

**OCR ENTRY LEVEL CERTIFICATE IN
DESIGN AND TECHNOLOGY
(RESISTANT MATERIALS TECHNOLOGY)**

(3962)

Key Features

- Covers National Curriculum Order for Design and Technology
- The specification assesses achievement at Levels 1, 2 and 3 of the National Curriculum
- Designed to be co-teachable with GCSE
- There is only one assessment component: coursework 100%
- A range of suitable tasks for coursework
- Immediate support from specialist subject officer
- Moderation by visit

Support and In-Service Training for Teachers

- A full programme of In-Service training meetings arranged by the Training and Customer Support Division (telephone 01223 552950)
- Written advice on coursework proposals
- A report on the examination, compiled by senior examining personnel after each examination session
- Individual feedback to each Centre on the moderation of internally assessed coursework

Relationship with the GCSE (Full Course) Specification

This specification is based on the GCSE (Full Course) specification of the same name. Variations relating to content and scheme of assessment are shown in this specification by *italic text*.

The specification is designed to enable schemes of work used to deliver the GCSE specification of the same name to be used for its delivery.

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SECTION A: SPECIFICATION SUMMARY

The revised Entry Level Certificate specification retains the characteristics of the Design and Technology (Resistant Materials) specification previously offered by OCR.

The revised specification provides a coherent, satisfying and worthwhile course of study for candidates, whether they wish to pursue the study of Design and Technology in the future or whether it will be their last experience of studying the subject.

This specification meets the National Curriculum Order for England (DfEE/QCA 1999) for Design and Technology and is designed for candidates who are working towards a Grade G in GCSE. It provides opportunities for candidates to develop an awareness of the nature and significant importance of Design and Technology in a rapidly changing society. It enables candidates to develop their application of knowledge, skills, and understanding of Resistant Materials within an overall design and make based approach.

The specification offers a system of assessment which recognises the need for greater teacher involvement in candidates' work than in GCSE and which is based on clear targets and a coherent set of criteria for rewarding positive achievement within the three pass levels. The assessment of candidates is through 100% coursework and is divided into three clearly identified Units.

The specification is fundamentally designed to assess a candidate's capability at the end of KS4. It does, however, recognise that appropriate experiences at KS3 are essential if a candidate is to realise his/her full potential.

First certification will be in Summer 2003.

RELATIONSHIP WITH THE GCSE (FULL COURSE) SPECIFICATION

This specification is based on the GCSE (Full Course) specification of the same name. Variations relating to content and scheme of assessment are shown in this specification by italic text.

The specification is designed to enable schemes of work used to deliver the GCSE specification of the same name to be used for its delivery.

SCHEME OF ASSESSMENT

There will be three levels of award: Entry 1, Entry 2 and Entry 3.

WEIGHTING OF THE ASSESSMENT OBJECTIVES

The Assessment Objectives are to be weighted:

- Designing 40%
- Making 60%

There is only one assessment component:

Coursework 100%

SPECIFICATION CONTENT

Designing and Making (sections 5.0 and 5.1)	Knowledge and Understanding (section 5.2)
Recognising the need a product satisfies	
Developing and writing a design brief	Materials
Drawing up a specification <i>for a manufactured product</i>	Standard pre-manufactured components
<i>Contribute to</i> generating design proposals	Use of Systems and Control
<i>Contribute to</i> product development	Products and applications
Product planning	Quality
Tools and equipment	Health and Safety
Processes	
ICT applications	
Industrial applications	
Good working practice	
Product evaluation	

Note: Whilst the headings above are similar or the same as those for the GCSE specification it is expected that the interpreted depth and breadth for candidates following this specification will be less than for those entering for GCSE.

INTERNAL ASSESSMENT (COURSEWORK)

Internal Assessment (coursework) will consist of a project where candidates will be expected to *undertake an analysis of an existing manufactured product and then design and make a Resistant Materials Product.*

The project can be linked to a candidate's own interests, industrial practice or the community.

Projects may involve an enterprise activity, where candidates identify an opportunity, design to meet a need, manufacture products and evaluate the whole design and make process.

Candidates must use appropriate ICT to help with their work. This can include computer-aided design and manufacture (CAD/CAM) software, control programs, data analysis and ICT based sources for research.

Candidates must consider how technology affects society and their own lives.

SECTION B: GENERAL INFORMATION

1 Introduction

1.1 RATIONALE

The specification aims to prepare candidates to participate in tomorrow's rapidly changing technologies.

