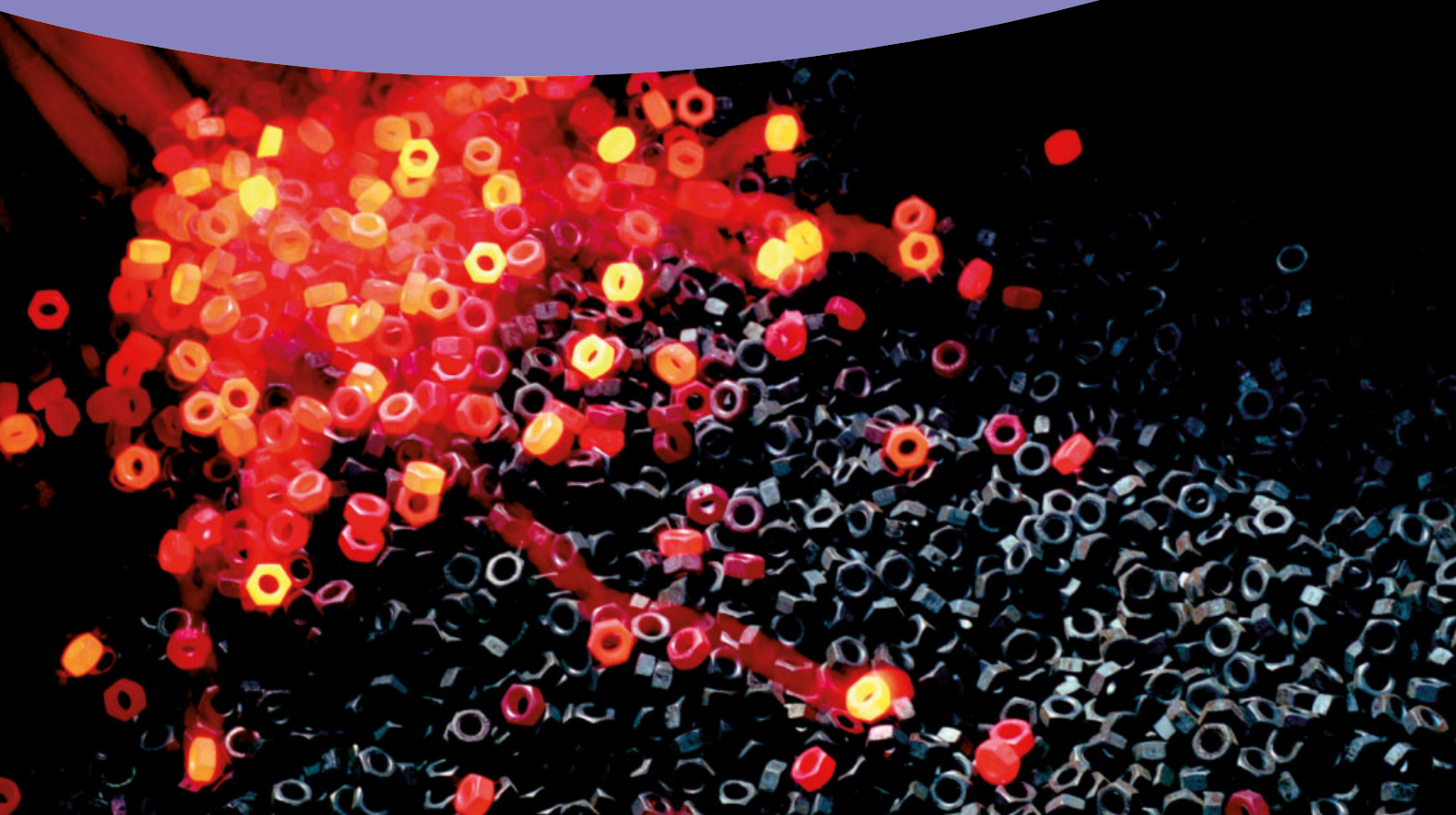
GCE

AS and A Level Specification

Design and Technology: Product Design (3-D Design)

For exams from June 2014 onwards
For certification from June 2014 onwards



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Vertical black lines indicate a significant change or addition to the previous version of this specification.

1 Introduction

1.1 Why choose AQA?

It's a fact that AQA is the UK's favourite exam board and more students receive their academic qualifications from AQA than from any other board. But why does AQA continue to be so popular?

- **Specifications**
  Ours are designed to the highest standards, so teachers, students and their parents can be confident that an AQA award provides an accurate measure of a student's achievements. And the assessment structures have been designed to achieve a balance between rigour, reliability and demands on candidates.
- **Support**
  AQA runs the most extensive programme of support meetings; free of charge in the first years of a new specification and at a very reasonable cost thereafter. These support meetings explain the specification and suggest practical teaching strategies and approaches that really work.
- **Service**
  We are committed to providing an efficient and effective service and we are at the end of the phone when you need to speak to a person about an important issue. We will always try to resolve issues the first time you contact us but, should that not be possible, we will always come back to you (by telephone, email or letter) and keep working with you to find the solution.
- **Ethics**
  AQA is a registered charity. We have no shareholders to pay. We exist solely for the good of education in the UK. Any surplus income is ploughed back into educational research and our service to you, our customers. We don't profit from education, you do.

If you are an existing customer then we thank you for your support. If you are thinking of moving to AQA then we look forward to welcoming you.

1.2 Why choose Design and Technology: Product Design (3-D Design)?

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

The specification retains much of the content of the previous GCE specification and continues to provide candidates with the opportunity to design and make a product (or, in the case of AS, a number of smaller products) in both years of the course.

Changes have been made to the coursework assessment criteria in an effort to assimilate into the major project at A2 the most useful aspects of the Product Study from the previous specification. A revised Candidate Record Form has been introduced in an attempt to limit the volume of work submitted in the folder and provide a focussed approach to the whole design-and-make activity.

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

1.3 How do I start using this specification?

Already using the existing AQA Product Design (3D Design) specification?

- Register to receive further information, such as mark schemes, past question papers, details of teacher support meetings, etc, at **http://www.aqa.org.uk/rn/askaqa.php**. Information will be available electronically or in print, for your convenience.
- Tell us that you intend to enter candidates. Then we can make sure that you receive all the material you need for the examinations. This is particularly important where examination material is issued before the final entry deadline. You can let us know by completing the appropriate Intention to Enter and Estimated Entry forms. We will send copies to your Exams Officer and they are also available on our website **http://www.aqa.org.uk/admin/p_entries.html**

Not using the AQA specification currently?

- Almost all centres in England and Wales use AQA or have used AQA in the past and are approved AQA centres. A small minority are not. If your centre is new to AQA, please contact our centre approval team at **centreapproval@aqa.org.uk**

1.4 How can I find out more?

Ask AQA

You have 24-hour access to useful information and answers to the most commonly-asked questions at **http://www.aqa.org.uk/rn/askaqa.php**

If the answer to your question is not available, you can submit a query for our team. Our target response time is one day.

