Comparison document

(Version 1.2 April 2015 compared to previous version)

National 5 Design and Manufacture Course Assessment Specification (C719 75)

The purpose of this document is to give a quick, visual guide to any amendments or clarifications made during the revision process.

Valid from August 2013

First edition: April 2012
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Please refer to the note of changes at the end of this Course Assessment Specification for details of changes from previous version (where applicable).

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Course outline

Course title:	National 5 Design and Manufacture
SCQF level:	5 (24 SCQF credit points)
Course code:	C719 75
Course assessment code:	X719 75

Course assessment structure

Component 1 — assignment	90 marks
Component 2 — question paper	60 marks
Total marks	**150 marks**

This Course includes six SCQF credit points to allow additional time for preparation for Course assessment. The Course assessment covers the added value of the Course.

Equality and inclusion

This Course Assessment Specification has been designed to ensure that there are no unnecessary barriers to assessment. Assessments have been designed to promote equal opportunities while maintaining the integrity of the qualification.

For guidance on assessment arrangements for disabled learners and/or those with additional support needs, please follow the link to the Assessment Arrangements web page: www.sqa.org.uk/sqa/14977.html.

Guidance on inclusive approaches to delivery and assessment of this Course is provided in the *Course Support Notes*.

Assessment

To gain the award of the Course, the learner must pass all of the Units as well as the Course assessment. Course assessment will provide the basis for grading attainment in the Course award.

Course assessment

SQA will produce and give instructions for the production and conduct of Course assessments based on the information provided in this document.

Added value

The purpose of the Course assessment is to assess added value of the Course as well as confirming attainment in the Course and providing a grade. The added value for the Course will 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, or application.

In this Course assessment, added value will focus on the following:

- breadth — drawing on knowledge and skills from across the Course
- challenge — requiring greater depth or extension of knowledge and/or skills
- application — requiring application of knowledge and/or skills in practical or theoretical contexts as appropriate

Through the Units, learners will develop skills and knowledge and understanding of key concepts related to design and manufacture including design, materials and manufacture.

The added value consists of a question paper and an assignment.

To achieve success in the Course, learners must show that they can **apply** this knowledge and these skills to solve design problems in both practical and theoretical contexts.

The assignment requires learners to demonstrate aspects of challenge and application in a practical context. Learners will **apply** knowledge and skills from the Course to produce a solution to an appropriately challenging design problem.

The question paper requires learners to demonstrate aspects of breadth and application in theoretical contexts. Learners will **apply** breadth of knowledge from across the Course, and depth of understanding, to produce descriptions and explanations related to theoretical design and manufacture contexts.

Grading

Course assessment will provide the basis for grading attainment in the Course award.

The Course assessment is graded A–D. The grade is determined on the basis of the total mark for all Course assessments together.

A learner's overall grade will be determined by their performance across the Course assessment.

Grade description for C
For the award of Grade C, learners will have demonstrated successful performance in all of the Units of the Course. In the Course assessment, learners will typically have demonstrated successful performance in relation to the mandatory skills, knowledge and understanding for the Course.

Grade description for A
For the award of Grade A, learners will have demonstrated successful performance in all of the Units of the Course. In the Course assessment, learners will typically have demonstrated a consistently high level of performance in relation to the mandatory skills, knowledge and understanding for the Course.

Credit
To take account of the extended range of learning and teaching approaches, remediation, consolidation of learning and integration needed for preparation for external assessment, six SCQF credit points are available in Courses at National 5 and Higher, and eight SCQF credit points in Courses at Advanced Higher. These points will be awarded when a grade D or better is achieved.

Structure and coverage of the Course assessment

The Course assessment will consist of two Components: an assignment and a question paper. The question paper will have two Sections.

Component 1 — assignment

The purpose of the assignment is to assess the learner's ability to apply skills, knowledge and understanding to solve a design task in a given context. It assesses the learner's ability to communicate, generate and refine ideas and apply practical skills in producing a potential solution.

This assignment will give learners an opportunity to demonstrate the following skills, knowledge and understanding:

- skills in idea generation and refinement
- the ability to communicate
- practical skills as described below
- the ability to apply knowledge and understanding and practical skills

The assignment will have 90 marks out of a total of 150 marks. This is 60% of the overall marks for the Course assessment.