The specification calls for candidates to become autonomous and creative problem solvers, as individuals and members of a team. They must look for needs, wants and opportunities and respond to them by developing a range of ideas and making products and systems. This specification combines practical skills with an understanding of aesthetics, social and environmental issues, function and industrial practices. Candidates reflect on and evaluate relevant present and past design and technology, its uses and effects.

The specification seeks to help candidates to become discriminating and informed users and innovators of products. It encourages candidates to think and intervene creatively to improve the quality of life for society.

The specification will assess achievement at levels 1, 2 and 3 of the National Curriculum.

This Entry Level qualification is a general qualification designed to enable candidates to progress either directly to employment or to Foundation Level courses within the National Framework for Qualifications.

This qualification is approved by the regulatory authorities (QCA, ACCAC and CCEA) as an Entry Level award as part of the National Qualifications Framework.

OCR has taken great care in the preparation of this specification and assessment material to avoid bias of any kind.

1.2 CERTIFICATION TITLE

This specification will be shown on a certificate as:

OCR Entry Level Certificate in Design and Technology (Resistant Materials Technology).

1.3 LEVEL OF QUALIFICATION

All Entry Level Certificate specifications are intended to cater for those candidates unlikely to achieve a grade, in the same subject, at GCSE level. The requirements of the three pass grades available (Entry 1, Entry 2 and Entry 3) are broadly equivalent to the requirements for National Curriculum Levels 1, 2 and 3 and are intended to recognise a level of achievement below that of a grade G at GCSE.

Entry Level Certificate specifications utilise appropriate short term goals and manageable elements and are closely related to the GCSE specifications of the same name, in order to provide a stepping stone for possible progression to GCSE or equivalent.

1.4 RECOMMENDED PRIOR LEARNING

Candidates who are taking courses leading to this qualification at Key Stage 4 should normally have followed the corresponding Key Stage 3 Programme of Study within the National Curriculum.

There is, however, no prior learning required for this qualification.

1.5 PROGRESSION

This Entry Level Certificate is a general qualification designed to enable candidates to progress either directly to employment or to Foundation Level courses within the National Framework for Qualifications.

1.6 OVERLAP WITH OTHER QUALIFICATIONS

The format of this specification is shared with other specifications in the Design and Technology suite. The very nature of designing and making means that processes are similar. However, the content that is examined in the papers and internal assessment of the specification is unique to this specification.

Of a more general nature this specification provides opportunities to promote knowledge and understanding of a wide range of skills, many of which are shared with other subject areas.

Those identified in the National Curriculum Order for England (DfEE/QCA 1999) for Design and Technology are:

- **thinking skills**, identifying relevant sources of information, and developing criteria for designs to guide their thinking;
- **financial capability**, through taking account of the relative cost of materials and components, in relation to their working characteristics and properties when deciding if, when and how to use them;
- **enterprise and entrepreneurial skills**, through identifying an opportunity to design something to meet a specific need, finding out about the work of professional designers and the manufacturing industry and then making and marketing the prototype product, and evaluating the whole process;
- **work-related learning**, through bringing a realistic industrial or commercial perspective to the development of a product in school based design studios or areas, visiting a workplace for hands-on experience related to designing and making, and providing the opportunity for visitors from business to act as product advisers or clients;
- **education for sustainable development**, through developing knowledge and understanding of the principles of sustainable design and production systems, developing skills in creative problem solving and evaluation, and exploring values and ethics in relation to the application of design and technology.

1.7 RESTRICTIONS ON CANDIDATE ENTRIES

Candidates who enter for this Entry Level specification may not also enter for any other Entry Level specification with the certification title Resistant Materials Technology in the same examination series.

They may however enter for any GCSE, GNVQ or NVQ.

1.8 ICT

In order to play a full part in modern society, candidates need to be confident and effective users of ICT. Where appropriate, candidates should be given opportunities to use ICT in order to further their study of Resistant Materials Technology.

The assessment of this course requires candidates to use ICT through preparing, presenting, and reviewing information as they work on their design ideas, and developing models that communicate these ideas.

This section offers guidance on opportunities for using ICT during the course.

ICT Application	Opportunities for Using ICT During the Course
Database	Sections 5.1.1, 5.1.8, 5.1.11
Internet	Sections 5.1.2, 5.1.8
Word Processing	Sections 5.1.2, 5.1.8, 5.1.11
Spreadsheet	Sections 5.1.5, 5.1.8
CAD	Sections 5.1.3, 5.1.4, 5.1.6, 5.1.8
CAM	Sections 5.1.8, 5.1.9, 5.1.10

1.9 CITIZENSHIP

From September 2002, the National Curriculum for England at Key Stage 4 includes a mandatory Programme of Study for Citizenship. Parts of this Programme of Study may be delivered through an appropriate treatment of other subjects.