Teacher Support

Details of the full range of current Teacher Support meetings are available on our website at **http://www.aqa.org.uk/support/teachers.html**

There is also a link to our fast and convenient online booking system for Teacher Support meetings at **http://events.aqa.org.uk/ebooking**

If you need to contact the Teacher Support team, you can call us on 01483 477860 or email us at **teachersupport@aqa.org.uk**

2 Specification at a Glance

AS Examinations

AS Award 1551

Unit 1 – PROD1 Materials, Components and Application

50% of AS, 25% of A Level

2 hour written paper

80 marks

Based primarily on Materials and Components and consisting of three sections
Section 1 contains compulsory limited response questions
Section 2 offers a choice of one question from two
Section 3 contains one compulsory question

Available June only

Unit 2 – PROD2 Learning Through Designing and Making

50% of AS, 25% of A Level

Coursework – approx 50 hours

80 marks

Written (or electronic) design portfolio

Manufactured outcome(s)

Coursework may take a number of forms: a simple design-and-make project, two smaller projects or a portfolio of work

Available June only

A Level Examinations

A Level Award 2551

Unit 3 – PROD3 Design and Manufacture

25% of A Level

2 hour written paper

84 marks

Based primarily on Design and Manufacture and consisting of two sections
Candidates answer three questions: one question from three in each section, plus a final question from either section.

Includes synoptic assessment

Available June only

Unit 4 – PROD4 Design and Making Practice

25% of A Level

Coursework – approx 60 hours

85 marks

Written (or electronic) design folder

Manufactured outcome

Candidates submit evidence of a simple, substantial designing and making activity

Available June only

AS + A2 = A Level

3 Subject Content

3.1 Unit 1 PROD1 Materials, Components and Application

This unit provides details of the subject content to be covered by candidates at AS level. Candidates are required to use the knowledge and understanding stated when completing their coursework unit at AS.

The content has been divided into three sections:

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

3.1.1 Section A: Materials and Components

At AS level candidates should develop an understanding of the physical and mechanical properties of a broad range of materials and components. They should understand why these are used in specific applications with particular emphasis on the life-cycle of products including manufacture, use and disposal.

Candidates should have a good understanding of the methods by which materials and components can be manipulated to manufacture products. Through study and first-hand experience in practical project work, candidates will also develop knowledge of the health and safety issues relevant to working with materials. Coursework projects may also provide an opportunity for students to learn about the use of computer aided design (CAD) and computer aided manufacture (CAM), and the use of basic quality control measures.

In addition to this, through study and detailed analysis of a wide range of products, candidates should begin to develop knowledge and understanding of the broader issues for the designer such as: environmental sustainability of products and their manufacture, ergonomic and anthropometrics, inclusive design, and consumer safety.

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 woods

Hardwoods, including beech, oak, ash, mahogany, teak

Softwoods including: Scots pine, spruce, Douglas fir, and the availability of stock forms, including: rough sawn and P.S.E, 'FSC' marked softwood

Applications for natural woods e.g. furniture, decorative products, jewellery/craft, construction

Man-made boards

Man-made boards including: plywood, aero ply, flexi-ply, marine ply, chipboard, MDF and hardboard

Applications for man-made boards e.g. furniture, work surfaces and exterior projects

Laminates and veneers

Veneers such as beech, ash, oak, walnut, paper and foil backed

Laminates such as 'Formica' (coated printed paper or foil laminates)

Applications for veneers and laminates e.g. decorative surfaces, laminate flooring, jewellery furniture

Ferrous metals

Ferrous metals including: mild steel, high carbon steel, cast and wrought iron

Availability of stock forms such as sheet, bar, tube and angle

Applications for ferrous metals such as car body panels, tools, white goods and machine parts

Non-Ferrous metals

Non-ferrous metals including: aluminium, copper, zinc, gold, silver and titanium

Availability of stock forms e.g. sheet, tube, ingot

Applications for non-ferrous metals such as kitchen ware, jewellery, food wrapping, cans and electronics

Alloys

Ferrous alloys including: stainless steel, high speed steel and die (tool steel)

Applications for ferrous alloys e.g. kitchen ware, street furniture, cutting and press tools

Non-ferrous alloys including; bronze, brass, pewter, and duralumin/aluminium alloys

Applications for non-ferrous alloys such as ornaments, valves, boat fittings, sculpture, coins and jewellery

Polymers

Thermoplastics including: ABS, PET, PMMA (acrylic), Polypropylene, High Impact Polystyrene, Expanded Polystyrene, Low and High Density Polyethylene, Nylon and UPVC

Applications for thermoplastics such as mobile communications products, toys, car parts, packaging, kitchen ware, pipes and window frames

Thermosets including: Epoxy resins, Polyester resins, Urea Formaldehyde and Melamine Formaldehyde

Applications for thermosets such as decorative laminates, casting and encapsulation, tableware and electrical fittings

Biodegradable' polymers

Degradable polymers (Oxo-degradable)

Biodegradable polymers ('bio-batch' additive mixed polymers)

Compostable polymers including: cellulose based polymers such as Biopol, and corn starch based polymers such as Polylactide (PLA)

Applications for 'biodegradable polymers' such as carrier bags, plastic bottles and detergent sachets

Absorbable/water soluble polymers including: lactide, glycolide, ('Lactel') and 'Ecofilm'

Medical applications such as slow release medication, bone repair fixings, detergent washing liquid sachets

Elastomers

Common elastomers such as Thermoplastic Elastomers (TPE), Thermoplastic Rubber (TPR) and Liquid Silicon Rubber (LSR)

Applications for elastomers such as car bumpers and trims, and product grips (over mouldings)

Composites

Fibre Reinforced Polymers including: glass (GRP), Carbon Fibre (CFRP) and Kevlar

Applications for FRP such as boat building, sports car manufacture, performance sports equipment and body armour

Particle based composites including: concrete and cermets such as tungsten carbide

Applications for concrete such as structural building components, garden ornaments and paving

Applications for cermets such as cutting tools

Compliant materials

Paper: including layout paper, bleed proof, photo quality cartridge and watercolour

Applications such as design drawings, presentations and graphic products

Card including carton board, multi-sheet, laminated, corrugated, metal effects, and mount board

Applications such as model making and packaging

Reflective films and holograms

Applications such as reflective/warning patches, jewellery and security holograms

Polymer based sheet and films including: foam board, fluted and translucent polypropylene sheet, acetate, Styrofoam, modelling foam, low density polyethylene sheet, and plastazote foam

Applications such as packaging, point of sale displays, and model making

Smart Materials

Shape Memory Alloy (SMA), such as 'Nitonol' (Nickel-Titanium alloy). Applications such as flexible spectacles (superelastic wire), heat activated cable connectors, muscle wires, and fire sprinkler control

Thermochromic pigment (Smart colours). Applications such as thermometers, baby feeding products, kettles, steam irons, thermal warning patches, and hi-tech jewellery

Thermochromic sheet. Applications such as thermal warning patches, battery condition indicators and jewellery

Photochromatic pigment. Applications such as sunglasses, anti-flash visors, sun-blocking products and radiation indicators

Phosphorescent pigment. Applications such as emergency exit signs, jewellery and toys

Polymorph. Applications such as modelling grip prototypes

Modern Materials

Metal based, including: coated metals e.g. anodised aluminium sheet, nickel plated steels, polymer coated aluminium, Alu composite- (polythene cored aluminium sheet) Aluminium foam and titanium

Wood based-including: flexible MDF, flexi-ply, aircraft grade plywood, Hexaboard and paper backed veneers

Product components

Knock Down fittings including: Barrel nut and bolt, corner plates, block connectors and dowels

Common applications e.g. Flat Pack furniture

Fastenings including: wood screws, self tapping screws and bolts

Common applications such as temporary joining methods

Adhesives

Common adhesives and uses including:

Solvent Cement/Tensol 12 for joining acrylic

PVA for wood and papers

Contact Adhesive (Evostik) for mixed materials such as laminate to MDF

Epoxy resin (Araldite) for mixed materials such as metals to woods

UV hardening adhesive (Superglue substitute)

3.1.2 Section B: Design and Market Influences

Through study and detailed analysis of a wide range of products, candidates should begin to develop knowledge and understanding of the broader issues for the designer such as: environmental sustainability of products and their manufacture, ergonomic and anthropometrics, inclusive design, and consumer safety.

