



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Education

Design and Technology Product Design 5551/6551 2009

Material accompanying this Specification

- Specimen Papers and Mark Schemes
- Reports on the Examination
- Teachers' Guide

SPECIFICATION

This specification will be published annually on the AQA Website (www.aqa.org.uk). If there are any changes to the specification centres will be notified in print as well as on the Website. The version on the Website is the definitive version of the specification.

Further copies of this specification booklet are available from:

AQA Logistics Centre, Unit 2, Wheel Forge Way, Ashburton Park, Trafford Park, Manchester, M17 1EH.

Telephone: 0870 410 1036 Fax: 0161 953 1177

or

can be downloaded from the AQA Website: www.aqa.org.uk

Copyright © 2007 AQA and its licensors. All rights reserved.

COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

Contents

Background Information

- | | | |
|---|-------------------------------------------------------|---|
| 1 | Advanced Subsidiary and Advanced Level Specifications | 5 |
| 2 | Specification at a Glance | 6 |
| 3 | Availability of Assessment Units and Entry Details | 7 |

Scheme of Assessment

- | | | |
|---|--------------------------------------------------------|----|
| 4 | Introduction | 9 |
| 5 | Aims | 11 |
| 6 | Assessment Objectives | 11 |
| 7 | Scheme of Assessment – <i>Advanced Subsidiary (AS)</i> | 12 |
| 8 | Scheme of Assessment – <i>Advanced Level (AS+A2)</i> | 13 |

Subject Content

- | | | |
|----|------------------------------|----|
| 9 | Summary of Subject Content | 16 |
| 10 | AS Product Design: 3D Design | 19 |
| 11 | A2 Product Design: 3D Design | 26 |
| 12 | AS Product Design: Textiles | 31 |
| 13 | A2 Product Design: Textiles | 38 |

Key Skills and Other Issues

- | | | |
|----|---------------------------------------------------------------------------------------|----|
| 14 | Key Skills – Teaching, Developing and Providing Opportunities for Generating Evidence | 44 |
| 15 | Spiritual, Moral, Ethical, Social, Cultural and Other Issues | 47 |

Centre-Assessed Component

- | | | |
|----|-----------------------------------------------|----|
| 16 | Nature of Centre-Assessed Component | 48 |
| 17 | Guidance on Setting Centre-Assessed Component | 52 |
| 18 | Assessment Criteria | 53 |
| 19 | Supervision and Authentication | 66 |
| 20 | Standardisation | 67 |
| 21 | Administrative Procedures | 68 |
| 22 | Moderation | 69 |

Awarding and Reporting

- | | | |
|----|---------------------------------|----|
| 23 | Grading, Shelf-Life and Re-Sits | 70 |
|----|---------------------------------|----|

Appendices

- | | | |
|---|------------------------------------|----|
| A | Grade Descriptions | 71 |
| B | Record Forms | 74 |
| C | Overlaps with Other Qualifications | 75 |

Background Information

1

Advanced Subsidiary and Advanced Level Specifications

1.1 Advanced Subsidiary (AS)

Advanced Subsidiary courses were introduced in September 2000 for the award of the first qualification in August 2001. They may be used in one of two ways:

- as a final qualification, allowing candidates to broaden their studies and to defer decisions about specialism;
- as the first half (50%) of an Advanced Level qualification, which must be completed before an Advanced Level award can be made.

Advanced Subsidiary is designed to provide an appropriate assessment of knowledge, understanding and skills expected of candidates who have completed the first half of a full Advanced Level qualification. The level of demand of the AS examination is that expected of candidates half-way through a full A Level course of study.

1.2 Advanced Level (AS+A2)

The Advanced Level examination is in two parts:

- Advanced Subsidiary (AS) – 50% of the total award;
- a second examination, called A2 – 50% of the total award.

Most Advanced Subsidiary and Advanced Level courses are modular. The AS comprises three teaching and learning modules and the A2 comprises a further three teaching and learning modules. Each teaching and learning module is normally assessed through an associated assessment unit. The specification gives details of the relationship between the modules and assessment units.

With the two-part design of Advanced Level courses, centres may devise an assessment schedule to meet their own and candidates' needs. For example:

- assessment units may be taken at stages throughout the course, at the end of each year or at the end of the total course;
- AS may be completed at the end of one year and A2 by the end of the second year;
- AS and A2 may be completed at the end of the same year.

Details of the availability of the assessment units for each specification are provided in Section 3.

2

Specification at a Glance

D&T: Product Design

Product Design includes 3D Design and Textiles. Separate written papers will be provided for each discipline in AS Units 1 and 3 and A2 Unit 6.

Advanced Subsidiary Award
5551



AS Examination 5551	
Unit 1	
Written Paper 1½ hours	30% of the total AS marks 15% of the total A Level marks
This paper is based primarily on Materials and Components. Candidates will answer three from four questions.	
Unit 2	
Coursework Approx 40 hours	40% of the total AS marks 20% of the total A Level marks
Either project work and/or a portfolio of coursework which will contain aspects of industrial and commercial practice.	
Unit 3	
Written Paper 1½ hours	30% of the total AS marks 15% of the total A Level marks
All the questions are compulsory and will be based on a theme sent to centres in February for issue to candidates in March. This paper will assess primarily Design and Market Influences.	

+

Advanced Level Award
6551



A2 Examination 6551	
Unit 4	
Coursework approx 20 hours	15% of the total A Level marks
The Product Study will test the ability to analyse, synthesise and draw conclusions from an in-depth study of the designing and making of a product.	
Unit 5	
Coursework approx 50 hours	15% of the total A Level marks
A single, integrated coursework project using any material or combination of materials.	
Unit 6	
Written Paper 3 hours	20% of the total A Level marks
This paper contains two questions set on a further study of each of the three sections of the Subject Content. Candidates will be required to answer one question from each section and one other question from any section.	

3

Availability of Assessment Units and Entry Details

3.1 Availability of Assessment Units

Examinations based on this specification are available as follows:

	Availability of Units		Availability of Qualification	
	AS	A2	AS	A Level
January	1	—	—	—
June	1, 2 and 3	4, 5 and 6	✓	✓

Resit opportunities for externally assessed A2 units will be available in January 2010. Details of the arrangements have been provided to centres through the JCQ notice [Withdrawal of Curriculum 2000 Specifications](#).

3.2 Sequencing of Units

The nature of Design & Technology requires each unit to be to some extent synoptic, but Unit 5 and Unit 6 particularly include the main synoptic element of the whole A level course which will test candidates' connections between the different elements of Design & Technology: Product Design. It is recommended that the units are taken in the sequence 1, 2, 3, 4, 5, 6.

3.3 Entry Codes

Normal entry requirements apply, but the following information should be noted.

The following unit entry codes should be used:

AS	A2
Unit 1 - 3D Design PD1D OR - Textiles PD1T	Unit 4 - PDN4
Unit 2 - PDN2	Unit 5 - PDN5
Unit 3 - 3D Design PD3D OR - Textiles PD3T	Unit 6 - 3D Design PD6D OR - Textiles PD6T

The **Subject Code** for entry to the AS only award is 5551.

The **Subject Code** for entry to the Advanced Level award is 6551.

3.4 Availability of Assessment Units and Entry Details

Every specification is assigned to a national classification code indicating the subject area to which it belongs.

Centres should be aware that candidates who enter for more than one GCE qualification with the same classification code, will have only one grade (the highest) counted for the purpose of the School and College Performance Tables.

The classification code for this specification is 9080.

3.5 Private Candidates

This specification is only available for private candidates where they attend an AQA centre which will supervise and assess the coursework (or other named Unit). Private candidates should write to AQA for a copy of '*Supplementary Guidance for Private Candidates*'.

3.6 Access Arrangements and Special Consideration

AQA pays due regard to the provisions of the Disability Discrimination Act 1995 in its administration of this specification.

Arrangements may be made to enable candidates with disabilities or other difficulties to access the assessment. An example of an access arrangement is the production of a Braille paper for a candidate with a visual impairment. Special consideration may be requested for candidates whose work has been affected by illness or other exceptional circumstances.

Further details can be found in the Joint Council for Qualifications (JCQ) document:

Access Arrangements and Special Consideration

Regulations and Guidance Relating to Candidates who are Eligible for Adjustments in Examination

GCE, VCE, GCSE, GNVQ, Entry Level & Key Skills

This document can be viewed via the AQA web site (www.aqa.org.uk)

Applications for access arrangements and special consideration should be submitted to AQA by the Examinations Officer at the centre.

3.7 Language of Examination

All Assessment Units in this subject are provided in English only.

Scheme of Assessment

4

Introduction

This GCE Design & Technology Product Design specification complies with:

- the Subject Criteria for Design & Technology
- the GCSE, GCE, GNVQ and AEA Code of Practice April 2007
- the GCE Advanced Subsidiary and Advanced Level Qualification – Specific Criteria
- the Arrangements for the Statutory Regulations of External Qualifications in England Wales and Northern Ireland: Common Criteria.

4.1 Rationale

The specification has been designed to encourage candidates to take a broad view of technology and design, to develop their capacity to design and make products and to appreciate the complex relations between design, materials, manufacture and marketing.

Two material areas are given in the Subject Content, 3D Design and Textiles.

3D Design is intended to reflect the wide-ranging activities of professional designers and covers a wide range of materials. Written papers will be restricted to testing the core content, but other materials such as ceramics and textiles and other areas such as electronics and mechanisms can be incorporated to produce exciting coursework.

Textiles provides wide opportunities ranging from fashion and aesthetics to industrial uses of textiles and from creative and individual work to aspects of manufacturing and industrial and commercial practice.

Each material area contains a section on *Communication Methods*. Graphics are an integral part of any Design and Technology work. In any Design & Technology course it is important that candidates can communicate their thinking clearly and represent their ideas graphically. This section can however be expanded to provide opportunities for more graphically focused coursework although it must be noted that all project work requires three dimensional outcomes.

4.2 Entry option

Separate written papers for Units 1, 3 and 6 will be available for each material area. Centres may enter candidates for either material area on different units or the same material area on all units. As coursework tasks will be determined by the centre or candidate, considerable opportunities are provided to follow a single or a broadly based approach. Candidates may not, however, take both a 3D Design unit and the equivalent Textiles unit at the same sitting

Centres should note that the specification title has no endorsements and so, whether a candidate takes a mixture of 3D Design and Textiles units or all the same material units, the certificate title remains Design and Technology: Product Design, i.e. it is not possible to enter or certificate the two routes separately irrespective of the number of units taken by the candidates.

4.3 Prior level of attainment

It is helpful but not necessary for candidates to have studied GCSE Design & Technology before commencing work on this specification and no prior knowledge of design and technology is necessary for candidates to undertake a course of study based on this specification.

5

Aims

Design and Technology offers candidates an opportunity to gain personal satisfaction and a positive experience from working with a variety of materials. The practical problem solving processes in this specification will encourage independent learning, creativity and innovation.

Candidates at both AS and A Levels are encouraged to

- a. develop and sustain their own innovation, creativity and design and technology capability, to recognise constraints and to produce high quality products;
- b. develop a critical understanding of the influences of the processes and products of design and technological activity from a historical perspective and in current practice;
- c. apply essential knowledge of understanding and skills of design production processes to a range of technological activities and develop an understanding of industrial practices;
- d. use information and communications technology (ICT) to enhance their design and technological capability.
- e. recognise the social, moral, spiritual and cultural values inherent in design and technological activity, and develop critical evaluation skills in technical, aesthetic, ethical, economic, environmental, social and cultural contexts;
- f. develop as discerning consumers able to make informed choices;
- g. develop positive attitudes of co-operation and citizenship and work collaboratively.