This section offers guidance on opportunities for developing knowledge, skills and understanding of citizenship issues during the course.

Citizenship	Opportunities for Teaching Citizenship Issues during the Course
Consider the needs of others	Section 5.1.1
Consider issues surrounding a particular product and its surroundings	Section 5.1.2
Seek opinions of others and be flexible and adaptable in responding to their needs	Sections 5.1.3/4
Consider the need to work together as a team	Section 5.1.9
Seek the opinions of others	Section 5.1.11
Consider the health and safety of others	Section 5.2.5

1.10 SPIRITUAL, MORAL, ETHICAL, SOCIAL AND CULTURAL ISSUES

During the course there are opportunities to promote candidates' spiritual, moral, social and cultural development.

The specification provides opportunities to promote:

spiritual development: through helping pupils recognise their own creativity and the creativity of others in finding solutions to problems, and through recognising the tension between material and non-material needs;

moral development: through helping pupils to reflect on how technology affects the environment so they can make informed choices when designing and making and through discussing the moral dilemmas posed by introducing new technologies within different value systems and the advantages and disadvantages of new technology to local, national and global communities;

social development: through helping pupils recognise the need to consider the views of others when discussing design ideas;

cultural development: through exploring the contribution of products to the quality of life within different cultures, and through valuing and reflecting on the responses of people from other cultures to design solutions.

1.11 HEALTH, SAFETY AND ENVIRONMENTAL ISSUES

OCR 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 assessments.

The specification provides opportunities to promote education for sustainable development, through developing knowledge and understanding of the principles of sustainable design and production systems, developing skills in creative problem solving and evaluation, and exploring values and ethics in relation to the application of design and technology.

Whilst candidates will not be specifically assessed in terms of their knowledge and awareness of issues associated with energy usage it is anticipated that, whenever possible, candidates will be encouraged to consider the benefits and drawbacks associated with the use of different sources of energy.

The specification content includes a specific requirement to consider issues associated with health and safety and the environment. See Section 5.

1.12 THE EUROPEAN DIMENSION

OCR has taken account of the 1988 Resolution of the Council of the European Community in preparing this specification and associated specimen assessments. European examples should be used where appropriate in the delivery of the subject content. Relevant European legislation is identified within the specification where applicable. See Section 5.

1.13 CODE OF PRACTICE REQUIREMENTS

This specification will comply in every respect with Code of Practice requirements for Entry Level qualifications.

1.14 STATUS IN WALES AND NORTHERN IRELAND

This specification has been approved by ACCAC for use by Centres in Wales.

Candidates in Wales and Northern Ireland should not be disadvantaged by terms, legislation or aspects of government that are different from those in England. Where such situations might occur, including in the external assessment, the terms used have been selected as neutral, so that candidates may apply whatever is appropriate to their own situation.

OCR will provide specifications, assessments and supporting documentation only in English.

Further information on the provision of assessment materials in Welsh and Irish may be obtained from the Information Bureau at OCR (telephone 01223 553998).

2 Specification Aims

The specification requires candidates to demonstrate fully their design and technology capability by combining skills with knowledge and understanding, in order to design and make quality products.

The specification allows candidates to acquire and apply knowledge, skills and understanding through:

- i analysing and evaluating products and processes;
- ii engaging in focussed tasks to develop and demonstrate techniques;
- iii engaging in strategies for developing ideas, planning and producing products;
- iv considering how past and present design and technology, relevant to a designing and making context, affects society;
- v recognising the moral, cultural and environmental issues inherent in design and technology.