Environmental/Sustainability Issues

Selection of materials and manufacturing processes to reduce environmental impact

The 3R's – (Reduce, Reuse, and Recycle) and application to design and manufacture

Ergonomics and anthropometrics

The application of ergonomics and anthropometrics such as in the use of product shaping, textures, colours, and physical size to promote ease of use

Inclusive Design

How designers meet the needs of all users, including the disabled, in a range of product areas

Consumer Safety

At AS level, candidates should have an understanding of the main methods designers and manufacturers employ to ensure products are safe to use.

They should be able to describe basic safety features in products such as electrical consumer goods, toys

Candidates should be able to describe simple safety tests that they might use on products.

3.1.3 Section C: Processes and Manufacture

Candidates should have a good understanding of the methods by which materials and components can be manipulated to manufacture products. Through study and first-hand experience in practical project work, candidates will also develop knowledge of the health and safety issues relevant to working with materials. Coursework projects may also provide an opportunity for students to learn about the use of computer aided design (CAD) and computer aided manufacture (CAM), and the use of basic quality control measures.

Fabrication methods:

Woods

Traditional joining methods including: mortise and tenon, dowel, dovetail and comb

Knock Down Fittings and fastenings

Metals

Permanent joining methods such as: soldering, brazing, riveting, welding (including oxy-acetylene, MIG and spot)

Temporary joining methods such as self-tapping screws, machine screws, nut and bolt

Plastics

Permanent joining methods including plastic welding and bonding with adhesives

Forming methods:

Woods

Techniques including steam bending and laminating

Metals

Techniques including: press forming, cupping and deep drawing, drop forging and wrought iron forging techniques

Plastics

Techniques including: vacuum forming, thermoforming and line bending

Composites

'Lay-up' resin techniques, laminating, casting including: concrete and resin

Redistribution methods

Casting (including: sand, die and investment)
Extrusion techniques to manufacture bar and profiles

Metals

Casting, spinning and pressing

Cermets

Sintering

Polymers

Moulding processes including: injection moulding, blow moulding, rotational moulding and compression moulding

Wasting processes

Common wasting processes including: drilling, turning and milling

Profile or shape cutting using routers, millers, flame cutting, and laser cutting

Piercing and blanking processes

CAM Processing

For example:

CNC laser cutters for 2D cutting and engraving sheet materials

CNC routers for 3D machining of block and sheet materials

CNC plotter cutters for 2D printing and cutting of vinyl

Use of 3D printers or stereo lithographic modellers to prototype designs

Finishing materials and processes:

Woods

Common forms of wood preservatives including: water based, exterior, stains, yacht varnish and polyurethane varnish

Finishes to enhance aesthetics e.g. gloss paints, stains and colour wash and wax finishes

Methods of application including: spray, dip and pressure treating

Laminate coverings for sheet materials

Metals

Primers including zinc and red oxide primers

Paints including acrylic and cellulose based

Method of application including: brush, spray, dip and powder coating

Plating including: chrome, silver and tin plated

Galvanizing

Dip coating with polymers

Brushed/polished stainless steel

Polymers

Pigments and stabilisers. Applied finishes including: acrylic paints and chrome effects

Health and Safety

COSHH-Control of Substances Hazardous to Health

Health and safety precautions associated with common school workshop processes

General health and safety measures carried out to protect employees in manufacturing industries

Risk assessments for hand and commercial processing

Quality Control

Inspection of stock materials for defects

Use of measuring devices including callipers, micrometers and go/ no go gauges

Use of drilling jigs and templates

Use of mitre saws and mitre blocks

Use of welding jigs or fixtures

3.2 Unit 2 PROD2 Learning Through Designing and Making

This unit is the AS Centre-Assessed Component.

This is a design-and-make unit where knowledge of the AS subject content is applied to the design and making of the candidates' own projects.

The Assessment Criteria for AS Coursework are given below. AQA will provide exemplar material and detailed guidance to illustrate the standard of work required for this coursework unit.

AS candidates' work will be marked out of a total of 80 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 standard, should be awarded a mark of zero.

Summary of Assessment Criteria

Assessment Criteria	AO1 Designing	AO2 Making	Maximum Mark Allocation
1 Investigation and Clarification of Problems	8		8
2 Development of Design Proposal	24		24
3 Making / Modelling		24	24
4 Evaluation and Testing	8	4	12
5 Communication and Presentation	8	4	12
Total	48	32	80

Criterion 1 Mark Band	Investigation and Clarification of Problems
7 – 8	• Comprehensive, organised range of sources of information including relevant practical investigations, taking into account current trends, available technologies and the needs of the client • Perceptive analysis of information • Comprehensive specification, well reasoned and based on research and investigation
5 – 6	• Wide range of sources of information, organised and supported by relevant practical investigations, taking into account current trends, available technologies and the needs of the client • Good analysis of information • Well-explained specification which reflects research and investigation
3 – 4	• A range of sources of information, supported by relevant practical investigations, with some consideration of available technologies and the needs of the client • Some analysis of information • A specification which is a list of points with some explanation
2	• Narrow range of sources of information supported by relevant practical investigations with little awareness of available technologies or the needs of the client • Little analysis of information • The specification is a range of points with one or two points explained
0 – 1	• Minimal sources of information and little awareness of the needs of the client • The specification identifies a few obvious points which are stated simplistically

Criterion 2 Mark Band	Development of Design Proposal
19 – 24	• Comprehensive, imaginative and feasible ideas • Excellent development of a sophisticated/elegant solution achieved by exploring and experimenting with different proportions, material combinations and the functions of materials, methods of production, construction and modelling • Full explanation of all decisions made • Comprehensive and detailed plan of making, including relevant quality control checks, in order to achieve a high quality outcome in the stated time
13 – 18	• Varied range of imaginative and feasible ideas • Good development of ideas achieved through experimental work and use of a range of different materials, showing understanding of the functions of the materials, construction techniques and modelling • Clear explanations given of all decisions made • Detailed plan of making, including relevant quality control checks, which identifies the sequence of activities to achieve a good quality outcome in the stated time
9 – 12	• Adequate range of feasible ideas with some imagination • Adequate development to allow a successful product with some experimental work with different materials and construction techniques • Sound explanations of decisions made • Good plan that identifies the essential stages of making; a predicted time schedule is given
5 – 8	• Limited range of feasible ideas, little imagination • Basic development with a little testing • Some explanation of decisions made • A plan that identifies the essential stages of making
0 – 4	• Simple ideas, lack of imagination • Minor changes to initial idea and no evidence of development • Simplistic explanation of design decisions made • Limited plan for the main stages of making

