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## Design and Manufacture Assignment (National 4)

**SCQF:** level 4 (6 SCQF credit points)

**Unit code:** H22W 74

### Unit outline

This is the Added Value Unit in the National 4 Design and Manufacture Course. The general aim of this Unit is to enable the learner to provide evidence of added value for the National 4 Design and Manufacture Course through the successful completion of an assignment which will allow the learner to demonstrate challenge and application.

Learners who complete this Unit will be able to:

- 1 Design and manufacture a product in response to a brief

This Unit is a mandatory Unit of the National 4 Design and Manufacture Course and is also available as a free-standing Unit. The Unit Specification should be read in conjunction with the *Course Support Notes*, which provide advice and guidance on delivery and assessment approaches. Exemplification of the standards in this Unit is given in *Unit Assessment Support*.

## **Recommended entry**

Entry to this Unit is at the discretion of the centre. It is recommended that the learner should be in the process of completing, or have completed, the Units of the National 4 Design and Manufacture Course:

- ◆ Design and Manufacture: Design (National 4)
- ◆ Design and Manufacture: Materials and Manufacturing (National 4)

## **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 *Course Support Notes*.

# Standards

## Outcomes and assessment standards

### Outcome 1

The learner will:

#### 1 Design and manufacture a product in response to a brief by:

- 1.1 Researching and confirming the design brief
- 1.2 Developing design ideas in response to the brief
- 1.3 Manufacturing a prototype based on the design ideas
- 1.4 Evaluating the design ideas and craft skills in the manufactured prototype

## Evidence Requirements for the Unit

This Unit will be assessed through controlled assessment which meets the Evidence Requirements below.

The assessment method for this Unit will be an assignment in which the learner will draw on their range of design knowledge and skills, and knowledge of materials and manufacturing, and apply their practical skills, in order to produce an effective overall response to a brief.

The assignment is:

- ◆ set by centres within the SQA guidelines described below
- ◆ conducted under some supervision and control

Evidence will be internally marked by centre staff in line with SQA guidelines.

All assessment is subject to quality assurance by SQA.

### Setting the assessment

The assignment will be set by centres within the following guidelines:

- ◆ The brief for the assignment will be agreed between the learner and the teacher/lecturer.
- ◆ The assignment will be a meaningful and appropriately challenging task, which should clearly demonstrate application of knowledge and skills, at an appropriate level, from both the *Design* and the *Materials and Manufacture* Units (as defined in the 'Further mandatory information on Course coverage' section of this document).
- ◆ The teacher/lecturer will provide overall guidelines for the assignment and a list of questions/tasks/prompts which will lead learners through the assignment in clear stages.

### Conducting the assessment

The assignment will be conducted under some supervision and control. This will take the form of the following:

- ◆ The assignment will be carried out under supervised open book conditions.

- ◆ The teacher/lecturer may also give learners some support and guidance, as appropriate to National 4 level, to help them progress through each stage of the assignment. The amount of support provided should be reflected in the assessment judgement.

### **Judging the evidence**

Evidence will be internally marked and verified by centre staff in line with SQA guidelines.

All assessment is subject to quality assurance by SQA.

Evidence should include:

- ◆ the completed design folio including and evaluation
- ◆ a manufactured prototype

### **Re-assessment**

In relation to Unit assessment, SQA's guidance on re-assessment for Units applies.

Further information is provided in the exemplification of assessment in *Unit Assessment Support*. Advice and guidance on possible approaches to assessment is provided in the *Course Support Notes*.

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

Please refer to the *Course Specification* for information about skills for learning, skills for life and skills for work.

## Further mandatory information on Course coverage for the National 4 Design and Manufacture Course

The following gives details of mandatory skills, knowledge and understanding for the National 4 Design and Manufacture Course. Assessment of this Added Value Unit will involve selecting appropriate skills, knowledge and understanding from those listed below, in line with the Evidence Requirements above. This list of skills, knowledge and understanding also provides the basis for the assessment of all the Units in the Course:

<b>Design and Manufacture (National 4): Design</b>		
<b>Design process</b>	<b>Members of a design team</b>	Designers, market researchers, accountants, engineers, manufacturers, marketing teams, ergonomists, consumers, retailers, economists
	<b>Identification of a problem</b>	Situation analysis, need and wants, product evaluation
	<b>Brief</b>	Statement of problem, target market, design brief analysis
	<b>Research</b>	Such as use of search engines, measuring and recording, asking questions, surveys, using data
	<b>Specification</b>	Generation of a specification
	<b>Idea generation</b>	Morphological analysis, thought showers, technology transfer, analogy, and lateral thinking. Application of idea generation techniques. Mood and lifestyle boards
	<b>Development and refinement of ideas</b>	Synthesis of ideas. Justification and recording of decisions taken. Presentation techniques. Modelling techniques
	<b>Evaluation</b>	Surveys, user trials, comparisons with specifications and standards, the concept of function and fitness for purpose
<b>Design factors</b>	<b>Function</b>	Primary and secondary functions, fitness for purpose
	<b>Performance</b>	Ease of maintenance, strength and durability, ease of use, material selection, construction, size
	<b>Market</b>	Consumer demands, social expectations, niche marketing, branding, introduction of new products, market segments, marketing mix, needs, wants, technology push, market pull
	<b>Aesthetics</b>	Shape, proportion, size, colour, contrast, harmony, texture, materials, fashion
	<b>Ergonomics</b>	Establishing critical sizes, basic understanding of how humans interact with products, anthropometrics
<b>Communication techniques and modelling</b>	<b>Graphic techniques</b>	Working drawings, annotated sketches and drawings, perspective sketches, illustration and presentation techniques, scale and proportion, simple orthographic drawings
	<b>Range of</b>	The role of simple modelling as it supports

	<b>modelling techniques and materials</b>	designing — scale models, mock-ups, fully crafted prototypes, computer generated models. Use of appropriate modelling materials such as paper, card, corrugated card, MDF, wire, pipe cleaners, foam, clay, modelling compound, balsa wood, expanded foam, sheet plastic, construction kits, smart materials. The role of modelling as it supports designing
<b>The impact of design technologies on the society and the environment</b>		Rise of consumerism, affordable and accessible products, impact of design decisions

<b>Design and Manufacture (National 4): Materials and Manufacture</b>		
<b>Planning for manufacture</b>		Preparing materials, planning for practical tasks, assembly, selecting appropriate tooling and finishes, reading of working drawings and diagrams, including an appreciation of orthographic projection
<b>Tools, materials and processes</b>	<b>Knowledge and understanding of common tools and equipment</b>	A range of common and acceptable hand tools for: Measuring, marking, cutting, shaping and forming of materials A range of common and acceptable tools or equipment for: holding, clamping and restraining materials A range of common and acceptable machine tools for: Sanding, shaping, drilling or other similar activities
	<b>Fixing and joining techniques</b>	A range of standard and recognised jointing/joining techniques for woods, metals and plastics including thermal joining and adhesive bonding
	<b>Metalworking and associated processes</b>	Cutting, shearing, notching, parallel and step turning, taper turning, drilling, knurling, annealing, hardening, tempering, filing, folding, bending, fitting and fixing, and in industry — casting, die-casting
	<b>Woodworking and associated processes</b>	Cutting, sizing, drilling, shaping, turning
	<b>Plastic work</b>	Cutting, drilling, filing, forming, bending and twisting, moulding and, in industry, vacuum forming, injection moulding, and rotational moulding
	<b>Surface finishing</b>	Sanding/abrading, polishing, varnishing, oiling, staining, waxing, painting/lacquering, dip coating

<b>Manufacturing in industry</b>	Computer-aided manufacture — benefits: (unit cost for mass production, quality assurance, globalisation, clean manufacturing); drawbacks: (breakdown, set up cost), awareness of rapid prototyping technology, identification of common industrial processes, standard components
<b>The properties of common materials</b>	Softwoods, hardwoods, manufactured boards, ferrous and non-ferrous metals, thermoplastics and thermosetting plastics
<b>The impact of manufacturing technologies and activities on the world of work and society</b>	Reduction in workforce, skilled workforce, cost of equipment, impact on environment (energy and pollution) and the measures that can be taken to support sustainability
<b>Health and safety</b>	Safe working practices and systems applicable to manufacturing activities, workshops or environments



# Administrative information

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**Superclass:** WB

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## History of changes to National Unit Specification

Version	Description of change	Authorised by	Date
1.1	Layout and minor content changes to course coverage table	Qualifications Development Manager	June 2013

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