6

Assessment Objectives

Candidates at both AS and A Levels should be able to apply their knowledge and understanding:

6.1 Designing

in combination with skills to design products to suitable specifications.

6.2 Making

of relevant materials and components, processes and techniques and their skills in using materials, tools and other equipment to produce work to suitable specifications.

6.3 Quality of Written Communication

The quality of written communication will be assessed in all assessment units. Candidates will be assessed according to their ability to:

- select and use a form and style of writing appropriate to the purpose and complexity of the subject matter;
- organise relevant information clearly and coherently, using specialist vocabulary when appropriate;
- ensure text is legible, and spelling, grammar and punctuation are accurate, so that meaning is clear.

Centres are reminded that AQA will be offering all its examinations through the medium of English only.

7

Scheme of Assessment - Advanced Subsidiary (AS)

The Scheme of Assessment has a modular structure. The Advanced Subsidiary (AS) award comprises three compulsory assessment units. Separate written papers will be provided for 3D Design and Textiles for Units 1 and 3.

7.1 Assessment Units

Unit 1 <i>30% of the total AS marks</i>	Written Paper <i>100 marks</i>	1½ hours
--------------------------------------------	-----------------------------------	----------

This paper contains four questions based primarily on Materials and Components.

All candidates will be required to answer Question 1 (40 marks). Candidates will then answer **two** of the remaining three questions, each of which is worth 28 marks.

Quality of Written Communication will be assessed in the candidates' written work.

Unit 2 <i>40% of the total AS marks</i>	Coursework <i>80 marks</i>	approx 40 hours
--------------------------------------------	-------------------------------	-----------------

Coursework may take a number of forms: a single design-and-make project, two smaller projects and/or a portfolio of work produced during the course which satisfies the coursework requirements.

Quality of Written Communication is to be assessed in the candidates' written work.

Centres must submit their candidates' marks to the AQA by 15 May.

Unit 3*30% of the total AS marks***Written Paper.***100 marks***1½ hours**

This paper is based primarily on Design and Market Influences. All the questions will be compulsory and will be based on a theme provided by AQA. The paper will contain two questions, the first (20 marks) which tests knowledge and understanding and the second (76 marks) which is an extended design question. 4 marks will be allocated to the assessment of the Quality of Written Communication.

Advance information about the theme for the design questions will be circulated to centres in February in the year of the examination for issue to candidates in March to allow candidates to carry out preparatory work. Separate themes will be provided for 3D Design and Textiles. Preparatory work may not be taken in to the examination room.

Centres are strongly recommended to make an early provisional entry to ensure they receive the advance information on time.

7.2 Weighting of Assessment Objectives for AS

The approximate relationship between the relative percentage weighting of the Assessment Objectives (AOs) and the overall Scheme of Assessment is shown in the following table:

Assessment Objectives	Unit Weightings (%)			Overall Weighting of AOs (%)
	1	2	3	
Designing	10	20	20	50
Making	20	20	10	50
Overall Weighting of Units (%)	30	40	30	100

Candidates' marks for each assessment unit are scaled to achieve the correct weightings.

8

Scheme of Assessment - *Advanced Level (AS+A2)*

The Scheme of Assessment has a modular structure. The A Level award comprises three compulsory assessment units from the AS Scheme of Assessment and three compulsory assessment units from the A2 scheme of assessment.

For Unit 6, separate written papers will be provided for 3D Design and Textiles.

8.1 AS Assessment Units

Unit 1
15% of the total A Level marks
Written Paper
100 marks
1½ hours

Unit 2
20% of the total A Level marks
Coursework
80 marks
approx 40 hours

Unit 3
15% of the total A Level marks
Written Paper 3
100 marks
1½ hours

8.2 A2 Assessment Units

Unit 4
15% of the total A Level marks
Product Study
50 marks
approx 20 hours

The Product Study is an in-depth study which will test candidates' ability to research, analyse and communicate their understanding of a particular manufactured product. Examples of possible studies will be provided, but it is expected that many centres will wish to combine the study with work experience or similar opportunities. The study will be assessed by the centre and moderated by AQA. Centres must submit their candidates' marks to the AQA by 15 May.

Quality of Written Communication in the Product Study will be assessed as an integral part of the section titled *Presentation*.

Unit 5
15% of the total A Level marks
Project
105 marks
approx 50 hours

Candidates will be required to submit evidence of a single, substantial designing and making activity. The project should represent approximately 50 hours of supervised time. The project will be assessed by the centre and moderated by AQA. Centres must submit their candidates' marks to the AQA by 15 May.

5 marks will be allocated to the assessment of the Quality of Written Communication in the candidates' written work.

Unit 6
20% of the total A Level marks
Written Paper
100 marks
3 hours

The paper will be presented in three sections, one for each section of the Subject Content.

A choice of two questions will be provided in each of the three sections. Candidates must answer one question from each section and one other question from any section.

4 marks will be allocated to the assessment of the Quality of Written Communication in the candidates' written work.

8.3 Synoptic Assessment

The Advanced Subsidiary and Advanced Level Criteria state that A Level specifications must include synoptic assessment (representing at least 20% of the total A Level marks).

All Units in Design & Technology are synoptic by nature. However, Units 5 and 6 are particularly appropriate for this assessment and so Unit 5 will contribute 5% and Unit 6, 15%, to the synoptic assessment.

8.4 Weighting of Assessment Objectives for A Level

The approximate relationship between the relative percentage weighting of the Assessment Objectives (AOs) and the overall Scheme of Assessment is shown in the following table.

A Level Assessment Units (AS + A2)

Assessment Objectives	Unit Weightings (%)						Overall Weighting of AOs (%)
	1	2	3	4	5	6	
Designing	5	10	10	7½	7½	10	50
Making	10	10	5	7½	7½	10	50
Overall Weighting of Units (%)	15	20	15	15	15	20	100

Candidates' marks for each assessment unit are scaled to achieve the correct weightings.

Subject Content

9

Summary of Subject Content

9.1 Introduction

This specification provides the opportunity for students to follow a broad multi-disciplinary Product Design course or to specialise in 3D Design or Textiles.

The content for each discipline is listed separately on the following pages.

Each content is presented in three sections

- A Materials and Components
- B Design and Market Influences
- C Processes and Manufacture.

9.2 Requirements

The content of a discipline should be studied in depth for the written papers in AS Units 1 and 3 and A2 Unit 6. Students may if they wish study more than one discipline and enter for a different discipline for different papers.

9.3 Presentation of content

Each Subject Content defines the knowledge and understanding required for an AS and an A2 course. The Contents are not presented as discrete teaching modules because the nature of design and technology requires an holistic approach. The chart below shows the relative contribution of the Subject Content sections to each of the assessment units.

9.4 Relationship of units to content

Levels of contribution

Significant = ●●

Minor = ●

SUBJECT CONTENT \ ASSESSMENT UNIT	AS			A2		
	Paper Unit 1	CW Unit 2	Paper Unit 3	Product Study Unit 4	Project Unit 5	Paper Unit 6
A. Materials and Components						
Classification of Materials	●●	●●			●●	●●
Working Properties	●●	●●	●	●	●●	●●
Manipulation and Combining	●●	●●	●	●●	●●	●●
B. Design and Market Influences						
Development of D&T		●●	●	●	●●	●●
Design in Practice	●	●●	●	●●	●●	●●
Design in the Human Context	●	●●	●●	●●	●●	●●
C. Processes and Manufacture						
Ind and Comm Practice	●	●●	●	●●	●●	●●
Product Manufacturing		●●	●	●●	●●	●●
Systems & Control	●	●●	●	●●	●●	●●

9.5 The nature of Design and Technology

The distinguishing feature of any design and technology course is its practical nature. Knowledge and Understanding is not, therefore, to be acquired purely for its own sake, but in order to *apply* it to the solution of practical problems which arise in everyday life and in industrial and commercial contexts.

Underpinning all learning are the designing and making skills which make use of Knowledge and Understanding in order to produce outcomes which satisfy a design brief.

Designing

Designing is a process based activity involving the progressive engagement with a problem which requires thinking, creating, inventing, predicting, experimenting, decision making, constant evaluation and, where necessary, modification. Designers develop an awareness of the opportunities and constraints placed upon them by taking account of the demands of users and producers and of market forces.

The activities detailed above draw upon relevant skills and knowledge which are enriched by the application of human values.

Making

The realisation of design ideas and solutions to problems is achieved by making products where a range of materials and media may be used. In design and technology, making activities may take many forms, ranging from early experiments through experimental mock-ups, prototypes, scale models and trials to a final marketable product. All the aspects detailed above provide opportunities for students to develop making skills as they seek to produce high quality outcomes.

Communication

Communication is an integral aspect of the whole process and it plays three major roles in any design and technology activity.

First, it enables the designer to visualise ideas and thoughts which permit detailed analysis. Second, it provides a record which can be referred to, adapted or refined as the process progresses. Third, it provides an explanation for others of the development of ideas from the mind to the outcome.

The range of communication methods is wide and becoming wider through the increasing use of ICT. All or any should be used *as appropriate to the task in hand* – notes, sketches, formal drawings, photographs, computer programs, oral communication and two or three dimensional representations are all relevant in particular circumstances.

Product Design: 3D Design

AS Section A

Materials and Components

Candidates should have the opportunity to work with and study a variety of resistant materials so that they understand the working characteristics, physical properties, cost and availability which influence the choice of materials in design situations.

10.1 Classifications which determine the market forms of a range of timber, metal, plastics and composite materials

A range of materials appropriate to modelling and prototyping.

Natural

Common hardwoods and softwoods and the availability of stock forms, e.g. rough sawn, P.S.E., mouldings.

Common ferrous and non-ferrous metals and the availability of stock forms, e.g. sheet, rod, hollow sections etc.

Manufactured

Timber boards and laminates, e.g. plywood, M.D.F., blockboards etc.

Metal alloys, extruded aluminium alloys, ingots etc.

Plastics

- common thermo-plastics, e.g. polystyrene, acrylic, A.B.S., polyethylene, and the availability of stock forms – sheet, block. Foam, powder etc.

- common thermosetting plastics, e.g. epoxy resins, phenols etc.

Paper/board materials – layout, tracing, corrugated, foamboard etc.

Composites, e.g. ceramics, F.R.P. – glass, carbon fibre, Kevlar, concrete etc. available forms – resins, fibres, powders etc.

Smart materials, created to provide specific properties, e.g. thermoplastic sheet, smart wire etc.

Product components

Candidates should have a knowledge of various components which are readily used in conjunction with the assembly and construction of manufactured items, e.g. K.D. fittings, glue, screws, hinges and handles.

10.2 Working Properties of Materials/components

Physical

Dimension, shape, density.

Environmental

Effects of the environment and service conditions on durability.

Mechanical

Strength, stiffness, elasticity, plasticity, malleability, ductility, brittleness and hardness.

Aesthetic

The ways in which the above properties are manifested in aesthetic qualities.

Finishing techniques necessary to protect and enhance.

Techniques of Testing/ Investigation

Common methods of workshop testing to establish working/mechanical properties qualitatively.

E.g. hardness, ductility, tension etc, candidates should be encouraged to carry out first hand testing to establish characteristics and properties of materials and components in order to aid selection relevant to product development. Use of ICT data base.

10.3 Hand and Commercial Processing

Combining materials to enhance their properties. E.g. use of composites, reinforcements and cross-sections.