3

Criterion 3 Mark Band	Making/Modelling
19 – 24	• High level of making/modelling skills and accuracy using a varied range of materials with ability to adapt the original idea • Planned quality control checks are applied throughout the making/modelling to ensure consistency and safety • Outcome satisfies all major points of the specification • In-depth and detailed use of appropriate modelling strategies which help clarify the form of the prototype or product and production/manufacturing methods
13 – 18	• Very good level of making/modelling skills using a range of materials at well above average level of accuracy • Planned quality control checks are applied to the making/modelling • Outcome satisfies most major points of the specification • Sound use of appropriate modelling strategies which help clarify the form of the prototype or product and production/manufacturing methods
9 – 12	• Good level of making skills using materials at and above average level of accuracy • Planned quality control checks used in parts of the making/modelling • Outcome satisfies some points of the specification • Appropriate modelling strategies used to help develop the prototype or product
5 – 8	• Adequate level of skill using materials with some confidence • Some attention paid to the quality of the finished product • Parts of the outcome satisfy some points of the specification • Some modelling strategies used to help develop the prototype or product
0 – 4	• Some ability to manipulate a limited range of materials using basic techniques • Little attention paid to quality of the finished product • Little of the specification is met • Limited evidence of modelling strategies used to develop the prototype or product

Criterion 4 Mark Band	Evaluation and Testing
9 – 12	• Detailed and comprehensive testing strategy applied throughout with results used to inform the design and refine any modifications • All aspects of the final prototype or product tested and evaluated against the specification • Comments of others used appropriately to develop the prototype or product to improve the effectiveness of the final outcome
7 – 8	• Appropriate testing strategy applied throughout with results used to inform the design and any modifications • All relevant combinations of materials and processes tested and evaluated against the specification • Views of others sought at various points during the design process and used to develop and improve the outcome
5 – 6	• From a structured testing procedure, conclusions are drawn of ways to improve the product. • Some combinations of materials and processes are tested and evaluated against the specification • Other people's opinions taken into account
3 – 4	• From a basic testing procedure conclusions are used to suggest ways of improving the product • Limited testing and evaluation against the specification • Other people's opinions sought
0 – 2	• A basic testing procedure generates some conclusions. • Basic testing and evaluation against the specification • Formative and summative comments largely predictable and based on personal opinion

Criterion 5 Mark Band	Communication and Presentation
9 – 12	• Excellent level of communication and presentation, including competent use of appropriate technical language • Excellent wide range of appropriate materials, techniques and media used to convey details of designing and making • Complex ideas expressed extremely clearly and fluently in a structured and relevant way with few, if any, errors of grammar, punctuation and spelling
7 – 8	• Very good level of communication and presentation, including competent use of appropriate technical language • Very good range of appropriate materials, techniques and media used to convey details of designing and making • Moderately complex ideas expressed clearly and fluently in a reasonably structured and relevant manner with only occasional errors of grammar, punctuation and spelling
5 – 6	• Good level of communication and presentation with good use of appropriate technical language • Good range of materials, techniques and media used to convey the details of designing and making • Straightforward ideas expressed clearly with some errors of grammar, punctuation and spelling but not sufficient to suggest a weakness in these areas
3 – 4	• Reasonable level of communication and presentation with limited use of appropriate technical language • A limited range of materials, techniques and media used to convey the details of designing and making • Simple ideas expressed clearly with errors of grammar, punctuation and spelling indicating a weakness in these areas
0 – 2	• Evidence of communication and presentation at basic level with little use of technical language • Some attempt has been made to convey the details of designing and making • Some attempt made to express ideas with significant errors of grammar, punctuation and spelling suggesting major weaknesses in these areas

3.3 Unit 3: PROD3 Design and Manufacture

This unit provides details of the subject content to be covered by candidates at A2 level.

The content has been divided into three sections:

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

3.3.1 Section A: Materials and Components

There is an expectation that candidates will have a knowledge and understanding of Materials and Components, gained as a result of studying the subject content at AS level and developing this through their coursework at Unit 2.

At A2 this knowledge and understanding will be developed through Unit 4 coursework and a further study of how materials and components play a major part in the sections which follow:

- Design and Market Influences

e.g. the evolution, selection and application of materials for the manufacture of modern products. How the use and conservation of both energy and raw materials affect the selection and application of materials for the production and function of products today.

- Processes and Manufacture

e.g. the application of materials and components to suit specific production processes, from one-off to mass-production.

3.3.2 Section B: Design and Market Influences

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.

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

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

Design methods

Ways in which designing may be undertaken from the intuitive and informal to those requiring a more systematic approach

Recognition of real and artificial needs, client-centred and task analysis through mind mapping

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 and the relationship between the user and the product

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.

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 in Design

Selection and use of CAD, word processing, DTP

Development

Spreadsheets, databases and modelling software

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

Quality assurance and quality control

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

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

Design Methods

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

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

Design in the Human Context

Human needs and the effects of products and systems on society

Sustainability and Environmental Concerns

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

Green technology, environmental problems, planned obsolescence

Suitability for intended environment

3.3.3 Section C: Processes and Manufacture

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

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

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

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

3.4 Unit 4 PROD4 Design and Making Practice

This unit is the A2 Centre-Assessed Component.

This is a design-and-make unit where knowledge of the AS and A2 subject content is applied to the design and manufacture of candidates' own projects.

The Assessment Criteria for A2 coursework are given below. AQA will provide exemplar material and detailed guidance to illustrate the standard of work required for this coursework unit.

A2 candidates' work will be marked out of a total of 85 marks.

Six 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 A2 standard, should be awarded a mark of zero.

Summary of Assessment Criteria

Assessment Criteria	AO1 Designing	AO2 Making	Maximum Mark Allocation
1 Context and Objectives	5		5
2 Plan of Action and Clarification of Problem	6	2	8
3 Development of Design Proposal	26		26
4 Manufacture/Modelling		26	26
5 Conclusions, Evaluations and Recommendations	8	4	12
6 Communication and Presentation	6	2	8
Total	51	34	85

Criterion 1 Mark Band	Context and Objectives
5	• Detailed and perceptive understanding of the context which is then used to determine the objectives of the design and manufacture activity
4	• Sound understanding of the context which is used to determine the objectives of the design and manufacture activity
3	• Some understanding of the context which is used to determine objectives of the design and manufacture activity
2	• Little understanding of the context with few objectives of the design and manufacture activity stated
0 – 1	• Minimal or no understanding of the context. Only basic objectives of the design and manufacture activity are recorded

3

Criterion 2 Mark Band	Plan of Action and Clarification of Problem
7 – 8	• A detailed and realistic plan of action to meet stated objectives • Uses an extensive range of appropriate investigative techniques, including practical activities (where relevant) • Perceptive analysis of gathered information • A comprehensive, well-reasoned and explained design specification taking into account the research information gathered
5 – 6	• A detailed plan of action to meet stated objectives • Uses a wide range of appropriate investigative techniques, including practical activities (where relevant) • Good analysis of gathered information • A well-reasoned and explained design specification taking into account the research information gathered
3 – 4	• A plan of action which meets some of the stated objectives • Uses a range of appropriate investigative techniques, including practical activities (where relevant) • Some analysis of gathered information • A design specification with some explanation taking into account some of the research information gathered
2	• A simple plan of action • Uses several investigative techniques including practical activities (where relevant) • Little analysis of gathered information • A simple design specification with one or two points explained
0 – 1	• A limited plan of action • Uses basic investigative techniques including practical activities (where relevant) • Minimal analysis of gathered information • A limited design specification

