



Design and Manufacture: Materials and Manufacturing (Higher) Unit

SCQF: level 6 (9 SCQF credit points)

Unit code: H22V 76

Unit outline

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

Learners will manufacture models and/or prototypes in order to inform and refine design proposals, 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 processes on design and the environment.

Learners will develop an understanding of manufacturing processes and of the various factors that influence the design and manufacture of products. Learners will have to consider the manufacturing techniques and processes that would apply to a design proposal in an industrial/commercial context.

Learners will gain an understanding of how design and manufacturing technologies impact on the environment and society.

Learners who complete this Unit will be able to:

- 1 Select and justify materials that would apply to a design proposal in an industrial/commercial context
- 2 Select and justify manufacturing techniques and processes that would apply to a design proposal in an industrial/commercial context
- 3 Manufacture a range of types of models or prototypes

This Unit is a mandatory Unit of the Higher 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 *Unit Assessment Support*.

The *Course Assessment Specification* for the Higher Design and Manufacture Course gives further mandatory information on Course coverage for learners taking this Unit as part of the Higher 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 5 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 Select and justify materials that would apply to a design proposal in an industrial/commercial context by:**
 - 1.1 Testing selected materials in terms of technical suitability to inform and refine proposals
 - 1.2 Justifying final selection of materials for the manufacture of products in terms of technical suitability
 - 1.3 Justifying the choice of materials in terms of their impact on the environment and society

Outcome 2

The learner will:

- 2 Select and justify manufacturing techniques and processes that would apply to a design proposal in an industrial/commercial context by:**
 - 2.1 Selecting and justifying potential processes for a design proposal in terms of scale of production, suitability to materials and complexity of shape
 - 2.2 Selecting and justifying suitable types of production and planning systems in terms of technical suitability
 - 2.3 Explaining the impact of the selected processes and production methods on the environment and society

Outcome 3

The learner will:

- 3 Manufacture a range of types of models or prototypes by:**
 - 3.1 Preparing and marking materials for component parts, which are accurate and free from faults
 - 3.2 Cutting and shaping component parts of a model and/or prototype
 - 3.3 Assembling and joining component parts resulting in functionally sound models and/or prototypes
 - 3.4 Finishing assembled models and/or prototypes

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 will be a combination of written, 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 a range of manufacturing processes and materials
- ◆ practical skills in planning and making models and prototypes
- ◆ a critical understanding of the factors that impact on the design and manufacture of products
- ◆ an understanding of the impact of design and manufacturing technologies on the environment and society

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. The timbers can be hardwoods, softwoods or manufactured boards. There are no restrictions on the metals or plastics that learners can use in their prototypes. Learners may also make use of a range of modelling materials and computer-aided design and manufacture.

Models/prototypes for Outcome 3 must be manufactured from at least three different materials. These can be materials from the different materials categories or from within one of them.

Exemplification of assessment is provided in *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

5.3 Applying

5.4 Analysing and evaluating

5.5 Creating

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: April 2014 (version 2.0)

Superclass: WB

History of changes to National Unit Specification

Version	Description of change	Authorised by	Date
2.0	<p>Changes made to Outcome 3 Assessment Standards to support materials and manufacturing context only, rather than linking to the Design Unit (H22T 76), allowing for the Materials and Manufacturing Unit to be taken as a single Unit, or part of the Course.</p> <p>Changes have been made to ensure consistency with the evidence required by the Outcomes:</p> <p>Previous AS 1.1 'Investigate appropriate materials...' has been removed.</p> <p>Previous AS 2.1 'Investigate appropriate processes...' has been removed.</p> <p>New AS 2.1 (previously AS 2.2) 'Evaluating' replaced with 'selecting and justifying'.</p> <p>New AS 2.2 (previously AS 2.2) 'investigating' replaced with 'selecting and justifying'.</p>	Qualifications Development Manager	April 2014

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Note: readers are advised to check SQA's website: www.sqa.org.uk to ensure they are using the most up-to-date version of the Unit Specification.

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