Product Design: 3D Design

AS Section B

Design and Market Influences

Candidates should develop an understanding of the broader perspectives of the designed world. This will encompass the perception and appreciation of line, shape, form, proportion, colour movement and texture within a critical awareness of aesthetics. It will also encourage the application of personal judgement and appropriate criteria in the appraisal of manufactured objects and systems, whilst at the same time influencing candidates in their approach to designing and making quality products that meet specific needs of the identified users. Candidates should engage in creative activities in which ideas take forms which satisfy the claims of originality, excellence and utility.

10.4 Development of Technologies and Design

Major developments in technology

Developments in material technology and processing equipment which affect application, material properties and manufacturing processes.

To include the history of style and product evolution.

The study of natural forms and mathematics to include both inanimate and living things

Perception of line, shape, form, colour, tone, texture, proportion, movement and materials. Structures and mechanisms.

Candidates should respond to a range of stimuli including direct observations, specified design briefs and secondary sources.

A study of manufactured products and systems

Appraisal of functional, aesthetic, technical and economic considerations in the design and manufacture of products, considering aspects of their physical surroundings as shaped by designers, craftsmen and technologists.

Product life cycle

To include design introduction, evolution, growth, maturity, decline and replacement.

ICT applications

Potential for design, retrieval/storage, manufacture and marketing.

10.5 Design in Practice

Communication and representation of ideas	The presentation and communication of the work of candidates is an important and integral part of any design based syllabus. The development, manufacture and marketing of products rely upon appropriate communication methods and so candidates are encouraged to develop illustration techniques and experiment with a range of presentation methods. E.g. annotated sketches, mood boards, working drawings, presentation boards etc.
Design methods	Ways in which designing may be undertaken from the intuitive and informal to those requiring a more systematic approach. Innovative and creative processes.
Design processes	Processes which may be used in the field of design, illustration techniques, planning for production, methods of communication, data storage and collection, modelling, testing and evaluation.
Safety	A recognition of the application of risk assessment to the design and manufacture of products.

10.6 Communication methods

	The means by which the detail and form of products, environments and systems are communicated so that they may be manufactured. Identify and use appropriate means to communicate ideas, design proposals and evaluations to a range of audiences including clients and potential users of the product.
Illustration, selection and use of appropriate 2D/3D techniques	Sketching, drawing, use of mixed media etc.
Enhancement	Rendering – use of line/tone/colour/form. Texture – to represent materials and surface finishes. Presentation – two dimensional and three dimensional products.
Information drawing	Quantitative – graphs, pie charts, bar charts, pictograms. Organisational and topological – flow charts, sequential, schematic etc.
Modelling	Using 3D forms, mock ups, prototypes, scale models etc.
Use of ICT	Selection and use of CAD, word processing, DTP. Spreadsheets, databases and modelling software.

10.7 Design in the Human Context

Human needs	Specific to various groups of people – consumers; young, old, disabled, workers. To meet physical and psychological needs.
Human factors	Ergonomics and anthropometrics – the relationship between people, products and the environment. Working triangle, colour.
Safety	The relevance of safety with regard to the maker and to the relationship between user and product.

Product Design: 3D Design

AS Section C

Processes and Manufacture

Candidates should have a broad knowledge of the manufacturing systems used to make and finish materials used in the production of commercial products. Through critical appraisal of specified products, candidates should understand how materials and components are utilised to become a design realisation. Candidates should be encouraged to explore practical applications of processing methods as appropriate to the products they design and make.

10.8 Industrial and Commercial Practice

Manufacturing systems	Volume of production – one-off, batch, team and mass-production techniques.
Safety	Candidates should be aware of the possible hazards found in a manufacturing environment. Safe procedures and working practices.

10.9 Product Manufacturing

Equipment and materials Processing	The use and application of hand and machine manufacturing methods. Candidates will be expected to demonstrate their capability through experience of fabrication and/or manufacture of a range of material.
Application of IT	
(a) in CAD/CAM systems	Set up and use basic CAD/CAM systems in the production of a product.
(b) presentation of information	Set up and use appropriate software to create a range of outputs.
Wastage	Hand and machine methods of cutting and shaping.
Addition	Fabrication techniques to include thermal, mechanical and chemical techniques.

Redistribution Forming, moulding, casting and sintering.

Finishing processes Applied surface coatings. Methods of self finishing and surface decoration.

10.10 Systems and Control

An understanding of simple control systems and their application including mechanical systems; energy sources, forms, storage conversion, transmission and efficient use. These may be related to either the function or manufacture of a product.

Systems diagrams – input, process, output.

Importance of feedback and control.

Application of control systems and sub-systems both within the manufacture and functioning of a range of products.

Quality assurance and quality control

During the stages of design, development and manufacturing “right first time” use of specifications product testing, continuous improvement.

Flexible manufacturing systems

Automation, use of CAD/CAM.

Artificial intelligence, computer-integrated manufacturing.

Product Design: 3D Design

A2 Section A

Materials and Components

11.1 Classification

The candidate's knowledge base of materials and their application to product manufacture which is expected to exist at the completion of AS level will be further developed and made use of in the development and manufacture of the Major Project.

As a result of the deeper understanding to be gained through personal experience of selection and application of materials, it is to be expected that candidates will be able to make informed judgements concerning the suitability of materials and components based upon technical knowledge, aesthetic qualities, performance parameters and relative costs.

11.2 The Working Properties of Materials

Materials and Components

The interaction between different materials and their properties

Develop an understanding of industrial and commercial practice through design and manufacture. To include systems of manufacture, quality assurance, stock control, marketing and customer relations.

The criteria for selection within design constraints should be understood. However, a highly detailed study of physical properties is not sought, rather an assimilation through general study and experience of the ways in which materials behave in applications met through problem solving and the ways they are worked to become components of a design realisation.

Materials testing

Common methods of workshop testing to establish qualitatively the properties indicated and the relevance of these properties to resist the application of force, i.e. tension, compression, torsion, shear, bending, in order to achieve equilibrium.

11.3 Manipulating and Combining Materials

The implication of 11.2 above for the selection of materials, structural sections and methods of joining.

Materials conditioning

In relation to strength, hardness, toughness, plasticity, durability and aesthetic qualities.

Product Design: 3D Design

A2 Section B

Design and Market Influences

11.4 Development of Technologies and Design

The work of past and present designers

As related to consumer products in particular, but also to include design movements and the inherent influences of socio-economic changes.

Copyright protection

To include patenting and its importance to the designer and manufacturer.

11.5 Design in Practice

Design Methods

Develop and use specifications which suit the requirements of potential clients in terms of price, quality and marketability.

Safety Legislation

Understand the implications of Health and Safety as an element of design activity and safety standards imposed by BSI and other regulatory bodies. Apply relevant legal requirements.

The Influence of Design and Technology in Society

Design and Technology awareness and understanding. The influence of designers and technologists.

Product development and improvement

Critical assessment of products in everyday use, whether hand or machine made, according to relevant criteria, practical and aesthetic.
Examination of alternative designs and redesigning existing products.

Communication methods – detail and form of products, environments and system so that they may be manufactured

Identify and use appropriate means to communicate ideas, design proposals and evaluations to a range of audiences, which includes clients and potential users of the product.

11.6 Design in the Human
Context

Human needs and the effects of products and systems on society.

Environmental Concerns

Use of natural resources, materials utilisation, conservation, waste disposal/management, pollution, recycling.

Green technology, environmental problems, planned obsolescence.

Suitability for intended environment.

Product Design: 3D Design

A2 Section C

Processes and Manufacture

11.7 Industrial and Commercial Practice

ICT applications

Appreciation and understanding of the use of CAM for industrial production.

Use of ICT in manufacturing data control (EDI).

CAA (computer aided administration).

CAD (computer aided design) product modelling.

PPC (production planning and control) networking.

CIM (computer integrated manufacture).

Flexible manufacturing systems.

The influence of design and technology in society

Awareness and understanding of the work of designers and technologists.

Human needs and the effects of products and systems on society. Including aspects of the use and conservation of energy in relation to both the manufacture and performance of products.

Role of the designer

The interface between client/designer/manufacturer/user.

Moral, economic, social and environmental responsibilities.

The marketing function

Satisfying customer requirements.

Profitability through identifying/anticipating needs.

Promotion, demographic trends, socio-economic groups.

11.8 Product Manufacturing

Manufacturing systems

Planning production procedures, methods. Craft to industrial, one-off to mass production.

The implications of these methods for the product, the designer, the maker and user.

Product development/improvement

Critical assessment of products in everyday use, whether hand or machine made, according to relevant criteria, practical and aesthetic. Examination of alternative designs and redesigning existing products.

11.9 Systems and Control	Interfacing, the need to consider how systems and parts of a system may be inter-connected, e.g. gears and chains in mechanical systems.
Health and Safety at Work	COSHH, Risk assessment.
Quality assurance	During the stages of design, development and manufacturing.

Product Design: Textiles

AS Section A

Materials and Components

Candidates should have the opportunity to work and study a variety of textiles materials so that they understand the working characteristics, physical properties, cost and availability which influence the choice of materials in design situations. Knowledge will be required of a wide range of components used in the making of textile products.

12.1 Classification

Classification of fibres which determine the market forms of fabrics	Natural	- e.g. Plant, animal, mineral.
	Regenerated	- e.g. Cellulosic (acetates, viscose); rayons.
	Synthetic	- e.g. Nylon, polyester, acrylic, elastomers, PVC.
Commercial names of fibres and fabrics	Popular names of natural, manmade and synthetic fabrics e.g. Tactel, Tencel, Tricel, Lycra, polar fleece and Trevira.	
Fabric construction methods	Woven	- basic weave – e.g. plain, tabby; fancy weave – e.g. twill, satin; pile weave – e.g. loop/cut pile; special effects due to coloured threads and blended fibres.
	Knitted	- weft knit – e.g. single jersey, double jersey; hand and machine; warp knit – e.g. tricot; machine.
	Non woven	- e.g. felting, bonding (methods of production).
		Smart materials, created to provide specific properties, e.g. reactive
Product components	Fastenings: e.g. buttons, Velcro, zips, clips, buckles, clasps, poppers, D-rings, hooks and eyes, fabric ties.	
	Trims: e.g. braid, ribbon, piping, petersham, bindings, fringing, lace.	

12.2 Working Properties

Properties of fibres	Strength, extensibility, elasticity, fineness, electrostatic charge, lustre, thermal insulation, flammability, moisture absorption, shrinkage.
-----------------------------	------------------------------------------------------------------------------------------------------------------------------------------------

Working properties of fabrics and physical characteristics, which influence the choice of materials in design solutions.

Working properties: strength, durability, elasticity, flammability, thermal qualities, creasing, absorption, stretch, formability.

Physical characteristics: handle, drape, weight, pattern repeat, directional pile, nap, texture, lustre.

Testing of materials to determine appropriate properties in relation to chosen end use.

12.3 Manipulating and Combining Materials

Yarn Composition

Staple and filament.

The importance of mixtures, blends and laminates

Fibre content, properties and applications, reasons for use.

Combining materials

Interfacings, underlinings, linings, interlinings: types and applications in relation to weight, construction, use.

In addition to this knowledge base, students should be able to make reasoned judgements about the suitability of fabrics and components for products based on technical knowledge, aesthetic qualities, performance parameters and relative costs per unit/metre.

Product Design: Textiles

AS Section B

Design and Market Influences

Study in this area will introduce candidates to the broader perspectives of the design world. It will expand knowledge and understanding of the basic elements of design, and how this can be effectively applied to textile products. It will encourage the application of personal judgement and appropriate criteria in the appraisal of textiles products and systems, whilst at the same time influence candidates in their approach to designing and making quality products that meet specific needs of identified users. Candidates should have the opportunity to work in both two and three-dimensional forms, engaging in creative activities in which ideas take forms, which satisfy the claims of originality, excellence and utility. They should develop designs from a variety of starting points and respond in both an intuitive as well as a systematic manner. Candidates should gain an understanding of industrial and commercial practices within the area of design and market influences.