Criterion 3 Mark Band	Development of Design Proposal
21 – 26	• Comprehensive and imaginative range of feasible ideas • Sophisticated and elegant solution achieved by exploring different proportions, materials and their functions, methods of production and construction • Design decisions fully explained • Comprehensive and detailed plan for manufacture, with the ability to adapt in the light of changing circumstances
16 – 20	• Varied range of imaginative and feasible ideas • Good development of product achieved by investigating a range of different materials and their functions and methods of production and construction. • Most design decisions fully explained • Detailed plan which identifies sequences of activities for manufacture
11 – 15	• An adequate range of feasible ideas with some imagination • Adequate development to allow a successful product to be produced which includes some experimental work with different materials and their functions and methods of production • Sound explanation of most design decisions • Good plan that identifies the essential stages of manufacture
6 – 10	• A limited range of feasible ideas with little imagination • Basic development with little evidence of testing • Basic explanation of design decisions • A plan that identifies the essential stages of manufacture
0 – 5	• Simple ideas, with lack of imagination • Minor changes to the original idea with little evidence of development • Limited explanation of design decisions • Limited plan for the main stages of manufacture

Criterion 4 Mark Band	Manufacture/Modelling
21 – 26	• High standards of manufacture/modelling using appropriate methods, technologies and materials and using a wide range of skills that demonstrate a high level of accuracy • Demonstrates and applies a thorough understanding of industrial practices • Evidence of appropriate health and safety and quality control checks throughout the making process to ensure consistency • Outcome satisfies all major points of the specification
16 – 20	• A very good standard of manufacture/modelling using appropriate methods, technologies and materials and using a wide range of skills with a good level of accuracy • Demonstrates and applies a clear understanding of appropriate industrial practices • Necessary health and safety issues and quality control checks built into manufacturing • Outcome satisfies most major points of the specification
11 – 15	• Good standard of manufacture/modelling, using appropriate methods, technologies and materials and using a range of skills with acceptable level of accuracy • Shows some understanding and application of industrial practices • Some consideration of health and safety issues and quality control checks is provided • Outcome satisfies some of the major points of the specification
6 – 10	• Adequate standard of manufacture/modelling using appropriate methods, technologies and materials and using skills with some accuracy • Shows basic understanding and application of industrial practices • Little evidence of health and safety issues and quality control checks • Outcome satisfies some points of the specification
0 – 5	• Limited standard of manufacture/modelling using methods, technologies and materials with little or no accuracy • A minimal understanding of industrial practices • Basic application of health and safety • Limited correlation between outcome and specification

Criterion 5 Mark Band	Conclusions, Evaluations and Recommendations
9 – 12	• A critical analysis of the design process and final outcome • Comprehensive testing strategies throughout the work including, where relevant, comments of others and consideration of industrial practices, used to make perceptive and critical judgements • An excellent understanding of the ways the outcome could be improved or extended
7 – 8	• A detailed analysis of the design process and final outcome • Good testing strategies throughout the work including, where relevant, comments of others and consideration of industrial practices, used to make appropriate judgements • A good understanding of the ways the outcome could be improved or extended
5 – 6	• Some analysis of the design process and/or final outcome • Reasonable testing strategies throughout the work including, where relevant, comments of others and consideration of industrial practices, used to make judgements • A reasonable understanding of the ways the outcome could be improved or extended
3 – 4	• Basic analysis of the design process and/or final outcome • Some testing strategies throughout the work including, where relevant, comments of others and consideration of industrial practices, used to make judgements • Some understanding of the ways the outcome could be improved
0 – 2	• Limited analysis of the design process and/or final outcome • Limited testing strategies throughout the work including, where relevant, comments of others and consideration of industrial practices, used to make judgements • Little understanding of the ways the outcome could be improved

Criterion 6 Mark Band	Communication and Presentation
7 – 8	• Excellent levels of communication and presentation, including competent use of appropriate technical language • Wide range of appropriate materials, techniques and media which conveys the details of design and manufacture • Complex ideas expressed extremely clearly and fluently in a structured and relevant way with few, if any, errors of grammar, punctuation and spelling
5 – 6	• Very good level of communication and presentation, including competent use of appropriate technical language • A good range of appropriate materials, techniques and media used to convey the details of design and manufacture • Moderately complex ideas expressed clearly and fluently in a reasonably structured and relevant manner with only occasional errors of grammar, punctuation and spelling
3 – 4	• Good level of communication and presentation with good use of appropriate technical language • A variety of appropriate materials, techniques and media used to convey the details of design and manufacture • Straightforward ideas expressed clearly with some errors of grammar, punctuation and spelling but not sufficient to suggest a weakness in these areas
2	• Reasonable level of communication and presentation with limited use of appropriate technical language • Sufficient information to show how the product has been designed and manufactured • Simple ideas expressed clearly with errors of grammar, punctuation and spelling indicating a weakness in these areas
0 – 1	• Evidence of communication and presentation at basic level with little use of technical language • The information appears disjointed; it may be difficult to see how the product has been designed and manufactured • Some attempt made to express ideas but with significant errors of grammar, punctuation and spelling suggesting major weaknesses in these areas

4 Scheme of Assessment

4.1 Aims

AS and A Level courses based on this specification should encourage candidates to:

- make use of tacit knowledge and reflective practices in order to work with tasks that are challenging and often require definition
- develop and sustain their creativity and innovative practice
- recognise and overcome challenges and constraints when working towards the production of high-quality products
- develop a critical understanding of the influences of the processes and products of design and technological activities from a contemporary and historical perspective
- draw on a range of skills and knowledge from other subject areas
- draw on and apply knowledge, understanding and skills of production processes to a range of design and technology activities
- develop an understanding of contemporary design and technology practices
- use digital technologies and information handling skills to enhance their design and technological capability
- recognise the values inherent in design and technological activities, and develop critical evaluation skills in technical, aesthetic, ethical, economic, environmental, sustainable, social, cultural and entrepreneurial contexts.

4.2 Assessment Objectives (AOs)

The Assessment Objectives are common to AS and A Level. Knowledge, understanding, skills and their applications are closely linked.

AS and A level specifications should require that all candidates demonstrate the following Assessment Objectives in the context of the content and skills set out in Section 3 (Subject Content).

The Assessment Objectives apply to the whole specification for AS and A Level.

AO1 Candidates should demonstrate specific knowledge and understanding and be able to apply that knowledge and understanding in combination with appropriate skills in their designing; and should communicate ideas and outcomes and demonstrate strategies for evaluation

AO2 Candidates should be able to demonstrate and apply skills, knowledge and understanding of relevant materials, processes and techniques, and use materials and equipment to produce suitable and appropriate outcomes; and should communicate ideas and outcomes and demonstrate strategies for evaluation

Quality of Written Communication (QWC)

In GCE specifications which require candidates to produce written material in English, candidates must:

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

In this specification QWC will be assessed in Units 2, 3 and 4 by means of specific criteria incorporated within the mark schemes.

Weighting of Assessment Objectives for AS

The table below shows the approximate weighting of each of the Assessment Objectives in the AS units.

Assessment Objectives	Unit Weightings (%)		Overall weighting of AOs (%)
	Unit 1	Unit 2	
AO1	30	30	60
AO2	20	20	40
Overall weighting of units (%)	50	50	100

Weighting of Assessment Objectives for A Level

The table below shows the approximate weighting of each of the Assessment Objectives in the AS and A2 units.