The context of the assignment task will be based on:

- a problem situation
- a design brief
- relevant research
- a design specification

The assignment task will allow learners the opportunity to produce a prototype of their potential solution. Time will be required for:

- preparation for the assignment, which could include considering exemplar assignments and practising required skills
- carrying out the stages of the assignment, with assessor guidance and support
- evaluating and justifying the choices of graphic items and techniques and processes employed

The assignment should clearly demonstrate application of knowledge and skills, at an appropriate level, related to design, materials and manufacturing (as defined in the 'Further mandatory information on Course coverage' section of this document).

The assignment will assess two areas:

Design skills (50% of assignment marks)

Learners will produce a folio covering the following areas:

- ideas
- development
- communication
- evaluation

Practical skills (50% of assignment marks)
Learners will produce a prototype in order to evaluate their solution to the assignment task.

The prototype will allow learners to demonstrate practical skills in:

- measuring and marking out
- cutting, shaping and forming
- assembly of components
- finishing

The prototype will also allow learners to demonstrate consistency of application of practical skills, which will be evident in its overall quality, effectiveness and performance.

The assignment is conducted over an extended period of time.

Evidence should include a design folio and a manufactured prototype.

Component 2 — question paper
The purpose of the question paper is to assess the learner's ability to retain and integrate knowledge and understanding from across the Course.

This question paper will give learners an opportunity to demonstrate the following skills, knowledge and understanding:

- knowledge and understanding of how products are influenced by materials and processes
- knowledge and understanding of the use of tools
- knowledge of how products are influenced by design factors

The question paper will have 60 marks out of a total of 150 marks. This is 40% of the overall marks for the Course assessment.

The paper will broadly examine the following categories of design and manufacturing learning:

- Design processes
- Design factors
- Communicating and modelling
- Planning for manufacture
- Tools, materials and processes
- Manufacturing in industry
- The impact of design and manufacturing technologies on society and the environment and the world of work
- The properties of common materials

The question paper will have two Sections.

Section 1 will represent approximately 40% of the total marks for the question paper. It will consist of a single question, based on a product, and will require extended and reasoned responses. The question will follow a similar format each year and will test

the learner's knowledge and understanding of core areas from across the Course. The question will also require the learner to integrate this knowledge.

This question will focus on the manufacturing issues associated with a product, namely materials, tools and processes. It will not assess commercial aspects of manufacturing.

Section 2 will represent approximately 60% of the total marks for the question paper. It will consist of four or five questions. The responses will require integration of knowledge and understanding from across the Course. Questions will be based on products which are illustrated or products with which the learners are familiar.

It will give learners an opportunity to demonstrate knowledge and understanding specified in the table provided in 'Further mandatory information on Course coverage' at the end of this *Course Assessment Specification.*

Within the question paper, a proportion of marks will be available for more challenging questions where learners may be expected to provide a more detailed response, an explanation, justification, or to respond to more challenging concepts.

Setting, conducting and marking of assessment

Question paper

This question paper will be set and marked by SQA, and conducted in centres under conditions specified for external examinations by SQA. Learners will complete this in 1 hour and 30 minutes.

Controlled assessment — assignment

This assignment is:

- set by SQA
- conducted under some supervision and control

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

All marking will be quality assured by SQA.

Setting the assessment

Set by SQA.

- A bank of assignments will be provided, and there will be choice from this bank.

Conducting the assessment

Conducted under some supervision and control

- The assignment will be carried out under open book conditions, but supervised to ensure that the work presented is the learner's own work.
- The assessor may give learners support and guidance to help them progress through each stage of the assignment; where any significant amount of support is provided, this should be reflected in the marks awarded.
- The assignment is designed to discriminate between learners, and therefore would be expected to provide a wide range of marks. Stronger learners should be able to complete the assignment successfully with minimal support and guidance. Weaker learners may not be able to complete all aspects of the assignment within a reasonable time, or may require significant assistance, and so would achieve a lower total mark.
- Once the assignment has been completed and assessed, it should **not** be returned to the learner for further work to improve their mark.