12.4 Development of Technologies and Design

The history of design

Study to include some of the major developments of design throughout the Nineteenth and Twentieth centuries. To understand the influences on aesthetic attitudes to style and fashion up to the present day.

Product evolution and product analysis

A study of manufactured products to illustrate the way in which the demands of a product have evolved as a result of new materials and technologies.

Appraisal of functional, aesthetic, technical and economic considerations in the design and manufacture of products. Consider aspects of their physical surroundings as shaped by designers, craftsmen and technologists.

12.5 Design in Practice

Design methodology

Analysis, research, inspiration, idea generation, illustration, modelling, planning, evaluating and testing.

The role of the designer	<p>An understanding of the varying roles of the commercial designer. Exploring different approaches to designing.</p> <p>Understanding of manufacturing constraints on product design. An awareness of environmental issues in relation to the design of textile products.</p> <p>Social and moral implications of product design.</p>
Design sources	<p>Candidates should be able to respond to a variety of stimuli, drawing from direct observation of natural and manmade forms, secondary sources and specified design briefs.</p>
Aiding the Design process	<p>Use of inspirational moodboards, designer sketchbooks. Analysing working and aesthetic characteristics of a range of materials and surface decoration techniques. Understand industrial processes used to produce these effects. Recognising design faults in existing products.</p>
Market Research	<p>Client profiling, identifying target markets, consumer and product research, e.g. opinion polls, questionnaires.</p>
The marketing function	<p>Customer identification. An awareness of the use of new technology in the marketing of textile products. Product costing, calculation and profit. Presentation of colourways.</p>
Product life cycles	<p>Understanding of the expected life cycle of products.</p>
Copyright protection	<p>The issue of copyright, patenting and its importance to the designer and manufacturer.</p>

12.6 Communication methods	<p>Detail and form of products, environments and systems so that they may be manufactured.</p> <p>Identify and use appropriate means to communicate ideas, design proposals and evaluations to a range of audiences, including clients and potential users of the product, e.g. presentation boards, fashion illustration, interior sketches, swatches, colourways.</p>
Illustration	<p>Selection and use of appropriate 2D/3D techniques. Sketching, drawing, use of mixed media, collage etc.</p>
Enhancement	<p>Rendering – Use of line/tone/colour/form. Texture – To represent materials, surface finishes and applied decoration. Presentation – Two dimensional and three dimensional products.</p>
Information Drawing	<p>Quantitative – graphs, piecharts, barcharts, pictograms. Organisational and topological – flowcharts, sequential/schematic.</p>

Modelling models	Using three-dimensional form – mock-ups – prototypes – scale.
Use of ICT	Selection and use of CAD, word processing/DTP, spreadsheets, databases and modelling software.

12.7 Design in the Human Context

Human needs	Designing to meet physiological, psychological and sociological needs of various categories of people – e.g. young, elderly, physically disabled in different environments and communities.
Human factors	Ergonomic and anthropometric influences and constraints. The relationship between people, products and the environment.
Health and Safety	Risk Assessment in relation to the design and manufacture of products. Safety standards imposed by BSI, recommended by DTI for product design. Recommendations for Health and Safety at work for employees and its implications for the employer.
Applications/material areas	Apparel fabrics – to satisfy basic clothing requirements fabrics, furnishing accessories, furnishings, floorings, e.g. protection, adornment, fashion, utility, sportswear (performance sport and leisurewear) footwear, accessories. Household fabrics – e.g. table/bed linen, decorative. Industrial textiles – e.g. fire protective wear, components for vehicles/machines, automotive fabrics, tents, awnings, harnesses, medical textiles.
Environmental concerns	Use of natural resources, materials utilisation, conservation, waste disposal/management, pollution in broad terms, recycling. Green technology: environmental problems.

Product Design: Textiles

AS Section C

Processes and Manufacture

Candidates should have a broad knowledge of the manufacturing systems used to make, finish and decorate materials for use as apparel fabrics, household and industrial textiles. Through critical appraisal of specified products, candidates should understand how materials and components are worked to become parts of a design realisation, initially as toiles, prototypes or models. Candidates should be encouraged to explore practical applications of processing methods as appropriate to the products they design and make. They should plan suitable production systems for the industrial manufacture of finished prototypes, which take into consideration quality assurance and quality control. Graphic communication should be used to illustrate construction processes within design portfolios. ICT should be an integral part of the course.

12.8 Industrial and Commercial Practice

ICT applications

Appreciation and understanding of CAD/CAM for designing and manufacturing processes, fabric production, pattern production, embroidery, garment manufacture.

CAD (Computer Aided Design) design of fabrics, products, colourways, product modelling, pattern construction;

CAM (Computer Aided Manufacture) understanding of fabric manufacture, lay planning, controlled cutting, controlled sewing, controlled pressing, controlled decoration.

ICT used in the integration of manufacture (CIM).

Manufacturing Systems

One-off, batch, mass/line production, vertical, in house production, pre-manufactured components, manufacturing specifications.

Response to market demands.

Manufacturing Sub systems.

JIT. (Just in time).

Product Maintenance

Care and maintenance of products.

Environmental Concerns

An awareness of environmental issues in relation to the dyeing of fabrics and piece goods.

Health and Safety

Risk assessment and health and safety issues for the manufacturing of textile products.

12.9 Product Manufacturing

Fabric manufacture	<p>Yarn: carding, spinning, blending/mixing fibres.</p> <p>Fabric: weaving, knitting, felting, bonding.</p> <p>Special effects: e.g. loop pile, velvets, boucles and crepes.</p> <p>Dyeing: Domestic, industrial dyeing methods – vat, discharge and resist, dye fastness.</p> <p>Surface Decoration: e.g. Screen, block and sublistatic – e.g. transfer printing, ink jet printing, roller printing, stencilling, direct application methods, embroidery, diffusing, quilting.</p> <p>Finishing: brushing, calendering, waterproofing, non-iron.</p>
Pattern drafting	<p>e.g. Basic pattern/template drafting using technical language (basic block, labelling and notching, balance marks, seam allowance and ease).</p> <p>Principles of grading.</p> <p>Basic adaptation to create unique, individual styles.</p>
Product manufacture	<p>Fabric preparation, lay planning, marking and cutting out, methods of joining, shaping, finishing edges, suitable construction techniques appropriate to the fabric being used and the products being made, pressing – use of correct tools, labelling and packaging.</p> <p>To plan appropriate methods and processes for the manufacture of chosen products. Including amendments and adaptations of prototypes and the use of industrial manufacturing processes.</p>

12.10 Systems and Control

Quality Assurance and Quality Control	<p>Quality control checks throughout the manufacturing process.</p> <p>Systems diagrams – input, output, process.</p> <p>Loop feedback systems, which ensure quality.</p> <p>Sealed samples.</p> <p>Awareness of quality and finish in the manufacture of own products.</p>
----------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

13

Product Design: Textiles

A2 Section A

Materials and Components

13.1 Classification

Fibre classification and generic names	<p>Natural - Plant (cellulose); cotton, flax. - Animal (protein); wool, silk. - Mineral; asbestos. - luxury fibres; cashmere, mohair.</p> <p>Regenerated - Natural polymers; cellulosic (regenerated), rubber.</p> <p>Synthetic - Synthetic Polymers; elastomeric, fluoro-fibres, polyamides, polyacrylic, Chloro-fibres, polyesters. Aramid fibres.</p> <p>Inorganic - Glass, carbon, metallic.</p>
Commercial names of fibres and fabrics	<p>Popular names of natural, regenerated and synthetic fibres. Recognition of brand familiarity/promotion.</p>
Fabric construction methods	<p>Variations of woven structures: e.g. fancy weaves, twill and satin variations, jacquards.</p> <p>Special effects: stripes, checks and crepe.</p> <p>Industrial and hand woven construction methods.</p> <p>Cultural traditions: weft knit; plain, jersey, double jersey, pique. Warp knit, locknit; Hand and machine knitted methods, fully fashioned panels. Non-woven; felting, bonding, methods of bonded manufacture, lamination. Influence of new technology.</p>
Technical terms related to yarns	<p>Tex, denier.</p>

13.2 Working Properties

Properties of fibres	<p>Resilience to light, alkali, acid, micro-organisms, shrinking.</p>
-----------------------------	-----------------------------------------------------------------------

Identify, test and compare the relative properties of fabrics

Test for extensibility, durability, insulation, rate of flammability, strength, moisture absorption.
Consumer advice in relation to the performance of different fabrics.
Evaluate the use of materials testing as set out in British Standards.

13.3 Manipulating and Combining Materials

Yarn creation

Yarn types, ply, core, fancy, colour effects, structure effects, lustre effects, texturing.

The importance of mixtures, blends and laminates to include the development of new technologies

Microfibres: Tactel, Tencel, fleece fabrics, Lycra, Trevira, outdoor performance fabrics, flame retardant materials.

Product Design: Textiles

A2 Section B

Design and Market Influences

13.4 Development of Technologies and Design

The effects of major developments in textiles technology

Production of fibre, yarns, cloth, manufacture, finish, colour application and decoration, production systems, computer control and increased automation.

The work of past and present textile designers.

As related to textile and fashion products in particular, but also to include design movements and the inherent influences on product design.

13.5 Design in Practice

Product life cycle

Concepts of introduction, growth, maturity, decline and replacement.

Fashion cycles

Fad, classic, standard. Industry cycles from colour, fibre trends and predictions to products at the point of sale e.g. Influence of trends from fashion, cultural and media sources. Importance and purpose of trade fairs.

The marketing function

Marketing and branding of new fibres and other textile products.
The importance of labelling, packaging and corporate identification.
The advertising and promotion of textile products.
An awareness of multi national textile companies and the concept of global marketing.
Meeting customer requirements/profitability through identifying socio-economic groups and demographic trends, niche marketing.

The role of the designer

The professional interfaces between client/designer, designer/manufacture, manufacture/user.
An awareness of constraints placed upon designers including environmental issues.
Social, political, ethical influences.

13.6 Design in the Human
Context

Health and Safety

Issues of health and safety in relation to industrial, commercial and trading practices. COSHH.

BSI standards for product testing.

**Impact of technological
development**

Balance between gain and loss for the individual and the community in terms of ethical, social, environmental and economic considerations.

Product Design: Textiles

A2 Section C

Processes and Manufacture

13.7 Industrial and Commercial Practice

ICT applications

Appreciation and understanding of the use of CAM for fabric printing and weaving, pattern drafting and grading, robotic control for garment construction.

Use of ICT in manufacturing data control (EDI).

EDP (Electronic Data Processing).

EDI (Electronic Data Interchange).

CAA (Computer Aided Administration) stock control.

CAD (Computer Aided Design) design of fabrics, products, colourways, product modelling, pattern construction.

CAM (Computer Aided Manufacture) understanding and application of fabric manufacture, lay planning, controlled cutting, controlled decoration, controlled pressing.

PPC (Production Planning and Control) networking.

Future implications – CIM (Computer Integrated Manufacture).

Global Production

Global production – offshore production/imports, branded/contracted goods.

Product maintenance

Care and maintenance of products HLCC.

International labelling, symbols, descriptions.

Understanding of temperature requirements for different fibres.

Testing for colour fastness.

Health and Safety

Risk assessment, Health and Safety issues.