Assessment Objectives	Unit Weightings (%)				Overall weighting of AOs (%)
	Unit 1	Unit 2	Unit 3	Unit 4	
AO1	15	15	15	15	60
AO2	10	10	10	10	40
Overall weighting of units (%)	25	25	25	25	100

4.3 National Criteria

This specification complies with the following:

- The Subject Criteria for Design and Technology
- The Code of Practice for GCE
- The GCE AS and A Level Qualification Criteria
- The Arrangements for the Statutory Regulation of External Qualifications in England, Wales and Northern Ireland: Common Criteria

4.4 Prior Learning

There are no prior learning requirements.

We recommend that candidates should have acquired the skills and knowledge associated with a GCSE Design and Technology course or equivalent.

It must be emphasised that this is not a requirement for candidates wishing to study the course offered through this specification. Any requirements are set at the discretion of centres.

4.5 Synoptic Assessment and Stretch and Challenge

Synoptic assessment in Design and Technology: Product Design (3-D Design) is assessed in the A2 units by testing the candidates' understanding of the connections between the different elements of the subject and their holistic understanding of the subject (Unit 3) and by requiring the candidates to combine their designing and making skills with knowledge and understanding in order to produce a substantial designing and making activity (Unit 4).

The requirement that Stretch and Challenge is included at A2 is met by the assessment of candidates' understanding of the connectivity of the subject content through synoptic questions in Unit 3, including the requirement to answer questions of an open-ended, extended nature. Stretch and challenge is also addressed in Unit 4 where candidates are expected to apply their knowledge and understanding of the subject content in order to produce a significant design-and-make activity.

4.6 Access to Assessment for Disabled Students

AS/A Levels often require assessment of a broader range of competences. This is because they are general qualifications and, as such, prepare candidates for a wide range of occupations and higher level courses.

The revised AS/A Level qualification and subject criteria were reviewed to identify whether any of the competences required by the subject presented a potential barrier to any disabled candidates. If this were the case, the situation was reviewed again to ensure that such competences were included only where essential to the subject. The findings of this process were discussed with disability groups and with disabled people.

Reasonable adjustments are made for disabled candidates in order to enable them to access the assessments. For this reason, very few candidates will have a complete barrier to any part of the assessment.

Candidates who are still unable to access a significant part of the assessment, even after exploring all possibilities through reasonable adjustments, may still be able to receive an award. They would be given a grade on the parts of the assessment they have taken and there would be an indication on their certificate that not all the competences had been addressed. Candidates with a visual impairment may find this subject difficult to access fully. This will be kept under review and may be amended in the future.

5 Administration

5.1 Availability of Assessment Units and Certification

After June 2013, examinations and certification for this specification are available in June only.

5.2 Entries

Please refer to the current version of *Entry Procedures and Codes* for up-to-date entry procedures. You should use the following entry codes for the units and for certification.

Unit 1 – PROD1

Unit 2 – PROD2

Unit 3 – PROD3

Unit 4 – PROD4

AS certification – 1551

A Level certification – 2551

5.3 Private Candidates

This specification is available to private candidates under certain conditions. Because of the nature of the coursework, candidates must be attending an AQA centre which will supervise and assess the coursework. As we will no longer be providing supplementary guidance in hard copy, see our website for guidance and information on taking exams and assessments as a private candidate www.aqa.org.uk/exams-administration/entries/private-candidates

5.4 Access Arrangements and Special Consideration

We have taken note of equality and discrimination legislation and the interests of minority groups in developing and administering this specification.

We follow the guidelines in the Joint Council for Qualifications (JCQ) document: *Access Arrangements, Reasonable Adjustments and Special Consideration: General and Vocational Qualifications.* This is published on the JCQ website (**http://www.jcq.org.uk**) or you can follow the link from our website (**http://www.aqa.org.uk**).

Access Arrangements

We can make arrangements so that candidates with disabilities can access the assessment. These arrangements must be made **before** the examination. For example, we can produce a Braille paper for a candidate with a visual impairment.

Special Consideration

We can give special consideration to candidates who have had a temporary illness, injury or indisposition at the time of the examination. Where we do this, it is given **after** the examination.

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

5.5 Language of Examinations

We will provide units in English only.

5.6 Qualification Titles

Qualifications based on this specification are:

- AQA Advanced Subsidiary GCE in Design and Technology: Product Design (3-D Design), and
- AQA Advanced Level GCE in Design and Technology: Product Design (3-D Design).

5.7 Awarding Grades and Reporting Results

The AS qualification will be graded on a five-point scale: A, B, C, D and E. The full A Level qualification will be graded on a six-point scale: A*, A, B, C, D and E. To be awarded an A*, candidates will need to achieve a grade A on the full A Level qualification and an A* on the aggregate of the A2 units.

For AS and A Level, 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.

5.8 Re-sits and Shelf-life of Unit Results

Unit results remain available to count towards certification, whether or not they have already been used, as long as the specification is still valid.

Each unit is available in June only. Candidates may re-sit a unit any number of times within the shelf-life of the specification. The best result for each unit will count towards the final qualification. Candidates who wish to repeat a qualification may do so by re-taking one or more units. The appropriate subject award entry, as well as the unit entry/entries, must be submitted in order to be awarded a new subject grade.

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

6 Coursework Administration

The Head of Centre is responsible to AQA for ensuring that coursework/portfolio work is conducted in accordance with AQA's instructions and JCQ instructions.

6.1 Supervision and Authentication of Coursework

The Code of Practice for GCE requires:

- **candidates** to sign the Candidate Record Form (CRF) to confirm that the work submitted is their own, and
- **teachers/assessors** to confirm on the CRF that the work assessed is solely that of the candidate concerned and was conducted under the conditions laid down by the specification.

The completed CRF for each candidate must be attached to his/her work. All teachers who have assessed the work of any candidate entered for each component must sign the declaration of authentication. Failure to sign the authentication statement may delay the processing of the candidates' results.

The teacher should be sufficiently aware of the candidate's standard and level of work to appreciate if the coursework submitted is beyond the talents of the candidate.

In most centres teachers are familiar with candidates' work through class and homework assignments. Where this is not the case, teachers should make sure that **all** coursework is completed under direct supervision.

In all cases, some direct supervision is necessary to ensure that the coursework submitted can be confidently authenticated as the candidate's own.

- If it is believed that a candidate has received additional assistance and this is acceptable within the guidelines for the relevant specification, the teacher/assessor should award a mark which represents the candidate's unaided achievement. The authentication statement should be signed and information given on the relevant form.
- If the teacher/assessor is unable to sign the authentication statement for a particular candidate, then the candidate's work cannot be accepted for assessment.

6.2 Malpractice

Teachers should inform candidates of the AQA Regulations concerning malpractice.

Candidates must **not**:

- submit work which is not their own
- lend work to other candidates
- allow other candidates access to, or the use of, their own independently-sourced source material (this does not mean that candidates may not lend their books to another candidate, but candidates should be prevented from plagiarising other candidates' research)
- include work copied directly from books, the internet or other sources without acknowledgement or an attribution
- submit work typed or word-processed by a third person without acknowledgement.

These actions constitute malpractice, for which a penalty (eg disqualification from the examination) will be applied.