The aims of this specification are:

- to encourage candidates to combine their designing and making skills with knowledge and understanding, in order to design and make quality products;
- to promote design and technology capability in candidates through activities which involve a range of contexts, materials, processes and to lead to practical outcomes;
- to give opportunities to develop practical abilities and the confidence to design, make and modify products for identified purposes, selecting and using resources effectively;
- to promote the use of graphic techniques and ICT including computer-aided design (CAD), to generate, develop, model and communicate design proposals;
- to promote the use of computer-aided manufacture (CAM) in single item production and in batch or volume production;
- to encourage the development of candidates' critical and aesthetic abilities, enabling them to evaluate design and technology activity, including their own, in the context of an identified need;
- to encourage the development of candidates' understanding of the needs and values of a range of users; including spiritual, moral, social, and cultural considerations;
- to promote the keys skills of communication, application of number, IT, working with others, improving learning and performance and problem solving;
- to encourage the development of candidates' thinking skills, financial capability, enterprise and entrepreneurial skills;
- to encourage the development of candidates' understanding of work-related learning and the principles of sustainable design and production systems;
- to encourage candidates to consider how present and past design and technology, relevant to a designing and making process, affects society;
- to encourage candidates to consider the uses and affects of new technologies and modern materials on product design and manufacture;
- to provide for activities which give candidates opportunities to work both individually and as a member of a team.

Most of these aims are reflected in the Assessment Objectives. Others, due to their very nature, cannot be readily assessed.

3 Assessment Objectives

The Assessment Objectives are designed to reflect the Programme of Study for Design and Technology.

Within this specification candidates will need to demonstrate their ability to:

- develop, plan and communicate ideas;
- work with tools, equipment, materials and components to produce quality products;
- evaluate processes and products;
- understand materials and components;
- *interact with* systems and control.

There are three Specification Assessment Objectives. These are developing capability through:

- acquiring and applying knowledge, skills and understanding of materials, components, processes, techniques and industrial practice;
- acquiring and applying knowledge, skills and understanding when designing and making quality products;
- acquiring and applying knowledge, skills and understanding when evaluating processes and products; and examining the wider effects of design and technology on society.

INTERNAL ASSESSMENT OBJECTIVES

The three Assessment Objectives will be internally evaluated against the following six internal assessment objectives: (see Guidance for Teachers, Section 7.4).

- 1 identify a need or opportunity that *has* led to a design brief *for a marketed product*;
- 2 *study of a manufactured product which results in the identification of specification points*;
- 3 *study of a manufactured product which results in the identification and communication of simple design decisions that may have influenced the product development*;
- 4 *from a design brief and specification generate possible ideas that contribute to a solution*;
- 5 *contribute to* planning and realising the product;
- 6 evaluate and test the product.

To allow Centres flexibility in choosing appropriate coursework routes, the six objectives are grouped into three units each focusing on a different aspect of Designing and Making (see Section 4.3).

Internal Assessment (coursework) will test the knowledge, skills and understanding necessary to design and make products in the appropriate media. The evidence required to be submitted for this task *should* include a 3 dimensional product with a concise portfolio and/or appropriate ICT evidence.

4 Scheme of Assessment

4.1 COMPONENTS

There is only one assessment component:

Coursework 100%

4.2 WEIGHTING OF ASSESSMENT OBJECTIVES

Designing 40%

Making 60%

4.3 ENTRY CODE

Entry Code	Title	Components
3962	Coursework	1

4.4 INTERNAL ASSESSMENT (COURSEWORK)

The internal assessment of coursework will consist of three Units each focusing on a different aspect of Designing and Making and centred on a choice of tasks set by OCR (See Section 6), or the course teacher (having obtained approval for the task from OCR).

Unit 1: *Analysis of a product and its development (examination of an existing product and identification of the situation, users and purpose for which it was designed, how it works, its materials and components and how it was produced commercially; then write a simple design brief and list specification points that it satisfies);*

Unit 2: *Generation of ideas, construction planning and realisation from a design brief and specification;*

Unit 3: *Evaluation of the realised product.*

Knowledge and understanding of specification content will be assessed through the evidence presented by candidates as coursework Units 1, 2 and 3.

The whole activity should reflect 20 to 25 hours of work.

There are two significantly different routes that candidates may take when producing their coursework, namely:

- 1 the three units are linked by a single product focus resulting in a 3 dimensional product with a concise portfolio and/or appropriate ICT evidence;*
- 2 Units 1 and 2 may have a different product focus enabling candidates to make a fresh start in Unit 2. The evaluation of the candidates realised product in Unit 3 must relate to the product developed in Unit 2.*

Full details of the internal assessment objectives for internally assessed work can be found in Section 7.

The product can be linked to a candidates' own interests, industrial practice or the community. Projects may involve an enterprise activity, where candidates identify an opportunity, design to meet a need, manufacture products and evaluate the whole design and make process.

Candidates must use appropriate ICT to help with their work, including computer-aided design and manufacture (CAD/CAM) software, control programs, data analysis and ICT based sources for research.

Through their project, candidates must consider how relevant technology affects society and their own lives.