13.8 Product Manufacturing

Fabric manufacture

Dyeing: Preparation of fabric, batch dyeing, continuous dyeing, resist methods.

Dye affinity to different fibres.

Grey goods, dyeing of yarns, fabric, garment piece goods. Dyeing in response to consumer demand.

Printing: direct, discharge, transfer, resist, hand (block, stencils), roller, rotary/flat bed screen-printing.

Finishing: mechanical – e.g. raising, calendering, pleating, shrinking, beetling, stone and sand washing.

Chemical: e.g. water repellency, laminating, stain resistance, flame resistance, anti-static, mothproofing, anti-pilling, rot proofing, anti-felting, hygienic (sanitised).

Product manufacture

Production systems and distribution.

Unit production, quantity production; (batch, mass).

Production Organisation Systems: synchronised, section, progressive bundle, to include line and team working.

Production Planning and Control: line balancing, factory load.

Response to market demands (QRM).

In-depth production planning to include inputs, processes, outputs, loops and feedback.

13.9 Systems and Control

Quality control systems

Control of quality throughout the manufacturing process.

Quality assurance. Quality control data systems for garment/product manufacture.

Awareness of quality and finish in the manufacture of own products.

Key Skills and Other Issues

14

Key Skills – Teaching, Developing and Providing Opportunities for Generating Evidence

14.1 Introduction

The Key Skills Qualification requires candidates to demonstrate levels of achievement in the Key Skills of *Application of Number, Communication and Information Technology*.

The units for the ‘wider’ Key Skills of *Improving own Learning and Performance, Working with Others* and *Problem-Solving* are also available. The acquisition and demonstration of ability in these ‘wider’ Key Skills is deemed highly desirable for all candidates, but they do not form part of the Key Skills Qualification. Design and Technology, however, does offer unique opportunities for centres to incorporate all Key Skills in their teaching.

Copies of the Key Skills Units may be downloaded from the QCA web site (<http://www.qca.org.uk>).

The units for each Key Skill comprise three sections:

- A What you need to know.
- B What you must do.
- C Guidance.

Candidates following a course of study based on this specification for Design and Technology: Product Design can be offered opportunities to develop and generate evidence of attainment in aspects of all Key Skills. Areas of study and learning that can be used to encourage the acquisition and use of Key Skills, and to provide opportunities to generate evidence for Part B of the units, are signposted below. More specific guidance on integrating the delivery of Key Skills in courses based upon this specification is given in the AQA specification support material.

14.2 Key Skills Opportunities in Design and Technology: Product Design

The broad and multi-disciplinary nature of Design and Technology, that calls upon candidates’ abilities to demonstrate the transferability of their knowledge, understanding and skills, makes it an ideal vehicle to assist candidates to develop their knowledge and understanding of the Key Skills and to produce evidence of their application. The matrices below signpost the opportunities for the acquisition, development and production of evidence for Part B of each of the Key Skills units at *Level 3*, in the teaching and learning modules of this specification. The degree of opportunity in any one module will depend upon a number of centre-specific factors, including teaching strategies and level of resources.

Communication

What you must do	Signposting of Opportunities for Generating Evidence in Teaching Modules					
	1	2	3	4	5	6
C3.1a Contribute to discussions	✓	✓	✓	✓	✓	✓
C3.1b Make a presentation	✓	✓	✓	✓	✓	✓
C3.2 Read and synthesise information	✓	✓	✓	✓	✓	✓
C3.3 Write different types of documents	✓	✓	✓	✓	✓	✓

Application of Number

What you must do	Signposting of Opportunities for Generating Evidence In Teaching Modules					
	1	2	3	4	5	6
N3.1 Plan and interpret Information from different sources	✓	✓	✓	✓	✓	✓
N3.2 Carry out multi-stage calculations	✓	✓	✓	✓	✓	✓
N3.3 Present findings, explain results and justify choice of methods	✓	✓	✓	✓	✓	✓

Information Technology

What you must do	Signposting of Opportunities for Generating Evidence in Teaching Modules					
	1	2	3	4	5	6
IT3.1 Plan and use different sources to for and select information	✓	✓	✓	✓	✓	✓
IT3.2 Explore, develop and information, and derive new information	✓	✓	✓	✓	✓	✓
IT3.3 Present information including text, numbers and images	✓	✓	✓	✓	✓	✓

Working with Others

What you must do	Signposting of Opportunities for Generating Evidence in Teaching Modules					
	1	2	3	4	5	6
WO3.1 Plan the activity	✓	✓	✓	✓	✓	✓
WO3.2 Work towards agreed objectives	✓	✓	✓	✓	✓	✓
WO3.3 Review the activity	✓	✓	✓	✓	✓	✓

Improving own Learning and Performance

What you must do	Signposting of Opportunities for Generating Evidence in Teaching Modules					
	1	2	3	4	5	6
LP3.1 Agree and plan targets	✓	✓	✓	✓	✓	✓
LP3.2 Seek feedback and support	✓	✓	✓	✓	✓	✓
LP3.3 Review progress	✓	✓	✓	✓	✓	✓

Problem Solving

What you must do	Signposting of Opportunities for Generating Evidence in Teaching Modules					
	1	2	3	4	5	6
PS3.1 Recognise, explain and describe the problem	✓	✓	✓	✓	✓	✓
PS3.2 Generate and compare different ways of solving problems	✓	✓	✓	✓	✓	✓
PS3.3 Plan and implement options	✓	✓	✓	✓	✓	✓
PS3.4 Agree and review approaches to tackling problems	✓	✓	✓	✓	✓	✓

NB. The signposting in the six tables above, represents opportunities to acquire and produce evidence of the Key Skills which are possible through this specification. There may be other opportunities to achieve these and other aspects of Key Skills via this specification, but such opportunities are dependent on the detailed course of study delivered within centres.

14.3 Key Skills in the Assessment of Design and Technology: Product Design

The ‘main’ Key Skill of Communication must contribute to the assessment of Design and Technology: Product Design at AS and A Level. Aspects of Communication are an intrinsic part of Assessment Objective 1 and hence will form part of the assessment requirements for Units 1, 3 and 6.

All Key Skills pervade any Design and Technology course. They will therefore contribute to the quality of all work submitted for assessment and provide evidence for Key Skills assessment.

14.4 Further Guidance

More specific guidance and examples of tasks that can provide evidence of one or more Key Skill are given in the AQA specification support material.

15

Spiritual, Moral, Ethical, Social, Cultural and Other Issues

15.1 Spiritual, Moral, Ethical, Social and Cultural Issues

The study of design and technology should contribute substantially to candidates' understanding of moral, ethical, social and cultural issues. Such issues underlie all design and manufacturing activities and are explicitly referred to in Sections B and C of the Subject Content. Testing may occur in any unit and will specifically appear in coursework assessment.

15.2 European Dimension

AQA has taken account of the 1988 Resolution of the Council of the European Community in preparing this specification and associated specimen papers.

15.3 Environmental Education

AQA has taken account of the 1988 Resolution of the Council of the European Community and the Report *“Environmental Responsibility: An Agenda for Further and Higher Education”* 1993 in preparing this specification and associated specimen papers. Environmental considerations are important to the development of all designs and products. Awareness of these issues is specifically required in all sections of the Subject Content and will be tested in all Assessment Units. See para 17.2 D for details of coursework requirements.

15.4 Health and Safety

Health and safety impinges on all aspects of Design and Technology and requires consideration in terms of the maker, the manufacturer, the individual user and society at large. Health and Safety and related issues are expected therefore to be an integral part of all teaching. They will form part of the assessment criteria for all coursework units and may also be tested in any externally assessed unit.

15.5 Avoidance of Bias

AQA has taken great care in the preparation of this specification and associated specimen papers to avoid bias of any kind.

Centre-Assessed Component

16

Nature of Centre-Assessed Component

Unit 2 is the coursework unit for the AS specification and Units 4 and 5 are the coursework units for A2. Each has a different character and purpose, but all are concerned with the design and realisation of products using a range of manufacturing methods and a strong awareness of market influences. Collectively, the coursework units account for 50% of the A Level scheme of assessment.

The use of ICT in the presentation of coursework is expected and encouraged. Design and Technology is also a particularly appropriate subject for demonstrating broader ICT skills such as CAD/CAM and the wide range of other ICT applications referred to in the Subject Content. All of these will receive appropriate credit where they are used.

Materials suitable for coursework are not restricted to those listed in the Subject Contents. Candidates are expected to produce *Design and Technology* projects which gives scope for the use of such materials as ceramics and aspects of technology such as electronics. In short, projects are only limited by the candidate's imagination and the need to satisfy the Assessment Criteria.

Coursework also provides ample opportunities to provide evidence for all six Key Skills. *Working with Others*, for example, can involve “designing, making and presenting a product for a customer or client”. (Candidates should be aware, however, that the work they present for assessment must be their own.)

16.1 Unit 2 AS Coursework

Centres may produce coursework in a variety of ways for this unit. A single project, two smaller projects or a portfolio of work which satisfies the coursework requirements, are all acceptable approaches. Some centres may also wish to present a minor project supplemented by a portfolio of work. Whichever approach is adopted, the work should be presented on A4 or A3 paper and should represent approximately 40 hours of supervised time and candidates will be required to provide evidence of:

AS

Assessment Criteria	Designing	Making	Total
1 Investigation and clarification of problem	7	-	7
2 Development of design proposal	16	7	23
3 Communication and modelling	7½	3½	11
4 Making and manufacturing	-	23	23
5 Evaluation and testing	7	4	11
Total Marks	37½	37½	75

Coursework must be completed and marked in time for marks to be submitted to the AQA by 15 May in the year of examination.

**16.2 A2 Unit 4
Product study**

Candidates are required to submit an in-depth product study for assessment of approximately 2000 words presented on A4 paper. The study is expected to take approximately 20 hours of supervised time. The study will be marked by the centre and moderated by an AQA moderator. Examples of possible studies will be provided, but it is expected that many centres will wish to produce their own titles in order to combine the study with work experience or similar opportunities. Candidates should select areas of study which are of interest and value to them, in consultation with their teacher.

The work should be school-based and should also involve the appropriate liaisons with professional designers, industry and commerce where possible.

The study may be based on the development and manufacture of either a single product or a group of products together with all the processes involved. It should be noted that designing and manufacturing knowledge and understanding will be assessed in equal measure.

The study must be based on a proposition that can be explored and from which conclusions can be drawn and evaluated. The study is not to be seen as simply a historical survey or an account of all the material gathered, but as a demanding intellectual investigation that allows a candidate to develop their critical analytical faculties, learn from the work of existing designers and technologists and thus become influential regarding their own design and technological activity.

The study should allow a candidate to gain a critical understanding of the influences and effects of processes, products and design and technological activity. In addition, it should allow a candidate to demonstrate a recognition of the social, spiritual, moral and cultural values inherent in design and technological activities, together with developing critical evaluation skills in one or more of the following contexts: technical, aesthetic, economic, environmental, social and cultural. Moreover, it should provide an opportunity to develop an understanding of design production processes and industrial practices whilst examining the moral and ethical issues associated with manufacturing the product.

16.3 Examples of possible types of topics

- a** A study of the flow of materials or the technological processes underpinning the flow through a manufacturing company from the raw material, its processing and output to packaging for sale, together with identifying areas for improvement.
- b** A study of the development of a product, together with the reasons for changes to its design and manufacture and the success or otherwise of those changes.