Further mandatory information on Course coverage

The following gives details of mandatory skills, knowledge and understanding for the National 5 Design and Manufacture Course. Course assessment will involve sampling the skills, knowledge and understanding. This list of skills, knowledge and understanding also provides the basis for the assessment of the Units of the Course.

The Course assessment (assignment and question paper) will require learners to draw on and apply knowledge of any of the concepts listed below. This table should be read in conjunction with the descriptions of the question paper and assignment.

Component 1 — assignment The purpose of the assignment is to assess the learner's ability to apply skills, knowledge and understanding to solve a design task in a given context. It assesses the learner's ability to communicate, generate and refine ideas and apply practical skills in producing a potential solution. The assignment Component of Course assessment will require learners to draw on and apply skills, knowledge and understanding of the topic areas listed in the table below in planning, developing, producing or supporting the production of a response to a design and manufacture situation, problem and/or brief.		
Design **Topic area**		
Design process The application of knowledge, understanding, and skills to key elements within the processes of designing	**Research**	Such as use of search engines, measuring and recording, asking questions, surveys, using data.
	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	Comparisons with specifications and standards, the concept of function and fitness for purpose.
Design factors The application of knowledge and understanding to design factors and limited by the context of a given brief	**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 The application of communication and modelling techniques, as required, in responding to a given brief	**Graphic techniques**	Working drawings, annotated sketches and drawings, perspective sketches, illustration and presentation techniques, scale and proportion, simple orthographic drawings.
	Range of modelling techniques and materials	Scale models, mock-ups, and 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.

Materials and Manufacturing topic area		
Planning for manufacture – Application of planning techniques as required by the response to a brief		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 The use of appropriate tools, materials and processes , as required, in the manufacturing of a prototype as required	**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.
The properties of common materials In supporting design proposals, in response to a brief, and selecting appropriate materials for a prototype		Softwoods, hardwoods, manufactured boards, ferrous and non-ferrous metals, thermoplastics and thermosetting plastics.
Health and safety Adherence to safe working practice when undertaking design and manufacturing tasks		Safe working practices and systems applicable to manufacturing activities, workshops or environments.

Component 2 — question paper The purpose of the question paper is to assess the learner's ability to retain and integrate knowledge and understanding from across the Course. The question paper Component of Course Assessment will require learners to draw upon and apply knowledge and understanding of a sample from the topic areas listed below.		
Design topic area		
Members of a design team		Designers, market researchers, accountants, engineers, manufacturers, marketing teams, ergonomists, consumers, retailers, economists.
Design process **The uses and/or roles (or function) of key elements within the processes of designing.**	**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

The role of key design factors as they influence design and manufacturing decisions and activities		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 The purpose and role of communication as an integral part of designing	**Graphic techniques**	Working drawings, annotated sketches and drawings, perspective sketches, illustration and presentation techniques, scale and proportion, simple orthographic drawings.
	Range of modelling techniques and materials	The role of simple modelling as it supports 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 impact of design technologies on the society and the environment		Rise of consumerism, affordable and accessible products, and potential impact of design and manufacturing decisions on society and the environment.
Materials and Manufacturing topic area		
Planning for manufacture – knowledge an understanding of planning activities, processes and information needed for manufacturing		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 the use of tools, materials and processes as they support design requirements and efficient manufacturing activities	**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 Knowledge and understanding of the role of, and techniques in, safe practice in designing and manufacturing activities		Safe working practices and systems applicable to manufacturing activities, workshops or environments.

Administrative information

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History of changes to Course Assessment Specification

Version	Description of change	Authorised by	Date
1.1	Further clarification in 'added value' section'; further information and clarification on scope and structure of the question paper and Coursework given in the 'Structure and coverage of Course assessment' section; 'Further mandatory information' section divided into parts for question paper and Coursework and further information added	Qualifications Development Manager	June 2013
1.2	The following sentence added to "Further Mandatory information on course coverage" section of Nat 5 CAS: "The Course assessment (assignment and question paper) will require learners to draw on and apply knowledge of any of the concepts listed below."	Qualifications Manager	April 2015

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