The evidence required to be submitted for this project must include a 3 dimensional product with a concise portfolio and/or appropriate ICT evidence. The whole activity should not exceed 20 to 25 hours of work.

If candidates work in groups, each candidate must take responsibility for a uniquely definable aspect of the overall project and undertake unique analysis, product design, manufacture and evaluation of that project aspect. Each candidate must provide unique evidence for assessment against the six internal assessment objectives with additional evidence in internal assessment objective 6 (evaluation and testing) to indicate the performance of the candidate's design within the context of the performance of the overall project.

Examples of appropriate tasks are given in Section 6.

Full details of the Internal Assessment Objectives for internally assessed work can be found in Section 7.

4.5 ASSESSMENT OF ICT

The assessment of this course requires candidates to use ICT through preparing, presenting, and reviewing information as they work on their analysis and design ideas. They can also use ICT to develop models that communicate these ideas, and make products using computer-aided manufacture (CAM).

4.6 DIFFERENTIATION

Differentiation will be achieved by task and outcome in the Internal Assessment. The internal assessment tasks undertaken by each candidate should reflect their capabilities. Exemplar tasks will be available. (See Section 6)

4.7 AWARDING OF GRADES

There will be three levels of award: Entry 1, Entry 2 and Entry 3, where Entry 3 is the highest outcome.

A candidate's mark for each of the three units of coursework will be combined to give the candidate's total mark for the specification. The candidate's award will be determined by this total mark.

4.8 GRADE DESCRIPTIONS

Grade descriptions are provided to give a general indication of the standards of achievement likely to have been shown by the candidates awarded particular levels. The descriptions must be interpreted in relation to the content specified in Section 5; 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 overall assessment objectives. Shortcomings in some aspects of the assessment may be balanced by better performance in others.

Entry 1

When investigating products, candidates show some consideration of the situation of the intended users that has led to the design brief. They identify the intended use of the product and list some basic requirements that the product meets. They identify some of the materials and methods of manufacture and communicate using pictures and words.

When designing and making, candidates contribute a simple idea related to a specific task and, with frequent prompting use basic skills and techniques appropriate to the task producing evidence of simple modelling and making which will probably be incomplete and will be of a low standard. They show limited understanding of safe working practices and offer very limited relevant but unsupported evaluation of their work.

Entry 2

When investigating products, candidates consider both the situation and the intended users of a marketed product. The intended use of the product is examined, some functions identified and they provide a limited description of how it works. They produce a limited brief for the product and identify some key points of its specification along with most materials, components, finishes and production methods identified. There will be some evidence relating to quantity manufacture. Presented outcome and communication will be through a limited number of techniques.

When designing and making, candidates will contribute two alternative ideas related to a specific task, offer limited evaluation of these ideas and probably no valid reasons for the choice of either. There will be simple but poor quality modelling presented and, with guidance, candidates will use basic skills and techniques appropriate to the task. There is likely to be some evidence of prompted planning. They will have a reasonable understanding of safe working practices and their presented outcome will be mainly complete.

There will be some relevant and supported evaluation of their work with reference to the given specification/criteria and a simple review of materials used.

Entry 3

When investigating products candidates will provide a brief description of both the situation and the needs of the intended users along with most details of its intended use and fairly clear description of how it works. There will be a clear design brief and details of a specification that it meets including some reference to quantity manufacturing requirements.

Communication will be through several techniques and be of a reasonable standard.

When designing and making, candidates will propose several ideas related to a specific task, they will (with help) evaluate these ideas and give simple reasons for their choice. There will be evidence of a contribution to planning, a reasonable standard of modelling, and with guidance, they will have used a range of skills and techniques appropriate to the task. The outcome will be of a reasonable standard, will be mainly complete and they will have worked safely most of the time (without much prompting). They will have evaluated their outcome against the given specification and will offer comments related to function, use of their time, the materials and processes used.

SECTION C: SPECIFICATION CONTENT

5 Specification Content

During the key stage, candidates should be taught the knowledge, skills and understanding through: (N.C. order reference paragraph number).

- product analysis (6a);
- focused practical tasks that develop a range of techniques, skills, processes and knowledge (6b);
- design and make assignments, which include activities related to industrial practices and the application of systems and control (6c).

This section is set out in column format to help teachers relate the requirements of the specification content with experiences that would be applicable.

Design and Technology, by its very nature, is continually developing. Teachers should be aware of new developments when preparing candidates for this examination.