A study of the influences a particular designer or group of designers has had on the development of a product and its manufacture or the processes supporting its manufacture and their implications, together with evaluating the impact their work has had, within a specified context, on the world of design.
- c**

16.4 Presentation

Before selecting a topic for the product study, it is essential that candidates study the assessment criteria for this module and the guidance notes

The vehicle for communicating understanding and the method of presentation will vary depending upon the media area and the type of study being undertaken. It is expected, however, that a variety of communication methods will be used wherever they are appropriate. The design and presentation of the work is clearly of importance and should allow the teacher to access easily the information and apply the assessment criteria when marking the study.

16.5 The Structure

The study should proceed through the following broad stages:

- 1 Identifying the topic in such a way that the purpose of the investigation and the desired outcome are clear.
- 2 Deciding how the investigation will be conducted, what data/information will be used and what methods will be used to collect it.
- 3 Carrying out the plan of action, making justified changes as and when the need arises.
- 4 Analysing the data/information gathered, drawing conclusions and where appropriate making recommendations.
- 5 Presenting the work effectively and clearly to the reader with regard to the tasks undertaken, the thinking that took place and the results that were achieved within the chosen context.

16.6 A2 Unit 5 Project

Candidates are required to submit a single, substantial project for assessment. The project should consist of a design folder presented on A4 or A3 paper and the associated outcome(s), and should represent approximately 50 hours of supervised time.

Candidates will be required to provide evidence of:

A2

Assessment Criteria	Designing	Making	Total
1 Investigation and clarification of problem	10	-	10
2 Development of design proposal	20	10	30
3 Communication and modelling	10	5	15
4 Making and manufacturing	-	30	30
5 Evaluation and testing	10	5	15
Total Marks	50	50	100

Coursework must be completed and marked in time for marks to be submitted to the AQA by 15 May in the year of examination. Although the AS and the A2 mark schemes are identical (see para 18), the top band of marks is reserved for A2 candidates. Candidates working at Advanced Level are also expected to take increased responsibility for the management of their major project. At this level, no set brief or task should be given to allow appropriate work to be identified by the candidates themselves, guided by their teachers. Candidates may respond to or adapt exemplar tasks provided in the exemplar materials, or devise their own using the guidelines given in para 17.

A Level design and technology involves increased emphasis on the industrial and commercial aspects of designing and making, an increased awareness of a wider range of users such as clients, manufacturers and the potential end user and an increased sensitivity to the wider effects of their work on society and the environment.

Guidance for Setting Centre-Assessed Component

17.1 Guidelines on Producing AS Portfolio Work

It is anticipated that teachers adopting the portfolio approach for AS coursework will wish to integrate assignments for assessment with their teaching. It is possible to produce five entirely separate assignments to match each of the five criteria (see para 18). It is equally possible that setting too many small assignments will fragment the process of designing. This would be highly artificial and unlikely to produce genuine design and technology work. It would be more appropriate to create realistic assignments which combine two or three criteria; for example, investigating a problem and developing a solution could be seen as a discrete activity. Communication and evaluation are likely to feature in any work produced and so it is a relatively simple matter to select the appropriate evidence to demonstrate the candidate's best achievements.

Where evidence for one criterion features in more than one piece of work, it is the teacher's responsibility to identify on the back of the Candidate Record Form where the best work is to be found. This will help to ensure moderators assess what teachers have selected for assessment.

17.2 Guidelines on the Writing of Project Outlines

A2 project outlines are given in the Exemplar Material. Candidates may use these or adapt them to their needs and the facilities and resources available. They may also use these outlines for an AS project but due consideration must be given to the different times available. It is expected that teachers will ensure each candidate has time to complete a quality project commensurate with his/her ability.

Candidates developing their own outlines should take note of the following guidelines. These are given here to help teachers ensure that the project outlines they approve will meet the needs of candidates, the requirements of the specification and the available resources. Teachers unsure of the appropriateness of a particular candidate's outlines may submit them to their Coursework Adviser for further advice.

- A** Does the outline encourage an integrated approach to designing and making and the application of knowledge?
- B** Has the candidate so written the context or problem that he/she will be able to demonstrate the highest level of his/her ability in each assessment criterion?

- C Where a single, broad context, e.g. design and make an educational toy, is to be given to the teaching group, has each candidate produced a brief for him/herself that will be individual, challenging and sufficiently detailed?
- D Does the project outline require the candidate to consider:
- systems and control
 - materials and components
 - provision for product maintenance where appropriate (e.g. remedial work, wash care labelling)
 - the effects and implications of technological activity (e.g. industrial, commercial, social, moral, economic, environmental factors)
 - repetition skills (e.g. multiple production)
 - use of CAD/CAM and ICT skills
 - design, manufacturing and product quality
 - health and safety in relation to the maker and others?

Account will be taken of the above during assessment as appropriate.

- E Are the physical and human resources available for the potential demands of the project?
- F Can the project be completed satisfactorily in the time available?
- G Will the task permit sufficient supervision to enable the teacher to certify that the candidate's work is his/her own?

18

Assessment Criteria

18.1 Introduction

The Assessment Criteria for AS and A2 Coursework are given below and this is followed by the criteria for the Product Study. AQA will provide exemplar material and detailed guidance to illustrate the standard of work required for each coursework unit.

The Assessment Criteria for AS and A2 coursework are common except that the top level for each criterion, printed in *italics*, is available only for A2 candidates. AS candidates' work will be marked out of a total of 75 marks and A2 candidates' work out of 100 marks.

Five criteria are produced for assessment and each criterion has five bands of marks. Each band should be viewed holistically when making assessments; a weakness in one element of a level, for example, can be balanced by strengths in another. Candidates who produce no work for a criterion, or who produce work below AS or A Level standard, should be awarded a mark of zero.

An assessment out of 5 marks for *Quality of Written Communication* (QWC) is also to be made for each of Units 2 and 5. See paragraph 20.3 for full details.

This makes the total possible mark for Unit 2 80 marks and for Unit 5 105 marks. QWC for the Product Study is an integral part of the *Presentation* section of the Assessment Criterion and therefore separate marks have not been allocated.

All coursework needs to be completed and collected in sufficient time for teachers to mark and submit marks by 15 May. It is recommended that formative assessments are made during its production to provide candidates with feedback on their progress and to ease the marking load at the end of the course. It will be necessary, however, to re-assess work at the end of the coursework period to ensure any additional work receives due credit.

18.2 AS and A2 Project Coursework Assessment Criteria

The assessment of coursework is divided into 50% Designing and 50% Making. For the five Assessment Criteria which follow, each statement has been clearly identified to show whether it is:

1. (a) (i) Primarily Designing (D)
(ii) Primarily Making (M)

It should be understood, however, that evidence of Designing or Making can be produced under most criteria, although the letters D and M do indicated where the main thrust is likely to be.

OR

- (b) A mixture of both (D/M).

Evidence of both may be produced under criteria marked D/M.

2. Two sets of criteria are not annotated because *Investigation and Clarification of Problems* is exclusively Designing, and *Making/Manufacturing* is exclusively Making.
3. The italicised text for section (a) under each heading applies only to A2 assessments.

1. Investigation and Clarification of Problems**(AS = 7 marks
A2 = 10 marks)**

- 8-10** **(a)** • *Identifies and collects a comprehensive range of primary and secondary information which is well organised and takes into account market needs/ trends/ demands.*
- *Perceptive analysis of information.*
 - *Design objective clearly and independently identified.*
 - *Comprehensive, well reasoned and explained specifications taking full account of the research information collected.*
- 6-7** **(b)** • Identifies and collects a good range of primary and secondary information which has been organised carefully, and takes into account market/ user needs and demands.
- Good analysis of information.
 - Design objective is quite clearly stated and attempts to respond to the information collected.
 - Specifications cover the main points and are well explained, taking into account the research information gathered.
- 4-5** **(c)** • Identifies and collects a useful range of primary and secondary information which shows some reasonable organisation and some awareness of market needs.
- Some analysis of information collected.
 - Prepares a design objective but may need occasional advice.
 - Specification lists most of the main points with some explanation.
- 2-3** **(d)** • Collects some primary and secondary information which shows some organisation, analysis and awareness of market needs.
- Reacts to suggestions and begins to formulate a design objective.
 - Specification identifies a reasonable range of points with one or two showing a little explanation.
- 0-1** **(e)** • Collects basic information from a very limited range of sources and shows a little awareness of market needs.
- Considerable help needed to formulate a design objective.
 - Specification identifies a few obvious points which are simplistically stated.

2. Development of a Design

Proposal

(AS = 23 marks)

A2 = 30 marks)

24–30

- (a)
- *Comprehensive and imaginative range of feasible ideas and/ or approaches which show flair and ingenuity. (D/M)*
 - *A sophisticated/ elegant solution which satisfies all of the requirements. (D)*
 - *Clear and full explanation of all decisions taken. (D)*
 - *Explores different proportions, material combinations, technologies and methods of production. (M)*

18–23

- (b)
- Varied range of imaginative and feasible ideas. (D/M)
 - Imagination/originality clearly evident. (D)
 - Good development of initial idea(s) or approach. (D/M)
 - Shows ability to discriminate. (D)
 - Clear and well reasoned explanations showing the details considered in arriving at a preferred solution. (D)
 - Experimented with a range of different materials and constructions. (M)

12–17

- (c)
- Adequate range of feasible ideas with some variety of approach/principle. (D/M)
 - Some imagination and/ or originality evident. (D)
 - Adequate development of initial idea(s) which improves the chances of success of the finished product. (D/M)
 - Some feasible solutions indicated with some sound explanation evident. (D)
 - Some willingness shown to experiment with a limited range of materials and constructions. (M)

6–11

- (d)
- Limited range of feasible ideas. (D/M)
 - Suggestions/approaches are largely predictable and lack originality. (D)
 - Some elementary development of an idea. (D)
 - Some explanation evident in at least one area. (M)

0–5

- (e)
- Initial thoughts/suggestions are simple variations of one idea or approach and lack originality. (D/M)
 - Some minor changes made to an initial idea which improve minor aspects. (D)
 - Explanation evident but simplistic. (D)
 - Drawing of a chosen idea has few details of constructions given. No use of mock-ups. (M)

3. Communication and Modelling**(AS = 11 marks****A2 = 15 marks)****12-15**

- (a)**
- *High level of presentation, modelling and communication skills, showing sensitivity and a high degree of accuracy. (D/M)*
 - *Wide range of appropriate materials, techniques and media used to convey all details necessary for third party manufacture to proceed smoothly at every stage. (M)*
 - *Provides clear and articulate verbal explanation about all aspects of the work. (D)*

9-11

- (b)**
- *Very good level of presentation, communication and modelling skills. (D/M)*
 - *Broad range of appropriate materials, techniques and media used to convey how the manufacturing process will proceed effectively at all stages. (M)*
 - *Can clearly explain work to others through discussion. (D)*

6-8

- (c)**
- *Good level of presentation, communication and modelling skills. (D/M)*
 - *Sufficient information is given, using a range of appropriate materials, techniques and media, so that own making/production can proceed. (M)*
 - *Able to talk through ideas with others. (D)*

3-5

- (d)**
- *Sound level of presentation, communication and modelling skills. (D/M)*
 - *Adequate information, using correct materials, techniques and media provided so that making/ production/prototyping can be started. (M)*
 - *With encouragement, can discuss ideas with others. (D)*

0-2

- (e)**
- *Evidence of presentation, communication and modelling skills at a basic level. (D/M)*
 - *Some of the information necessary to make the product included. (M)*
 - *Little attempt to communicate a logical approach to the problem. (D)*
 - *Limited ability to talk to others about the work. (D)*

4. Making/Manufacturing

(AS = 23 marks

A2 = 30 marks)

24–30

- (a)
- *Comprehensive and detailed plan for all stages of designing and making.*
 - *Able to adapt the work schedule in the light of changing circumstances and ongoing developments whilst still meeting realistic deadlines.*
 - *High level of making skills using materials, components and media.*
 - *Ability to adapt original design, where appropriate, whilst still working with precision and accuracy.*
 - *Detailed quality assurance and quality control checks built into the manufacturing process to ensure consistency when items are manufactured in quantity, demonstrating a very clear understanding and application of commercial and/or industrial practices.*

18–23

- (b)
- A very detailed plan which identifies sequence of activities to be followed in both designing and making in order to achieve a high quality outcome.
 - Detailed time schedule for each stage of designing and manufacture given.
 - Evidence to show how the method of manufacture may need to vary.
 - Very good level of making skills using materials, media and components at a well above average level of accuracy.
 - Evidence of modifications, where appropriate, during manufacture to improve the original design and ensure a good quality outcome.
 - Quality assurance and quality control checks built into the manufacturing process.
 - Demonstrates a clear understanding and application of commercial and/or industrial practices.