If malpractice is suspected, the Examinations Officer should be consulted about the procedure to be followed.

Where suspected malpractice in coursework/portfolios is identified by a centre after the candidate has signed the declaration of authentication, the Head of Centre must submit full details of the case to AQA at the earliest opportunity. The form JCQ/M1 should be used. Copies of the form can be found on the JCQ website (http://www.jcq.org.uk/).

Malpractice in coursework/portfolios discovered prior to the candidate signing the declaration of authentication need not be reported to AQA, but should be dealt with in accordance with the centre's internal procedures. AQA would expect centres to treat such cases very seriously. Details of any work which is not the candidate's own must be recorded on the coursework/portfolio cover sheet or other appropriate place.

6.3 Teacher Standardisation

We will hold annual standardising meetings for teachers, usually in the autumn term, for the coursework units. At these meetings we will provide support in developing appropriate coursework tasks and using the marking criteria.

If your centre is new to this specification, you must send a representative to one of the meetings. If you have told us you are a new centre, either by submitting an estimate of entry or by contacting the subject team, we will contact you to invite you to a meeting.

We will also contact centres if:

- the moderation of coursework from the previous year has identified a serious misinterpretation of the coursework requirements,
- inappropriate tasks have been set, or
- a significant adjustment has been made to a centre's marks.

In these cases, centres will be expected to send a representative to one of the following meetings. For all other centres, attendance is optional. If you are unable to attend and would like a copy of the materials used at the meeting, please contact the subject team at **dandt@aqa.org.uk**.

6.4 Internal Standardisation of Marking

Centres must standardise marking within the centre to make sure that all candidates at the centre have been marked to the same standard. One person must be responsible for internal standardisation. This person should sign the Centre Declaration Sheet to confirm that internal standardisation has taken place.

Internal standardisation involves:

- all teachers marking some trial pieces of work and identifying differences in marking standards
- discussing any differences in marking at a training meeting for all teachers involved in the assessment
- referring to reference and archive material such as previous work or examples from AQA's teacher standardising meetings

but other valid approaches are permissible.

6.5 Annotation of Coursework

The Code of Practice for GCE states that the awarding body must require internal assessors to show clearly how the marks have been awarded in relation to the marking criteria defined in the specification and that the awarding body must provide guidance on how this is to be done.

The annotation will help the moderator to see as precisely as possible where the teacher considers that the candidates have met the criteria in the specification.

Work could be annotated by either of the following methods:

- key pieces of evidence flagged throughout the work by annotation either in the margin or in the text
- summative comments on the work, referencing precise sections in the work.

6.6 Submitting Marks and Sample Work for Moderation

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

6.7 Factors Affecting Individual Candidates

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.

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. Centres should use the JCQ form JCQ/LCW to inform AQA Candidate Services of the circumstances.

Where special help which goes beyond normal learning support is given, AQA must be informed through comments on the CRF so that such help can be taken into account when moderation takes place (see Section 6.1).

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 arrange for the moderator to assess the work through the 'Educated Elsewhere' procedure. Centres should contact AQA at the earliest possible stage for advice about appropriate arrangements in individual cases.

6.8 Retaining Evidence and Re-using Marks

The centre must retain the work of all candidates, with CRFs attached, under secure conditions, from the time it is assessed, to allow for the possibility of an enquiry about results. The work may be returned to candidates after the deadline for enquiries about results. If an enquiry about a result has been made, the work must remain under secure conditions in case it is required by AQA.

6.9 Candidate Record Forms

A revised Candidate Record Form has been introduced for use with Unit 2 and Unit 4, the centre assessed components. Examples of both of the Candidate Record Forms are shown on the AQA website.

It is hoped that the introduction of these revised forms will be welcomed by centres as it is felt that they will offer benefits to candidates, teachers and moderators alike.

For candidates, the forms will provide a clear indication of the criteria against which they will be assessed and they will allow candidates to signpost where specific aspects of their folder work meets the stated criteria. The intention is to encourage candidates to provide succinct evidence of work undertaken and remove the requirement for the inclusion of large amounts of work in the folder.

The revised forms enable the teacher/assessor to clearly identify where evidence of meeting the criteria can be found, thereby facilitating the process of teacher/assessor annotation.

Finally, it is expected that the completion of these revised Candidate Record Forms will enable the moderator to more easily identify where appropriate credit has been awarded by the teacher/assessor.

For Unit 2 it is expected that the candidate will complete the Candidate Record Form to indicate where, in their folder work, they have addressed each of the assessment criterion. It is not expected that they will provide any more information other than the page reference in their folder to show where specific criteria have been addressed.

For Unit 4, candidates are asked to include in some sections of the Candidate Record Form specific information which will form part of the final project. In other sections they will need to indicate where in their folder particular assessment criteria have been addressed. By doing this it is hoped that we can encourage a more focussed approach by candidates and remove the need for an excessive number of pages in the folder.

7 Moderation

7.1 Moderation Procedures

Moderation of the coursework is by inspection of a sample of candidates' work, sent by post from the centre to a moderator appointed by AQA, and centre visits, where appropriate, to assess practical outcomes. The centre marks must be submitted to AQA and to the moderator by the specified deadline (see **http://www.aqa.org.uk/deadlines.php**). We will let centres know which candidates' work will be required in the sample to be submitted for moderation.

Following the re-marking of the sample work, the moderator's marks are compared with the centre marks to determine whether any adjustment is needed in order to bring the centre's assessments into line with standards generally. In some cases it may be necessary for the moderator to call for the work of other candidates in the centre. In order to meet this possible request, centres must retain under secure conditions and have available the coursework and the CRF of every candidate entered for the examination and be prepared to submit it on demand. Mark adjustments will normally preserve the centre's order of merit but, where major discrepancies are found, we reserve the right to alter the order of merit.

7.2 Post-moderation Procedures

On publication of the AS/A Level results, we will provide centres with details of the final marks for the coursework unit.

The candidates' work will be returned to the centre after moderation has taken place. The centre will receive a report with, or soon after, the despatch of published results, giving feedback on the appropriateness of the tasks set, the accuracy of the assessments made, and the reasons for any adjustments to the marks.

We reserve the right to retain some candidates' work for archive or standardising purposes.

Appendices

A Performance Descriptions

These performance descriptions show the level of attainment characteristic of the grade boundaries at A Level. They give a general indication of the required learning outcomes at the A/B and E/U boundaries at AS and A2. The descriptions 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 (see Section 4) overall.

Shortcomings in some aspects of the examination may be balanced by better performances in others.

