

Draft National Unit Specification



Unit title: Design and Manufacture: Materials and Manufacturing (Higher)

SCQF: level 6 (9 SCQF credit points)

Unit code: to be advised

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 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 our 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 to inform and refine design proposals

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 the *National Assessment Resource*.

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:

- ◆ Design and Manufacture (National 5) Course or relevant component Units

In terms of prior learning and experience, relevant experiences and outcomes may also provide an appropriate basis for doing this Unit. Further information on relevant experiences and outcomes will be given in the *Unit Support Notes*.

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* and the *Unit Assessment Specification*.

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 Investigating appropriate materials for manufacture of a design proposal
 - 1.2 Testing selected materials in terms of technical suitability to inform and refine proposals
 - 1.3 Clearly justifying final selection of materials for manufacture of a product in terms of technical suitability
 - 1.4 Justifying the choice of materials in terms of their impact on our 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 Investigating appropriate processes for manufacture of a design proposal which are relevant to selected materials
 - 2.2 Evaluating potential processes in terms of scale of production, suitability to materials and complexity of shape in order to inform and refine proposals
 - 2.3 Investigating suitable types of production and manufacturing systems in terms of technical suitability
 - 2.4 Explaining the impact of the selected processes and production methods on our environment and society

Outcome 3

The learner will:

- 3 Manufacture a range of types of models or prototypes to inform and refine design proposals by:**
 - 3.1 Selecting appropriate types of models for different purposes and stages in developing a design proposal
 - 3.2 Demonstrating practical skills in a range of materials in terms of manipulating, cutting, shaping, forming, joining and finishing
 - 3.3 Exploring practical aspects of design proposals, such as mechanisms or joining methods
 - 3.4 Evaluating the effectiveness of each type of model selected in developing a design proposal and informing potential manufacturing processes

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 our 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 CADD or CAM.

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. The models/prototypes can, on the other hand, be made of several different materials from each of the materials categories.

Exemplification of assessment will be provided in the *National Assessment Resource*. 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

(Note: The information given below reflects the initial thinking on significant opportunities for development of skills for learning, skills for life and skills for work. These may be subject to change as the development process progresses.)

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.

1 Literacy

- 1.1 Reading
- 1.2 Writing

2 Numeracy

- 2.2 Money, time and measurement
- 2.3 Information handling

3 Health and wellbeing

- 3.3 Physical wellbeing

4 Employability, enterprise and citizenship

- 4.3 Working with others

5 Thinking skills

- 5.2 Understanding
- 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



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Superclass: to be advised

History of changes

Version	Description of change	Authorised by	Date

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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.