



Higher Design and Manufacture — draft Course rationale and summary

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Course rationale

Background

All new and revised National Courses reflect Curriculum for Excellence values, purposes and principles. They offer flexibility, provide more time for learning, more focus on skills and applying learning, and scope for personalisation and choice.

In this Course, and its component Units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practice, enabling learners to achieve the highest standards they can.

This Course provides learners with opportunities to continue to acquire and develop the attributes and capabilities of the four capacities as well as skills for learning, skills for life and skills for work.

All Courses provide opportunities for learners to develop breadth, challenge and application, but the focus and balance of the assessment will be appropriate for the subject area.

Relationship between the Course and Curriculum for Excellence values, purposes and principles

The Higher Design and Manufacture Course allows learners to explore the multi-faceted world of product design and manufacturing¹. Creativity is at the heart of this Course — yet it is its combination with technology that makes it so exciting.

The Course combines scientific, mathematical and technological rigour with design creativity and innovation. It is this interface between technology and creativity that makes the Course so full of options and possibilities, and of great educational benefit.

In the Course, learners are encouraged to exercise imagination, creativity and logical thinking. The Course thus provides a broad scope for personalisation and choice.

The Course allows learners to broaden and deepen their skills base and to widen their horizons regarding a range of vocations and careers. It will provide opportunities to further acquire and develop the attributes and capabilities of the four capacities, including: creativity, flexibility and adaptability; enthusiasm and a willingness to learn; perseverance, independence and resilience; responsibility and reliability; and confidence and enterprise.

The Course provides learners with skills that allow them to learn, live and work more effectively in our advanced technological society. It allows them to become not just effective contributors but better informed and discerning consumers.

The Course provides progression from Design and Manufacture (National 5).

Purpose and aims of the Course

The Course provides a broad and practical experience in product design and manufacture. It provides opportunities for learners to gain skills in designing and communicating design proposals. It provides opportunities for learners to discover how to refine and resolve their design ideas.

The Course stresses the integration of designing and making. It confirms that design is an iterative process. The Course highlights the close relationship between designing, making, testing and refining proposals.

¹ In this Course the words 'manufacture' and 'make' are generally interchangeable. In this document both words are to be understood to refer to the production of models, prototypes or products in a school workshop context and hence either bespoke or low-volume crafts work. The exception to this general rule is where the word 'manufacture' definitely refers to large scale factory or industrial production of multiple units, such as may be understood by the term 'mass production'. In these cases the context will make this clear.

The Course provides opportunities for learners to apply practical skills and an understanding of the properties and uses of materials and manufacturing processes. It does so in a way that allows learners to inform and refine their own design proposals. It offers them opportunities to explore design alternatives and consider the manufacturing practicalities that these design alternatives bring to light.

The Course is practical, exploratory and experiential in nature. It combines elements of creativity and designing for aesthetic or visual impact with elements of designing for the practicalities of manufacturing. It helps the learner appreciate the importance to a product of form, function and performance. It helps them learn how to evaluate these attributes and to refine and resolve their designs accordingly.

The Course allows learners to consider the various factors that impact on a product's design. It will consider the life cycle of a product from its inception through design, manufacture, and use, including its disposal — a cradle-to-grave approach to design and manufacture.

The Course provides learners with opportunities to develop skills that are of general value for learning, life and work:

- ◆ research skills
- ◆ idea generation techniques
- ◆ the ability to read drawings and diagrams
- ◆ the ability to communicate design ideas and practical details
- ◆ the ability to evaluate and apply both tangible and subjective feedback
- ◆ the ability to devise and develop practical solutions to design opportunities

The Course allows learners to engage with technologies. It allows them to evaluate the impact that design and manufacturing technologies have on our environment and society. It allows them to evaluate how technologies have impacted on the world of the designer and on manufacturing industry.

The Course differs in purpose and aim from the equivalent Courses at National 4 and National 5. It does so most obviously by requiring learners to give greater priority to evaluating design proposals and arriving at a resolved design. Of necessity, this may reduce time spent on the crafting of quality prototypes. However, it may increase the time spent on making models in order to inform and refine design proposals.

The aims of the Course are to enable learners to develop:

- ◆ skills in design and in the refining of design proposals
- ◆ practical skills in the development of models and prototypes
- ◆ skills in evaluation and research
- ◆ knowledge and understanding of manufacturing processes and materials

- ◆ an understanding of the impact of design and manufacturing technologies on our environment and society

Information about typical learners who might do the Course

This Course is a broad-based qualification, suitable for learners with an interest in design and technology generally. It is suitable for learners with an interest in product design in particular. It is suitable for those wanting to progress onto higher levels of study in the subject.

The qualification is largely learner-centred and includes practical and experiential learning opportunities. The world of design and manufacturing covers a vast spectrum of experiences. Some products are designed to create an emotional or visual impact; others are more functional in their requirements. These facts allow the Course to be flexible in nature, and allow scope for personalisation and choice for each learner.