AS Performance Descriptions for Design and Technology

	Assessment Objective 1	Assessment Objective 2
Assessment Objectives	Candidates should demonstrate specific knowledge and understanding and be able to apply that knowledge and understanding in combination with appropriate skills in their designing and should communicate ideas and outcomes and demonstrate strategies for evaluation.	Candidates should be able to demonstrate and apply skills, knowledge and understanding of relevant materials, processes and techniques and use materials and equipment to produce suitable and appropriate outcomes, and should communicate ideas and outcomes and demonstrate strategies for evaluation.
A/B boundary performance descriptions	Candidates characteristically: a) demonstrate specific knowledge and understanding of the working characteristics of materials, ingredients, components and their uses and/or systems and control • develop an appropriate brief and specification • understand quality issues • use correct technical language relevant to the task b) research and communicate a broad range of ideas and information effectively in a creative and innovative way through some recognition of values issues or uniqueness (for the candidate) or connections with other ideas • demonstrate that they understand the main features of industrial and commercial practices related to manufacturing systems including the use of ICT and stages of production • show that they understand health and safety issues through the regulatory and legislative framework c) demonstrate clear strategies for testing and evaluating by taking into account form and function of a product, trends and styles of products reflecting environmental, cultural and ethical/moral issues as well as stylistic and engineering considerations • analyse and assess information and ideas in appropriate ways, including ICT, enabling others to interpret them.	Candidates characteristically: a) apply skills that demonstrate understanding of the working characteristics and potential application of a range of materials, ingredients, components and/or systems and control including preparation and processing • demonstrate that they understand the principles of testing materials and/or components b) demonstrate that they understand and can carry out appropriate making processes during product development/ manufacture • understand and use safe working practices • use appropriate skills in the development of a practical outcome c) communicate ideas and outcomes • refine and/or modify products and/or manufacturing methods • use a range of criteria, for example social, economic, environmental, cultural, and ethical/moral considerations d) demonstrate clear strategies for testing and evaluating by analysing the planning, production and manufacturing methods.

A

AS Performance Descriptions (continued)

	Assessment Objective 1	Assessment Objective 2
E/U boundary performance descriptions	Candidates characteristically: a) demonstrate some understanding of how their knowledge and understanding of materials, ingredients, components and their uses meet general design criteria • develop an outline brief and specification b) communicate ideas and information appropriately • demonstrate that they understand at least one feature of industrial and commercial practices, a relevant manufacturing system and some stages of production c) demonstrate some strategies for testing and evaluating by taking into account form and function of a product and the need for appropriate modifications.	Candidates characteristically: a) demonstrate that they understand the application of a limited range of materials, ingredients and components including their uses • demonstrate some knowledge of testing a material or component b) demonstrate that they understand and can carry out a limited range of making processes safely during product development • demonstrate that they understand how to plan for production c) communicate ideas and outcomes through a suitable development process and manufacturing method d) demonstrate the ability to test and evaluate a limited range of manufacturing methods.

A2 Performance Descriptions for Design and Technology

	Assessment Objective 1	Assessment Objective 2
Assessment Objectives	Candidates should demonstrate specific knowledge and understanding and be able to apply that knowledge and understanding in combination with appropriate skills in their designing and should communicate ideas and outcomes and demonstrate strategies for evaluation.	Candidates should be able to demonstrate and apply skills, knowledge and understanding of relevant materials, processes and techniques and use materials and equipment to produce suitable and appropriate outcomes, and should communicate ideas and outcomes and demonstrate strategies for evaluation.
A/B boundary performance descriptions	Candidates characteristically: a) demonstrate specific ability to analyse questions and/or contexts and select and explain relevant ways to proceed during in-depth study • take account of a wide range of factors and show knowledge and understanding of materials and manufacturing processes • combine distinct elements of technical information in their responses • develop an initial design brief, an outline specification and produce a design for manufacturing, considering maintenance and product life • clarify the task during designing and making activities identifying a wide range of user needs and carry out in-depth research including some relevant primary research b) originate a range of ideas and possible solutions when generating and developing proposals • apply knowledge and understanding to develop and refine their solutions, demonstrating evidence of creativity and innovation through recognition of value issues or uniqueness (for the candidate) or connections with other ideas	Candidates characteristically: a) demonstrate their understanding of systems and control and/or products and applications by discriminating between aspects of a system or product that perform and those which could be improved after in-depth study • demonstrate understanding of reliable and quantifiable performances of a range of materials, components and production processes • demonstrate applied knowledge of the working properties and functions of materials and components • work safely, accurately and skilfully with materials, components, tools and processes including appropriate technologies to create high-quality products that match the specification b) plan, demonstrating an awareness of industrial methods and approaches during designing and making activities • select an appropriate range of tools and equipment and plan processes • manage time by anticipating potential problems and responding to changing circumstances • determine the degree of accuracy required for products to function as intended, and apply relevant external standards to their task • test the performance of their product against specified criteria and act on their findings by modifying their proposals if appropriate

A2 Performance Descriptions (continued)

	Assessment Objective 1	Assessment Objective 2
A/B boundary performance descriptions	c) research, analyse and communicate a broad range of ideas and information effectively • use technical language fluently and draw appropriate conclusions • model aspects of their ideas when developing proposals d) demonstrate clear strategies for testing and evaluating by taking into account the working characteristics of materials and components; the product's impact on society; and the precise requirements of the brief and/or specification • confidently analyse ideas and outcomes and draw highly appropriate conclusions, enhancing interpretation by others.	c) communicate ideas and outcomes using ICT appropriately for communicating, modelling, data handling, controlling or manufacture • work to devised plans and seek agreement on realistic deadlines • take account of the relationship between material, form and manufacturing processes d) demonstrate clear strategies for evaluating: • analyse information critically and objectively • assess the extent to which their work will meet genuine needs • devise quality assurance procedures and review the way the work plan is followed using external sources for evaluating products.

A2 Performance Descriptions (continued)

	Assessment Objective 1	Assessment Objective 2
E/U boundary performance descriptions	Candidates characteristically: a) demonstrate their ability to analyse questions and/or contexts and record some relevant information during in-depth study • take account of a limited range of factors • take account of requirements and demonstrate some knowledge and understanding of manufacturing processes during product analysis • develop a design brief and specification b) use technical language relevant to the task • clarify the task identifying user needs and carry out research during designing and making activities • generate ideas based on their own knowledge and understanding, satisfying most of the specification criteria • show awareness of manufacturing processes • develop their proposals and model at least one aspect • indicate at least one working characteristic of a material or component • demonstrate some strategies for testing and evaluating that refer to products and the need for modifications • evaluate ideas and outcomes in an appropriate way, including ICT, and draw conclusions enabling others to understand them.	Candidates characteristically: a) demonstrate a basic understanding of systems and control and/or products and applications during in-depth study b) demonstrate some understanding of a limited range of materials, ingredients, components and production processes c) work safely with materials, ingredients and components to create a product that meets their specification d) plan, demonstrating some awareness of industrial methods during making activities e) select some appropriate tools and resources f) carry out at least one test of their product g) work to an outline plan h) use ICT appropriately for communicating, modelling, data handling, controlling or manufacture i) demonstrate strategies for testing and evaluating: • analyse information • assess the extent to which the product meets its specification

A

B Spiritual, Moral, Ethical, Social and other Issues

European Dimension

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

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 units.

Avoidance of Bias

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

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.

C Overlaps with other Qualifications

Overlaps exist between this and the Design and Technology: Product Design (Textiles), Food Technology and Systems and Control Technology specifications. The overlap is primarily in the design process and the scheme of assessment. As all four specifications conform to the GCE AS and A Level Subject Criteria for Design and Technology, 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.

D Key Skills

Key Skills qualifications have been phased out and replaced by Functional Skills qualifications in English, Mathematics and ICT from September 2010.

GCE Design and Technology: Product Design (3-D Design) (2550) For exams from June 2014 onwards

Qualification Accreditation Number: AS 500/2216/7 - A Level 500/2215/5
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Every specification is assigned a discounting code indicating the subject area to which it belongs for performance measure purposes.
The discount codes for this specification are:
AS VF2
A Level 9080

The definitive version of our specification will always be the one on our website, this may differ from printed versions.