



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:

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

	modelling techniques and materials	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
The impact of design technologies on the society and the environment		Rise of consumerism, affordable and accessible products, impact of design decisions

Design and Manufacture (National 4): Materials and Manufacture		
Planning for manufacture		Preparing materials, planning for practical tasks, assembly, selecting appropriate tooling and finishes, reading of working drawings and diagrams, including an appreciation of orthographic projection
Tools, materials and processes	Knowledge and understanding of common tools and equipment	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
	Fixing and joining techniques	A range of standard and recognised jointing/joining techniques for woods, metals and plastics including thermal joining and adhesive bonding
	Metalworking and associated processes	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
	Woodworking and associated processes	Cutting, sizing, drilling, shaping, turning
	Plastic work	Cutting, drilling, filing, forming, bending and twisting, moulding and, in industry, vacuum forming, injection moulding, and rotational moulding
	Surface finishing	Sanding/abrading, polishing, varnishing, oiling, staining, waxing, painting/lacquering, dip coating

Manufacturing in industry	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
The properties of common materials	Softwoods, hardwoods, manufactured boards, ferrous and non-ferrous metals, thermoplastics and thermosetting plastics
The impact of manufacturing technologies and activities on the world of work and society	Reduction in workforce, skilled workforce, cost of equipment, impact on environment (energy and pollution) and the measures that can be taken to support sustainability
Health and safety	Safe working practices and systems applicable to manufacturing activities, workshops or environments

Administrative information

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Superclass: WB

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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