12–17

- (c)
- Good step by step plan that identifies the essential stages of designing and making.
 - Predicted time schedule given.
 - Comprehensive list of the tools, materials and processes to be used.
 - Good level of making skills using materials, components and media at an above average level of accuracy.
 - Competent use of tools and equipment to minimise waste.
 - Outcome is of acceptable quality and accuracy.
 - Able to adapt methods of manufacture to changing circumstances, showing some understanding and application of commercial and/or industrial practices.

- 6-11 (d) • Step by step plan identifying essential stages of designing and making.
- Tools, materials and process to be used listed.
 - Adequate level of skill using materials, components and media with some confidence.
 - Clear evidence of quality and accuracy in some aspects of the work.
 - Evidence of the ability to overcome problems to achieve a successful outcome.
 - Evidence of industrial and/or commercial practices is slight.

- 0-5 (e) • Elementary plan for the main stages of designing and making.
- Some tools/equipment and materials/ingredients/components listed.
 - Some ability to manipulate materials, components and media using a range of basic techniques.
 - Work shows some evidence of quality and accuracy.
 - Some attention paid to the quality of the finished product.
 - Functional and aesthetic characteristics of the finished product considered.

5. Evaluation and Testing

(AS = 11 marks

A2 = 15 marks)

- 12-15 (a) • *Highly detailed and comprehensive testing strategy used to make perceptive and critical comments that go beyond the original specification. (D/M)*
- *Such comments used to suggest ways to improve product. (D/M)*
 - *Very detailed judgements made throughout designing process based on personal and expert opinion. (D)*
 - *Views of consumers and others used to develop and refine the product. (D)*
 - *Detailed and perceptive judgements related to commercial and/or industrial practices. (D/M)*
- 9-11 (b) • Detailed and appropriate testing strategy employed from which critical judgements made on ways to improve product based on original specification. (D/M)
- Detailed evaluation comments made at appropriate stages throughout the designing process. (D)
 - Other people's views canvassed in depth at various points throughout the designing process. (D)
 - Detailed evaluative judgements related to commercial and/or industrial practice. (D/M)

- | | |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6-8 | <p>(c)</p> <ul style="list-style-type: none">• From a structured testing procedure, conclusions are drawn of ways to improve product. (D/M)• Other people's opinions taken into account throughout the folio. (D)• Important criteria used to comment on the design process throughout the folio. (D)• Initial specification is clearly used to comment on the final outcome. (D)• Good evaluative judgements relating to commercial and/or industrial practices. (D/M) |
| 3-5 | <p>(d)</p> <ul style="list-style-type: none">• Limited conclusions drawn from a simple testing strategy. (D/M)• Formative and summative evaluation comments throughout the folio based on minor criteria. (D)• Some evaluation relating to industrial and/or commercial practices. (D/M) |
| 0-2 | <p>(e)</p> <ul style="list-style-type: none">• Elementary testing used. (D/M)• Formative and summative comments are largely descriptive and predictable and based on personal opinion. (D)• Only limited evaluation related to commercial/ industrial practices. (D/M) |

18.3 Quality of Written Communication (QWC)

When the coursework for Unit 2 or Unit 5 is complete, an assessment of QWC out of 5 marks should be made and recorded on the Candidate Record Form. The total maximum marks are therefore 80 for Unit 2 and 105 for Unit 5.

The assessment of the candidate's ability should be determined across the submitted coursework as a whole using the criteria given below. Award zero only where the quality falls below the lowest criterion.

Marks

- 5 The candidate will express complex ideas extremely clearly and fluently. Sentences and paragraphs will follow on from one another smoothly and logically. Arguments will be consistently relevant and well structured. There will be few, if any, errors of grammar, punctuation and spelling.
- 3-4 The candidate will express moderately complex ideas clearly and reasonably fluently, through well-linked sentences and paragraphs. Arguments will be generally relevant and well structured. There may be occasional errors of grammar, punctuation and spelling.
- 2 The candidate will express straightforward ideas clearly, if not always fluently. Sentences and paragraphs may not always be well connected. Arguments may sometimes stray from the point or be weakly presented. There may be some errors of grammar, punctuation and spelling, but not such as to suggest a weakness in these areas.
- 1 The candidate will express simple ideas clearly, but may be imprecise and awkward in dealing with complex or subtle concepts. Arguments may be of doubtful relevance or obscurely presented. Errors in grammar, punctuation and spelling may be noticeable and intrusive, suggesting weaknesses in these areas.

18.4 Product Study Criteria

As with AS and A2 coursework, it is recommended that the Product Study is assessed as work progresses.

Marks will be allocated to the five aspects of the Product Study detailed below. A greater weight is given to *Analysis and Synthesis* and *Control, Evaluations and Recommendations* as they represent the most demanding aspects of the Product Study.

The study will be marked out of a total of 50 marks.

25 marks are allocated for the understanding of designing issues and

25 marks are allocated for the understanding of manufacturing issues.

1. Product Study Objectives and Context (5 marks)

- a. The context within which the study is set.
- b. The nature of the activity.
- c. What the candidate set out to achieve by undertaking the study.

2. The Plan of Action and its Execution (5 marks)

- a. What data were required to allow the study to be undertaken.
- b. How the data were collected and collated.
- c. The proposed action plan and its relationship to the stated objectives.
- d. What happened when the work was carried out, together with, if necessary, an explanation of how and why the plan was changed.

3. Analysis and Synthesis (20 marks)

- a. The relevance of the actual information presented.
- b. The quality of the analysis of the information.
- c. The quality of synthesis leading to conclusions being drawn.

4. Conclusions, Evaluations and Recommendations (15 marks)

- a. The accuracy of the Conclusions, Evaluations and Recommendations made given the nature of the Product Study.
- b. The quality of the Conclusions, Evaluations and Recommendations made from the investigation.
- c. The ways in which the study could be extended.

5. Presentation (5 marks)

It is recognised that the work will be presented in a variety of ways using various techniques that will be dependent upon the nature of the Product Study. There should however be evidence of:

- a. Clear and logical presentation that allows easy access to the information.
- b. Appropriate presentation techniques being employed.
- c. The use of a variety of techniques including the use of ICT.

18.5 Assessment Criteria for the Product Study

1. Objectives and Context (5 marks)

- 4-5** The candidate provides a detailed analysis of the factors involved and shows a clear understanding of the context, together with fully explaining the value of the study with regard to both design and manufacture.
- 2-3** The candidate provides some analysis of the factors involved and shows an understanding of the context. There is some evidence of thought concerning the value of the study with regard to both design and manufacture.
- 0-1** The candidate shows some understanding of the context, but there is limited evidence with regard to the value of the study and the analysis of the factors involved with regard to both design and manufacture.

2. The Plan of Action and its Execution (5 marks)

- 4-5** The candidate clearly identifies a range of appropriate investigative techniques that are undertaken successfully and demonstrates a very good understanding of both designing and manufacturing. The collation of the data is excellent and the action plan is both thorough and relevant. The way the study has been executed and any necessary changes are very clear.
- 2-3** The candidate identifies a range of appropriate investigative techniques that are undertaken successfully and demonstrates a good understanding of both designing and manufacturing. The collation of the data is good and the action plan is thorough, but not always relevant. The way the study has been executed and any necessary changes are quite clear.
- 0-1** The candidate identifies some appropriate investigative techniques, which are undertaken only with limited success and demonstrates some understanding of designing and/or manufacturing. The collation of the data is weak and the action plan lacks cohesion. The way the study has been executed and any necessary changes are unclear.

3. Analysis and Synthesis (20 marks)

- 14-20** The candidate displays high level analytical skills and has selected relevant information with real flair and discrimination, regarding both designing and manufacturing together with their moral and ethical implications.

- 6-13** The candidate displays good analytical skills and has selected information that is mostly relevant and shown some flair and discrimination, regarding both designing and manufacturing together with their moral and ethical implications.
- 0-5** The candidate has selected some relevant information, but there is little evidence of flair and discrimination, regarding either designing or manufacturing and with their moral and ethical implications.

4. Conclusions, Evaluations and Recommendations (15 marks)

- 11-15** The candidate provides a critical analysis of the results of the study and fully justifies the Conclusions, Evaluations and Recommendations, together with displaying an excellent understanding of the ways in which the study could be extended, with regard to both designing and manufacturing.
- 5-10** The candidate provides an analysis of the results of the study and justifies the Conclusions, Evaluations and Recommendations, together with displaying a good understanding of the ways in which the study could be extended, with regard to both designing and manufacturing.
- 0-4** The candidate provides a limited analysis of the results of the study and draws some Conclusions, Evaluations and Recommendations, together with displaying some understanding of the ways in which the study could be extended, with regard to designing and/or manufacturing.

5. Presentation (5 marks)

- 4-5** The candidate's submission is very clearly and logically presented and utilises entirely appropriate and varied techniques. An informed third party can access the information very easily, with regard to both designing and making and there is clear and varied evidence of the use of ICT.
- 2-3** The candidate's submission is clear and logically presented and utilises a number of appropriate and varied techniques. An informed third party can access the information, with regard to both designing and making. There is some evidence of the use of ICT.
- 0-1** The candidate's submission is clear and logically presented and utilises a number of appropriate and varied techniques. An informed third party can access the information, with regard to designing and making, but there is little or no evidence of the use of ICT.

18.6 Evidence to Support the Award of Marks

Candidates will be required to submit a portfolio of work and appropriate evidence of making/manufacturing for each coursework unit. Portfolios should show full evidence for the relevant assessment criteria, together with relevant evidence of making/manufacturing knowledge and understanding and, where appropriate, skills.

In addition, teachers should provide explanatory notes on the Candidate Record Form where it is considered important to draw certain aspects of a candidate's work to the attention of the moderator. Such annotation should also be of value for internal standardising and providing feedback to candidates as their work progresses.

Teachers should keep records of their assessments during the course, in a form which facilitates the complete and accurate submission of the final assessments at the end of the course.

When the assessments are complete, the final marks awarded under each of the assessment criteria must be entered on the appropriate Candidate Record Form, with supporting information where relevant given in the spaces provided.

A Candidate Record Form for each coursework unit submitted must be attached to the candidate's work.

Supervision and Authentication

19.1 Supervision of Candidates' Work

Candidates' work for assessment must be undertaken under conditions which allow the teacher to supervise the work and enable the work to be authenticated. If it is necessary for some assessed work to be done outside the centre, sufficient work must take place under direct supervision to allow the teacher to authenticate each candidate's whole work with confidence.

