

National Unit Specification: general information

UNIT	Product Design: Manufacturing Products (Higher)
NUMBER	DF4X 12
COURSE	Product Design (Higher)

SUMMARY

In this Unit candidates will develop knowledge and understanding of commercial manufacturing processes, systems and materials and why they are used for particular products. Candidates will also produce an orthographic drawing to convey information required for the manufacture of products. The Unit is suitable for candidates with previous experience in related subjects (such as Craft and Design, Graphic Communication or Art and Design). It is also suitable as an introduction for candidates studying product design for the first time.

OUTCOMES

1. Explain why particular materials are used for the manufacture of commercial products.
2. Explain why particular processes and systems are used for the manufacture of commercial products.
3. Produce an orthographic drawing suitable for use in the manufacture of a given product.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have achieved one of the following or equivalent:

- ◆ Standard Grade Craft and Design at Credit level
- ◆ Standard Grade Graphic Communication at Credit level
- ◆ The Unit *Product Design: Manufacturing Products* at Intermediate 2

Administrative Information

Superclass:	VF
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National Unit Specification: general information (cont)

UNIT Product Design: Manufacturing Products (Higher)

CREDIT VALUE

1 credit at Higher (6 SCQF credit points at SCQF level 6*).

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

CORE SKILLS

There is no automatic certification of Core Skills or Core Skills components in this Unit.

National Unit Specification: statement of standards

UNIT Product Design: Manufacturing Products (Higher)

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

Explain why particular materials are used for the manufacture of commercial products.

Performance Criteria

- (a) Materials used to manufacture given products are correctly identified.
- (b) Valid reasons are given to justify the identification of materials.
- (c) A valid explanation is given of why materials are suitable for the given products.

Evidence Requirements

(See Evidence Requirements for the Unit at the end of the statement of standards).

OUTCOME 2

Explain why particular processes and systems are used for the manufacture of commercial products.

Performance Criteria

- (a) Processes and systems used to manufacture given products are correctly identified.
- (b) Valid reasons are given to justify the identification of processes.
- (c) A valid explanation is given of why processes are suitable for the given products.

Evidence Requirements

(See Evidence Requirements for the Unit at the end of the statement of standards).

OUTCOME 3

Produce an orthographic drawing suitable for use in the manufacture of a given product.

Performance Criteria

- (a) A complete and accurate orthographic drawing is produced.
- (b) Line type and dimensioning are correct.

Evidence requirements

(See Evidence Requirements for the Unit at the end of the statement of standards).

National Unit Specification: statement of standards (cont)

UNIT Product Design: Manufacturing Products (Higher)

EVIDENCE REQUIREMENTS FOR THE UNIT

Evidence for this Unit can be written or oral, and graphical. The evidence should be produced under supervised closed-book conditions. The assessments must be capable of being completed in one hour 30 minutes, and will cover all Outcomes.

For Outcomes 1 and 2, evidence is required in the form of responses to questions which test the knowledge and understanding outlined in the PCs.

For Outcome 3, the candidate will be required to produce an orthographic drawing.

Achievement is decided by the use of a cut-off score. The standard to be applied is detailed in the National Assessment Bank items available for this Unit. If a centre wishes to design its own assessments for this Unit, they should be of a comparable standard.

National Unit Specification: support notes

UNIT Product Design: Manufacturing Products (Higher)

This part of the Unit Specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

This Unit focuses on the planning for manufacture of commercial products and the materials and processes used for manufacture. Candidates will consider why particular materials and processes are chosen for commercial products.

The Course content which is likely to be covered in this Unit is detailed below:

Plastics:	Polythene (high and low density), polyvinyl chloride, polystyrene, nylon, cellulose acetate, acrylic, polypropylene, ABS, epoxy resin, melamine formaldehyde, urea formaldehyde, polyester resin, glass-reinforced plastic, carbon-fibre plastics, elastomers.
Metals:	Mild steel, high carbon steel, stainless steel, high-speed steel, cast iron, brass, bronze, duralumin, aluminium, copper, tin, lead, zinc.
Woods:	Beech, oak, ash, mahogany, teak, walnut, balsa, Scots pine, red cedar, parana pine, spruce.
Timber derivatives:	Manufactured boards (medium density fibreboard, plywood, blockboard, chipboard, hardboard), veneer.
Identification of materials:	Colour, surface texture, weight, properties, labelling and symbols.
Plastic processes:	Injection-moulding, extrusion, rotational moulding, vacuum-forming, blow-moulding, laminating, joining, compression moulding, finishing.
Metal process:	Turning, milling, die-casting, pressing, stamping, punching, joining (spot welding, arc welding, riveting, adhesives, fitted joints, bolts, screws, patent devices), sand casting, casting, piercing and blanking, forging, finishing.
Wood processes:	Turning, routing, spindle moulding, laminating, jointing, finishing.
Identification of processes:	Form, material, split lines, injection points, ejector points, shrinkage, draft angle, intricate form, clean and precise, flash, thinning of sheet material at corners, shear marks, cross-section over length, surface texture.
Production systems:	One-off, batch, mass, line, flow. Gantt charts, flow charts, project planning, JIT, jigs, patterns, standard components, CAD/CAM, CNC machining.
Orthographic drawing	Elevation, end elevation, plan, outline, hidden detail, centre-line, dimensioning, section, hatch lines — all to BS conventions.

National Unit Specification: support notes (cont)

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GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

Candidates should be introduced to materials and processes through the examination of actual products. Candidates should have access to suitable commercially manufactured products throughout the Unit.

Candidates should be given enough opportunity to develop orthographic drawing skills to prepare them for the Outcome 3 assessment.

Centres may wish to ask candidates to consider the commercial manufacture of the product which has been designed in Unit 2 as a method of covering the learning and teaching for all three Outcomes.

The Course Arrangements give further information on teaching and learning in a Course context. It should be noted that there are areas of content in the Course which are not directly assessed within the Unit but are covered in the external Course assessment.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

There are two types of evidence required in this Unit. Outcomes 1 and 2 require responses to questions on materials and processes. Outcome 3 requires the production of an orthographic drawing. Centres may wish to teach and assess materials and processes separately from orthographic drawing.

The standard to be applied is detailed in the National Assessment bank items available for this Unit.

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 special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, September, 2003).