On completing the Course, learners will be able to: initiate, develop and communicate design proposals; solve design problems in applied contexts; and evaluate and improve design proposals and manufacturing practicalities.

In addition, learners will have developed: design skills, including creativity; knowledge and understanding of manufacturing processes and materials; and skills in making models and prototypes.

Learners will also have developed an appreciation of the diverse factors that impact on the design and manufacture of products, and an understanding of the impact of design and manufacturing technologies on our environment and society.

The Course or its components may provide progression to:

- ◆ Advanced Higher Design and Manufacture
- ◆ other SQA qualifications in technologies and in expressive arts

and ultimately, for some, to:

- ◆ a range of design- or manufacturing-related Higher National Certificates (HNCs) and Higher National Diplomas (HNDs)
- ◆ degrees in design, engineering or manufacturing-related disciplines
- ◆ employment and/or training in design, manufacturing, graphics, marketing, computing, engineering, and related fields

Course summary

Course title: Higher Design and Manufacture

SCQF level 6 (24 SCQF credit points)

Course outline

Mandatory Units

Design and Manufacture: Design (Higher) (9 SCQF credit points)

Design and Manufacture: Materials and Manufacturing (Higher) (9 SCQF credit points)

Course assessment (6 SCQF credit points)

This Course includes six SCQF credit points for 40 additional programmed hours to allow preparation for Course assessment. The Course assessment covers the added value of the Course. Further information on the Course assessment is provided in the Assessment section.

Course structure and conditions of award

The Course is practical, exploratory and experiential in nature. It combines elements of creativity and designing for visual impact with elements of practicalities and an appreciation of functionality.

On completing the Course, learners will have developed: design skills in the context of products; practical skills in making or manufacturing models and prototypes, including the use of equipment, materials and/or software; and skills in the evaluation of design proposals, including form and function, leading to a refinement of their design ideas.

Learners will also have developed: skills in building and testing in order to prove and resolve their design ideas; knowledge and understanding of manufacturing processes and materials; and an understanding of the impact of design and manufacturing technologies on our environment, on society, on the world of work and on industry.

Units are statements of standards for assessment and not programmes of learning and teaching. They can be delivered in a variety of ways.

Design and Manufacture: Design (Higher)

This Unit covers the product design process from brief to resolved design proposals and specification. It helps learners develop skills in initiating, developing, articulating and communicating design proposals for products. It allows them to gain skills and experience in evaluating design proposals in order to refine, improve and resolve them. It allows them to develop an appreciation of design concepts and the various factors that influence the design and manufacture of products.

Design and Manufacture: Materials and Manufacturing (Higher)

This Unit covers the product design process from design proposals to prototype. It allows learners to gain skills in making models and prototypes. It helps learners to 'close the design loop' by manufacturing their design ideas. It allows them to develop an appreciation of manufacturing practicalities. It allows them to develop an appreciation of the various factors that influence the design and manufacture of products.

In both Units, learners will develop an understanding of how design and manufacturing technologies impact on our environment and society.

To gain the award of the Course, the learner must pass all the Units as well as the Course assessment. The required Units are shown in the Course outline section. Course assessment will provide the basis for grading attainment in the Course award.

Assessment

Information about assessment standards for the Course will be included in the *Course Assessment Specification*, which will provide full details including advice on how a learner's overall attainment for the Course will be determined.

Unit assessment

All Units are internally assessed against the requirements shown in Unit specifications.

They will be assessed pass/fail within centres.

SQA will provide rigorous external quality assurance, including external verification, to ensure assessment judgements are consistent and meet national standards.

Exemplification of possible assessment approaches for these Units will be provided in the *National Assessment Resource*.

Course assessment

Courses from National 4 to Advanced Higher include assessment of [added value](#)². At National 5, Higher and Advanced Higher, the added value will be assessed in the Course assessment. The added value for the Course must address the key purposes and aims of the Course as defined in the Course Rationale. It will do this by addressing one or more of breadth, challenge and application.

In the Higher Design and Manufacture Course, added value will focus on:

- ◆ breadth
- ◆ challenge
- ◆ application

Learners will draw on, extend and apply the skills they have learned during the Course. These will be assessed through a combination of a [project](#)³ and a [question paper](#)⁴.

The Design and Manufacture project adds value by introducing challenge and application. Learners will draw on their range of design skills, knowledge of materials, and practical skills, in order to produce an effective overall response to the project brief.

² Definitions can be found here: www.sqa.org.uk/sqa/45528.html

³ See link above for definition.

⁴ See link above for definition.

successful learner, confident individual, responsible citizen, effective contributor

The response to the brief will include the realisation of a design proposal. The brief for the project will be sufficiently open and flexible to allow for personalisation and choice.

The question paper introduces breadth to the assessment. It requires depth of understanding and application of knowledge from the Units.

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