SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Mechanical Systems (Intermediate 2)

NUMBER D188 11

COURSE Technological Studies (Intermediate 2)

SUMMARY

This unit is designed to enable candidates to study pneumatic systems and mechanisms.

OUTCOMES

1 Design, construct and evaluate pneumatic systems.
2 Describe the operation and performance of mechanisms.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates will normally be expected to have attained one of the following:

- Standard Grade Technological Studies at grade 3 or 4
- equivalent NC units.

CREDIT VALUE

0.5 credit at Intermediate 2.

Administrative Information

Superclass: VE

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National Unit Specification: general information (cont)

UNIT Mechanical Systems (Intermediate 2)

CORE SKILLS

This unit gives automatic certification of the following:

Complete core skills for the unit	Problem Solving	Int 2
	Numeracy	Int 1
Additional core skills components for the unit	Using Number	Int 2

Additional information about core skills is published in *Automatic Certification of Core Skills in National Qualifications* (SQA, 1999).

National Unit Specification: statement of standards

UNIT Mechanical Systems (Intermediate 2)

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

OUTCOME 1

Design, construct and evaluate pneumatic systems.

Performance criteria

(a) Diagrams are interpreted correctly in describing the operation of a pneumatic system.
(b) The graphical representation of pneumatic systems is in accordance with given standards.
(c) Calculations to determine cylinder pressure and piston force and area are carried out correctly.
(d) A pneumatic system is constructed to meet a given specification.
(e) A pneumatic system is evaluated correctly against a given specification.

Note on range for the outcome

PCs (a) and (b) Pneumatic systems: combinational control, sequential control.

Evidence requirements

Written and graphical evidence for PCs (a) to (c). Performance evidence for PCs (d) and (e).

OUTCOME 2

Describe the operation and performance of mechanisms.

Performance criteria

(a) Graphical representation of mechanisms is appropriate.
(b) Diagrams are interpreted correctly in describing the operation of mechanisms.
(c) Calculations related to mechanisms are carried out correctly.
(d) Methods used to adjust the performance of mechanisms are described clearly.

Evidence requirements

Written and graphical evidence for PCs (a) to (d).

National Unit Specification: support notes

UNIT Mechanical Systems (Intermediate 2)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 20 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

A data booklet will be issued by SQA in connection with this unit.

Guidance for each outcome is listed below.

Outcome 1	Pneumatic circuits: a typical circuit would consist of a 5/2 air-operated valve control of a double-acting cylinder. Electrical control valves and simple time delay circuits should be used. Calculations: to determine piston force, operating pressure, area and diameter.
Outcomes 1 and 2	Graphical methods for representation of mechanisms and pneumatic systems: circuit diagram; system diagram; block diagram (showing boundary and energy transformations).
Outcome 2	Mechanisms: force multiplier systems such as levers, linkages, pulleys, cranks and gears. Speed control systems: gears, pulleys, sprockets. Calculations to determine: force ratio (mechanical advantage), speed ratio, moment, torque.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

Candidates will be given a series of problem solving activities based on pneumatic systems. Candidates must be able to interpret pneumatic systems from circuit diagrams. Candidates will be expected to construct and evaluate pneumatic systems from given specifications. Related calculations should be carried out.

Candidates should be introduced to a range of mechanisms. They should be able to describe the operation and performance of mechanisms. Typically, candidates should be able to describe the mode of operation of a compound gear train. Candidates should be able to describe how to adjust input and output conditions of mechanisms. Related calculations should be carried out.

Every opportunity should be taken to ensure that the learning and teaching contexts are of an industrial nature and are relevant to the candidate.

The opportunity should be taken to relate content, where possible, to other units on the course. This could be achieved by incorporating mechanical systems into control systems. In presenting courses, teachers and lecturers should ensure that there is a balance between direct teaching and candidate-centred activities.

National Unit Specification: support notes (cont)

UNIT Mechanical Systems (Intermediate 2)

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Both outcomes of this unit must be assessed by a written test. The tests should be closed book with the teacher/lecturer in attendance to ensure examination conditions within the classroom. Candidates should be allowed to use the data booklet.

In order to gain success in the written test for an outcome, the candidate must achieve at least the cut-off score for that outcome. In addition, each candidate has to construct a pneumatic system and evaluate it against a given specification.

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements for Candidates with Special Needs/Candidates whose First Language is not English* (SQA, 1998).