The subject content is included to help teachers structure their schemes of work and to define areas that will be assessed through coursework. It should be noted that only the content relevant to the chosen coursework task(s) will be assessed by OCR. It is however intended that teachers should use the content as a means of defining the breadth and depth delivered through their scheme of work and as an indicator that they are covering the Programme of Study for Design and Technology.

The specification is fundamentally designed to assess a candidate's capability at the end of KS4. It does, however, recognise that appropriate experiences at KS3 are essential if a candidate is to realise his/her full potential and that some candidates may be working to Key Stage 3 Programmes of Study. The specification content is therefore cross referenced with both KS4 and KS3 Programmes of Study.

5.1 DESIGNING AND MAKING

5.1.1 Developing and Writing a Design Brief (1a, 1a)

Candidates should be able to:	Range of activities:
(KS4 NC order reference paragraph number, <i>KS3 NC order ref. paragraph number in italics</i>)	
(a) provide <i>information on</i> the design need using various means of communication; (1e)	text, drawings, photographs, graphs, media clippings, word processing, scanning.
(b) extract from verbal, and visual information the essential problems <i>that have</i> to be solved;	life styles, popular activities, media publicity, consideration of information to identify the situation and design brief.
(c) identify the range of users and the market for which the product is intended; (1b)	questionnaires, surveys, influences of trends, potential market possibilities.
(d) develop a design brief for a <i>marketed</i> product.	a clear statement of design intention.

5.1.2 Drawing up a Specification for a Manufactured Product

Candidates should be able to:	Range of activities:
(a) examine the intended purpose of the product;	observation, consideration of <i>an existing product from</i> the past or present.
(b) identify and collect data relevant to the product and its users; (1b)	i.e. dimensions, sizes, costs etc.
(c) identify and evaluate how an existing product fulfils the needs of the intended users; (3c)	simple market and product analysis, in relationship to moral, social, economic, environmental and cultural factors.
(d) demonstrate an ability to form a suitable specification; (1b)	a written specification.
(e) consider how a product has been manufactured in quantity. (1c, 4d)	consideration of industrial manufacturing methods.

5.1.3 *Contribute to Generating Design Proposals*

Candidates should be able to:

- (a) generate and record a range of design proposals; (1c, 1d)
- (b) identify within those proposals the resources needed for the solution to be realised; (1e)
- (c) evaluate their ideas against the specification and modify where necessary; (3a)
- (d) consider whether ideas meet the original need; (3a)
- (e) understand the relevance of function and aesthetics; (1e)
- (f) use mock-up models to check on the idea feasibility;
- (g) identify, with reasons for selection/rejection, the chosen design proposal (s) for product development;
- (h) use graphic techniques and ICT, including computer-aided design (CAD), to generate, develop, model and communicate design proposal. (1g, 1h).

Range of activities:

- ideas recorded in a combination of text and graphic techniques.
- materials, constructions and processes.
- annotated comments about ideas.
- simple reference to the need.
- consider how it could work and whether it would look pleasing.
- simple modelling.
- evidence to support choice and reasons for rejection.
- solutions recorded using a selection of text, simple graphical techniques and computer images e.g. clip art.*

5.1.4 *Contribute to Product Development*

Candidates should be able to:

- (a) conduct testing or trailing to make decisions on materials, production processes and selection of pre-manufactured standard components;
- (b) match materials and components with tools, equipment and processes when deciding how to manufacture;
(1e) (2a)
- (c) simulate production by developing a system to control the manufacture of a product individually and/or in batch quality;
(2e)
- (d) be flexible and adaptable in responding to changing circumstances and new opportunities;
(1f)
- (e) use graphic techniques and ICT, including computer-aided design (CAD), to generate, develop, model and communicate design proposal.
(1g) (1h)

Range of activities:

- appropriate testing to determine: optimum sizes of product, materials, degree of accuracy, production method and appearance.
- determine *what is needed to manufacture the product* taking notice of the relative costs of materials and components.
- appropriate use of jigs and/or templates.
- adjusting and modifying parts of the design if required.
- simple graphical techniques and computer aided design (CAD) used to generate and communicate design proposals.

5.1.5 *Product Planning*

Candidates should be able to:

- (a) produce and use a plan of work including:
 - manufactured items;
 - materials;
 - equipment;
 - tools and processes
 - consideration of health and safety issues against a realistic time schedule.
(1d) (3b) (1g)
- (b) prepare materials economically allowing for waste and fine finish and use pre-manufactured standard components appropriately.

Range of activities:

- a proposed work plan which sets realistic deadlines.
- efficient material preparation.