It is accepted that in design and technology candidates will draw on the work and ideas of other designers. It must be understood however that to present the work of others without acknowledgement will be regarded as deliberate deception. Such sources should be acknowledged in the text of their design work or in a bibliography.

19.2 Guidance by the Teacher

The work assessed must be solely that of the candidate concerned. Any assistance given to an individual candidate which is beyond that given to the group as a whole must be recorded on the Candidate Record Form.

As coursework is such a significant element of this specification, it must be seen as much a vehicle for teaching as for assessment. It is expected therefore that teachers will continue to teach and support their candidates as part of normal teaching. Advice given should normally be presented in such a way that candidates have alternative possibilities to explore and can make their own decisions about accepting it.

19.3 Unfair Practice

At the start of the course, the supervising teacher is responsible for informing candidates of the AQA Regulations concerning malpractice. Candidates must not take part in any unfair practice in the preparation of coursework to be submitted for assessment, and must understand that to present material copied directly from books or other sources without acknowledgement will be regarded as deliberate deception. Centres must report suspected malpractice to AQA. The penalties for malpractice are set out in the AQA regulations.

19.4 Authentication of Candidates' Work

Both the candidate and the teacher are required to sign declarations confirming that the work submitted for assessment is the candidate's own. The teacher declares that the work was conducted under the specified conditions, and records details of any additional assistance.

Standardisation

20.1 Standardisation Meetings

Annual standardisation meetings will usually be held in the autumn term. Centres entering candidates for the first time must send a representative to the meetings. Attendance is also mandatory in the following cases:

- where there has been a serious misinterpretation of the specification requirements;
- where the nature of coursework tasks set by a centre has been inappropriate;
- where a significant adjustment has been made to a centre's marks in the previous year's examination.

Otherwise attendance is at the discretion of centres. At these meetings support will be provided for centres in the development of appropriate coursework tasks and assessment procedures.

20.2 Internal Standardisation of Marking

The centre is required to standardise the assessments across different teachers and teaching groups to ensure that all candidates at the centre have been judged against the same standards. If two or more teachers are involved in marking a component, one teacher must be designated as responsible for internal standardisation. Common pieces of work must be marked on a trial basis and differences between assessments discussed at a training session in which all teachers involved must participate. The teacher responsible for standardising the marking must ensure that the training includes the use of reference and archive materials such as work from a previous year or examples provided by AQA. The centre is required to send to the moderator the Centre Declaration Sheet, duly signed, to confirm that the marking of centre-assessed work at the centre has been standardised. If only one teacher has undertaken the marking, that person must sign this form.

Administrative Procedures

21.1 Recording Assessments

The candidates' work must be marked according to the assessment criteria set out in Sections 18.2 to 18.5. The marks and supporting information must be recorded in accordance with the instructions in Section 18.6. The completed Candidate Record Form(s) for each candidate must be attached to the work and made available to AQA on request. A separate Candidate Record Form is provided for each of the three centre-assessed components.

21.2 Submitting Marks and Sample Work for Moderation

The total component mark for each candidate must be submitted to AQA by the specified date on the relevant mark sheet(s) provided by AQA or via Electronic Data Interchange (EDI). Centres will be informed which candidates' work is required in the samples to be submitted to the moderator.

21.3 Factors Affecting Individual Candidates

Details for candidates with particular requirements are available from AQA and centres should ask for a copy of "*Regulations and Guidance relating to Candidates with Particular Requirements*".

Teachers should be able to accommodate the occasional absence of candidates by ensuring that the opportunity is given for them to make up missed assessments.

Special consideration should be requested for candidates whose work has been affected by illness or other exceptional circumstances. If work is lost, AQA should be notified immediately of the date of the loss, how it occurred, and who was responsible for the loss. AQA will advise on the procedures to be followed in such cases.

Where special help which goes beyond normal learning support is given, AQA must be informed so that such help can be taken into account when assessment and moderation take place.

Candidates who move from one centre to another during the course sometimes present a problem for a scheme of internal assessment. Possible courses of action depend on the stage at which the move takes place. If the move occurs early in the course the new centre should take responsibility for assessment. If it occurs late in the course it may be possible to accept the assessments made at the previous centre. Centres should contact AQA at the earliest possible stage for advice about appropriate arrangements in individual cases.

21.4 Retaining Evidence

The centre must retain the work of all candidates, with the Candidate Record Forms attached, under secure conditions, from the time it is assessed, to allow for the possibility of an enquiry upon result. The work may be returned to candidates after the issue of results provided that no enquiry upon result is to be made which will include re-moderation of the coursework component. If an enquiry upon result is to be made, the work must remain under secure conditions until requested by AQA.

22

Moderation

22.1 Moderation Procedures

One moderator will be appointed for Unit 2 and Unit 5. A separate moderator will be appointed for Unit 4, the Product Study.

Moderation of coursework will be achieved by a mixture of postal inspection of written/design work and, for Units 2 and 5, centre visits to assess practical outcomes. Moderators will re-assess samples of work from each centre. The centre's marks must be submitted to AQA by the 15 May in the year in which the qualification is awarded. A copy must be sent to the appointed moderator at the same time. Instructions about sending the sample of work to the moderator will be given in the Spring Term.

22.2 Post-Moderation Procedures

On publication of the GCE results, the centre is supplied with details of the final marks for the coursework component(s).

The candidates' work is returned to the centre after the examination. The centre will also receive feedback on the appropriateness of the tasks set, the accuracy of the assessments made, and the reasons for any adjustments to the marks.

Some candidates' work may be retained by AQA for archive or training purposes.

Awarding and Reporting

23

Grading, Shelf-Life and Re-Sits

23.1 Qualification Titles

The qualifications based on this specification have the following titles.

- AQA Advanced Subsidiary GCE in Design and Technology: Product Design.
- AQA Advanced Level GCE in Design and Technology: Product Design.

23.2 Grading System

Both the AS and the full A Level qualifications will be graded on a five-grade scale: A, B, C, D and E. Candidates who fail to reach the minimum standard for grade E will be recorded as U (unclassified) and will not receive a qualification certificate.

Individual assessment unit results will be certificated.

23.3 Shelf-Life of Unit Results

The shelf-life of individual unit results, prior to the award of the qualification, is limited only by the shelf-life of the specification.

23.4 Assessment Unit Re-Sits

Each assessment unit may be re-taken an unlimited number of times within the shelf-life of the specification. The best result will count towards the final award. However, marks for individual units may be counted once only to an AS and/or A level award. Candidates who repeat an award and who do not decline their previous grade must re-take all units.

23.5 Minimum Requirements

Candidates will be graded on the basis of work submitted for the award of the qualification.

23.6 Awarding and Reporting

The regulatory authorities, in consultation with GCE awarding bodies, developed a revised Code of Practice for new GCE qualifications which were introduced in September 2000. This specification complies with the grading, awarding and certificate requirements of the current GCSE, GCE, GNVQ and AEA Code of Practice April 2007 and will be revised in the light of any subsequent changes for future years.

Appendices

A

Grade Descriptions

The following grade descriptors indicate the level of attainment characteristic of the given grade at A Level. They give a general indication of the required learning outcomes at each specific grade. The descriptors should be interpreted in relation to the content outlined in the specification; they are not designed to define that content.

The grade awarded will depend in practice upon the extent to which the candidate has met the assessment objectives (as in Section 6) overall. Shortcomings in some aspects of the examination may be balanced by better performances in others.

GRADE A

Combining their designing and making skills with knowledge and understanding, candidates:

- a when generating ideas and clarifying the task, use an imaginative range of appropriate primary research methods, analyse and record information and demonstrate a high degree of selectivity;
- b when developing and communicating ideas, take into account functionality, aesthetics, ergonomics, maintainability, quality and user preferences, then work to a specification which could be developed in conjunction with an external partner or client. Take account of commercial manufacturing requirements in terms of scale of production, time and resource management. Demonstrate an understanding of product life cycles.

Initiate and develop a wide range of imaginative and feasible alternative ideas, showing that they effectively and completely satisfy all of the specification criteria. Demonstrate high level communication skills through a wide variety of appropriate and effective methods and techniques, including information technology, graphical, numerical and linguistic;

- c when planning and evaluating, demonstrate good management of time and resources in the development of design proposals and appropriately test and evaluate final outcomes, as well as the various stages of development, discriminating between aspects which performed well and others which could be further improved. Evaluate the effect of the design proposal upon the wider society, taking into account, spiritual, moral, social, economic and environmental implications.

- d when making, demonstrate demanding and high level skills which include shaping, forming, assembly and finishing, and show imaginative use of materials. Take into account quality assurance procedures and precise and appropriate levels of tolerance in the realisation of design proposals. Select, use and demonstrate understanding of a range of materials/components and production processes appropriate to the specification and the scale of production. Demonstrate high levels of safety awareness both in the working environment and beyond.

GRADE C

Combining their designing and making skills with knowledge and understanding, candidates:

- a when generating ideas use a wide range of appropriate research methods, analyse and record information and demonstrate a degree of selectivity;
- b when developing and communicating ideas, take into account functionality, aesthetics, ergonomics, maintainability, quality and user preferences. Take account of commercial manufacturing requirements in terms of scale of production, time and resource management.

Initiate and develop a range of feasible alternative ideas and show that they satisfy all of the specification criteria. Demonstrate a good level of communication skills through a variety of appropriate and effective methods and techniques, including information technology, graphical, numerical and linguistic;

- c when planning and evaluating, demonstrate management of time and resources in the development of the design proposal and test and evaluate both final outcomes and the various stages of development. Evaluate the effect of design proposals upon the wider society, taking into account, spiritual, moral, social, economic and environmental implications;
- d when making, demonstrate high level skills which include, shaping, forming, assembly and finishing. Take into account quality assurance procedures and appropriate levels of tolerance in the realisation of their design proposals. Select, use and demonstrate understanding of a range of materials/components and production processes appropriate to the specification and the scale of production. Demonstrate safety awareness both in their working environment and beyond.

GRADE E

Combining their designing and making skills with knowledge and understanding, candidates:

- a when generating ideas, use a range of research methods, analyse and record information appropriately:
- b when developing and communicating ideas, take into account functionality, aesthetics, ergonomics, quality and user preferences. Take some account of commercial manufacturing requirements in terms of scale of production, time and resource management, although this may be superficial.

Initiate and develop a limited range of feasible alternative ideas and show that they satisfy most of the specification criteria. Demonstrate a range of communication methods and techniques to a competent level, including information technology, graphical, numerical and linguistic;

- c when planning and evaluating, demonstrate some management of time and resources in the development of the design proposal and test and evaluate both the final outcome and the various stages of development. Evaluate the effect of design proposals upon the wider society, possibly taking into account, spiritual, moral, social, economic and environmental implications;
- d when making, demonstrate an adequate level of making/modelling skills which include, shaping, forming, assembly and finishing. Take into account quality assurance procedures and levels of tolerance in the realisation of their design proposals. Select, use and demonstrate understanding of a limited range of materials/components and production processes appropriate to the specification and the scale of production. Demonstrate safety awareness in their working environment.

B

Record Forms

Candidate Record Forms and Centre Declaration Sheets are available on the AQA website in the Administration area. They can be accessed via the following link: http://www.aqa.org.org.uk/admin/p_course.php

C

Overlaps with Other Qualifications

Overlaps exist between this and the Design and Technology: Food Technology and Systems and Control Technology specifications. The overlap is primarily in the design process and the scheme of assessment. As all three specifications conform to the AS/A Design and Technology Subject Criteria, there are also overlaps of broad content, e.g. ICT, Health and Safety, systems and control, industrial and commercial practice, but each is dealt with in the context of the material areas embodied in the specification title.