed by short answer questions written within the context of exercise worksheets set in class and practical computer exercises.

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

Outcome 1	Restricted response questions to cover Performance Criteria (a) and (b) to ensure that all stated ranges are covered.
Outcomes 2, 3 and 4	All the performance criteria could be assessed by the use of a performance observation checklist.

PROGRESSION This unit could form part of National Certificate programmes for national awards in engineering and for the required programme for SVQ in Engineering Manufacture: Foundation level II.

RECOGNITION Many SQA NC 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.