5.1.6 Tools and Equipment

Candidates should be able to use a range of tools, equipment and processes effectively and safely, including:

(2a)

- (a) proper procedures for the preparation of materials; (4a)
- (b) correct use of marking-out, measuring and testing tools;
- (c) correct use of tools, equipment and components for shaping, forming, cutting, joining, fitting, assembling and finishing; (2a)
- (d) safe working practices.

Range of activities:

use of datum edges.

rule, try square, calipers, dividers, scribe, marking and mortise gauges, centre punches and templates.

matching tools and equipment to the materials and processes.

personal protection and the safety of others.

Use of drawing instruments

Candidates should be able to use drawing instruments to achieve a good standard of graphical representation.

access to a minimum range of simple drawing equipment: pencils, pens, compasses, 300mm rule, erasers, drawing boards and set squares as appropriate.

Use of drafting aids

Candidates should be able to use drafting aids to develop good drafting techniques.

access to a minimum range of drafting aids: circle templates, ellipse templates, *flexi curves* or *french curves*.

Use of colouring media

Candidates should be able to use colouring media to enhance drawings.

access to a minimum range of colouring media: coloured pencils and *marker pens*.

Use of tools and equipment for model making

Candidates should be able to use tools and equipment to make 2 and 3 dimensional models.

access to scissors, craft knives, safety rules and cutting boards to cut paper, card, foamboard and styrofoam.

5.1.7 Processes

Candidates should be able to understand and use:

(4b) (2a, c, d)

Range of activities

- | | |
|---|--|
| (a) work by wasting; | an understanding of hand wasting: sawing, planing, filing, drilling, and machine drilling. An awareness of machine wasting; jigsaw, CNC mill. |
| (b) work by deforming; | an awareness and experience of some of the following: laminating, bending, press moulding, vacuum forming, blow moulding. |
| (c) work by fabricating; | an awareness and experience of some of the following: - Temporary joints: screws, nuts and bolts and K-D fittings; Permanent joints: adhesive, nail, dowel, halving/cross halving, mortise and tenon, butt/rebate, housing, mitre, braze, solder, pop rivet. |
| (d) work by reforming; | an awareness of casting and injection moulding. |
| (e) assemble and fit parts correctly; | final adjustments to ensure the product functions. |
| (f) apply surface finishes; | an awareness and experience of some of the following: self-finishing and applied finishing; polish, stain, varnish, preservative, paint, dip-coating. |
| (g) use appropriate industrial applications when working with familiar materials and processes. | an awareness and experience of computer controlled machines to work with a range of resistant materials. An understanding that CAM may be used to make products of repeatable quality.
Make parts of products in batches. |

5.1.8 ICT Applications

Candidates should:

- (a) *have an awareness of* how CAD/CAM is used in industrial manufacturing;
- (b) recognise that computer systems can control machines and equipment. (2d)

Range of activities:

- books, videos, etc, industrial visits.
- how robotics are used in production lines.

Candidates should use ICT where appropriate to:

- (c) desk top publish; combine written information and graphics, produce a questionnaire.
- (d) produce bar charts, pie charts, flowcharts from data; present results in a graphical form.
- (e) produce graphics; use a paint or draw program to produce original art work including line, texture, colour.
- (f) mould and size text, and/or graphics to suit requirements; produce text in appropriate styles and sizes for presentation and advertising/packaging.
- (g) aid Design and Technology activities; use ICT appropriately to generate, handle, model or communicate design proposals:
 - (i) research from a database, use the internet, e-mail;
 - (ii) present data in the form of tables or graphics.
- (h) utilise CAD; (1g) create and manipulate a range of 2D/3D images, producing accurate drawings, use of clip art.
- (i) utilise CAM. use a cutter plotter.

5.1.9 Industrial Applications

Candidates should be able to

- (a) understand the following commercial production methods:

job production; (2b) (2d)

batch production. (2c) (2d)

- (b) understand the packaging, marketing, and advertising implications of a product;

- (c) understand that control is a necessary part of production and marketing. (2c)

Range of activities:

understand that this involves producing 'one off' products. Every item produced is different. It is labour intensive.

understand that this involves the production of a specified quantity of a product. Batches can be repeated as many times as required. This type of production method is flexible and can be used to produce batches of similar products with only a small change to the tooling, e.g. using templates and jigs.

information about the product, consumer preference, labelling, storage, cultural and European influences.

understand that printed advertisements and point of sale displays are designed to:

- (i) inform people about the product;
- (ii) influence, persuade and encourage people to buy a company's products rather than someone else's.

procedures to ensure a quality product e.g. checking system in a production line.

awareness that quality control helps to ensure that the customer is satisfied with a product.

understand that a product should meet the criteria listed in the specification.

