



Design and Manufacture: Materials and Manufacturing (National 5)

SCQF: level 5 (9 SCQF credit points)

Unit code: H22V 75

Unit outline

The general aim of this Unit is to develop the learner's skills and creativity in manufacturing a product or prototype based on a given a design concept. The aim includes developing an appreciation and application of the properties and uses of materials.

Learners will manufacture models and prototypes, applying a range of practical skills. The Unit is designed to enable the learner to develop an understanding of the impact of materials and manufacturing on design and the environment.

Learners who complete this Unit will be able to:

- 1 Investigate materials for manufacturing tasks in a workshop context
- 2 Prepare for manufacturing tasks in a workshop context
- 3 Plan and implement a manufacturing sequence for a prototype
- 4 Review manufacturing processes and a finished prototype

This Unit is a mandatory Unit of the National 5 Design and Manufacture Course and is also available as a free-standing Unit. The Unit Specification should be read in conjunction with the *Unit Support Notes*, which provide advice and guidance on delivery, assessment approaches and development of skills for learning, skills for life and skills for work. Exemplification of the standards in this Unit is given in the *Unit Assessment Support*.

The *Course Assessment Specification* for the National 5 Design and Manufacture Course gives further mandatory information on Course coverage for learners taking this Unit as part of the National 5 Design and Manufacture Course.

Recommended entry

Entry to this Unit is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by one or more of the following or equivalent qualifications and/or experience:

- ◆ National 4 Design and Manufacture Course or relevant component Units

Equality and inclusion

This Unit Specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. For further information, please refer to the *Unit Support Notes*.

Standards

Outcomes and assessment standards

Outcome 1

The learner will:

- 1 Investigate materials for manufacturing tasks in a workshop context by:**
 - 1.1 Selecting potential materials to suit manufacturing tasks based on information given in working drawings and design proposals
 - 1.2 Testing the suitability of selected materials in terms of workability, practicability, function and performance
 - 1.3 Recommending final selection of materials for manufacture of component parts of prototypes
 - 1.4 Explaining why final selection of materials for the prototype is appropriate in terms of aesthetics, workability, practicability, function and performance
 - 1.5 Using correct names and terminology when referring to materials and their properties

Outcome 2

The learner will:

- 2 Prepare for manufacturing tasks in a workshop context by:**
 - 2.1 Selecting tools and equipment for manufacturing tasks based on information given in working drawings for prototypes and materials selections
 - 2.2 Suggesting a practical sequence for manufacturing processes for a prototype and giving reasons for its appropriateness in terms of practicability and efficiency.
 - 2.3 Confirming that tools and equipment are in good condition and safe working order before, during and after use
 - 2.4 Using correct names and terminology when referring to tools, equipment, and processes

Outcome 3

The learner will:

- 3 Plan and implement a manufacturing sequence for a prototype by:**
 - 3.1 Producing manufacturing plans which incorporate requirements for tools, equipment, materials and fixings, as well as manufacturing techniques and processes
 - 3.2 Preparing and marking materials for component parts, which are accurate and generally free from faults.
 - 3.3 Cutting, shaping and finishing component parts of prototype prior to assembly demonstrating precision in the safe use of tools and equipment.
 - 3.4 Assembling and joining component parts, resulting in a functionally sound prototype generally free from faults demonstrating skill in the safe use of tools and equipment
 - 3.5 Finishing assembled prototype with well-prepared surfaces to a high standard

Outcome 4

The learner will:

- 4 Review the manufacturing processes and finished prototype by:**
 - 4.1 Evaluating the success of the manufacturing plan and outlining suggestions for improvement in terms of practicalities and efficiency
 - 4.2 Evaluating the prototype and outlining suggestions for improvement in terms of craftship and finish
 - 4.3 Recommending changes in design that would improve the commercial manufacture of the prototype as a product in terms of economy, efficiency and sustainability
 - 4.4 Researching and recommending materials and manufacturing processes that might be used in a commercial setting to mass-produce products based on the prototype

Evidence Requirements for the Unit

Assessors should use their professional judgement, subject knowledge and experience, and understanding of their learners, to determine the most appropriate ways to generate evidence and the conditions and contexts in which they are used.

Evidence may be a combination of written, oral, graphic and practical evidence. Evidence may be presented for individual Outcomes or it may be gathered for the Unit as a whole through combining assessment holistically in one single activity. If the latter approach is used, it must be clear how the evidence covers each Outcome.

For this Unit, learners will be required to provide evidence of:

- ◆ knowledge and understanding of manufacturing processes and materials
- ◆ practical skills in preparing for and carrying out manufacturing tasks in a workshop context
- ◆ awareness of recognised workshop procedures and safe working practices

For each of the Outcomes in this Unit, the materials that learners will investigate, test and use will generally be from the categories timber, metals and plastics. Generally, the materials that will be used in manufacturing will be timbers, metals and plastics in their common forms; however, where required, other materials may be used.

Prototypes for Outcome 3 must be manufactured from at least two different materials. These can be materials from the different material categories or from within one of them.

Exemplification of assessment is provided in the *Unit Assessment Support*. Advice and guidance on possible approaches to assessment is provided in the *Unit Support Notes*.

Development of skills for learning, skills for life and skills for work

It is expected that learners will develop broad, generic skills through this Unit. The skills that learners will be expected to improve on and develop through the Unit are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and drawn from the main skills areas listed below. These must be built into the Unit where there are appropriate opportunities.

2 Numeracy

2.2 Money, time and measurement

4 Employability, enterprise and citizenship

4.4 Enterprise

5 Thinking skills

5.2 Understanding

5.3 Applying

5.4 Analysing and evaluating

Amplification of these is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work*. The level of these skills should be at the same SCQF level of the Unit and be consistent with the SCQF level descriptor. Further information on building in skills for learning, skills for life and skills for work is given in the *Unit Support Notes*.

Administrative information

Published: June 2013 (version 1.1)

Superclass: WB

History of changes to National Unit Specification

Version	Description of change	Authorised by	Date
1.1	Assessment Standard 3.5 — 'prototypes' now 'prototype'	Qualifications Development Manager	June 2013

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