5.1.10 Good Working Practice

Candidates should be able to:

Make effective use of available resources to:

- (a) produce process and block diagrams;

- (b) produce time plans and work schedules;

- (c) carry out testing, evaluation and modification of products. (3b) (3b)

Range of activities:

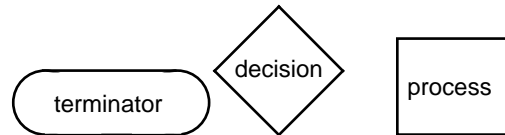
When planning their work candidates should be able to:

identify available materials, components, equipment and facilities;

establish an order for work;

organise their work to maximise the use of available time and resources;

produce time plans, flow charts and the use of appropriate software;



simple trialling of products;

results collected, analysed and relevant modifications made.

5.1.11 Product Evaluation

Candidates should be able to:

- (a) review their work at critical points and apply quality assurance techniques;
(3b) (3a)

- (b) evaluate the proposed product against:
 - (i) its fitness for purpose;
 - (ii) the design need;
 - (iii) the needs of the intended user(s);
(3c) (3c)

- (c) evaluate the proposed product against moral, cultural and environmental issues for the intended user;

- (d) review whether they have used materials and resources appropriately;

- (e) carry out testing, resulting in conclusions that suggest necessary modifications, and review the performance of the manufacturing control system. (3b)

Range of activities:

- regular checks to ensure quality outcome.

- critical evaluation related to initial specification and use of resources.

- sustainable sources of material supply and recycling of redundant products.

- testing with meaningful conclusions.

- proposal for further development, suggest modifications or improvements to:
 - product;
 - template / jig.

5.2 KNOWLEDGE AND UNDERSTANDING

5.2.1 Materials and Pre-manufactured standard Components

(4a, 4b, 4c 4d 4e) (4a, 4b, 4c 4d 4e)

Candidates should be:

- able to identify which material is suitable for a particular situation;
- able to identify the properties that materials (included applied finishes) need to have to fulfil an identified purpose;
- aware of the effects on society of using materials in terms of pollution, waste and recycleability.

Candidates should have a knowledge and understanding of resistant materials (metal, wood, plastic and composites) to include the following:

- General classification of materials: i.e. ferrous/non ferrous, hard/softwood, manufactured boards, thermoplastics, thermosetting plastics and composites;
- Working properties: the making of simple comparisons between these materials in relation to strength, hardness, toughness, weight, durability, and aesthetic qualities;
- Market forms: the shapes and sizes, (general, not specific) of sections of these materials and knowledge of their comparative cost;
- Standard pre-manufactured components: fastenings and fittings.

Metals

- (a) Experience shaping and joining various types of metals in a variety of forms:
- material preparation – marking out and checking;
 - wasting – filing, sawing, cutting, drilling, machining - centre lathe processes, including: facing; parallel turning and centre drilling;
 - deforming – bending;
 - fabrication – soldering, brazing, pop riveting, screws, nuts and bolts;
 - reforming – casting.
- (b) Have an awareness of how materials can be combined and processed to create more useful properties:
- heat treatment of metal to alter its properties – annealing, harden and tempering.
- (c) Know how to prepare for manufacture ensuring economical use of material:
- material preparation – marking out;
 - use of appropriate section/size of materials.
- (d) Have an awareness of the importance of self-finishing and applied finishing:
- paint;
 - polishing;
 - dipcoating.

- (e) Understand that to achieve the best use of materials and components the interrelationship between material, form and manufacturing processes must be considered carefully:
- matching the material to the desired form;
 - matching the material to the manufacturing process;
 - ensuring minimal waste.
- (f) Understand the use of pre-manufactured standard components:
- make use of standard types and sizes of pre-manufactured standard components.

Wood and Wood Based Materials

- (a) Have experience of shaping and joining various types of timber in a variety of forms including carcass, stool, frame and slab constructions:
- material preparation, sawing, cutting, drilling, sanding, machining;
 - fabrication –
temporary joints: using screws, K-D fitting, nuts and bolts permanent joints: using adhesives, nails, dowels, butt/rebate, housing, halving/cross-halving, mitre, mortise and tenon.
- (b) Know how materials can be combined and processed to create more useful properties:
- advantages of using reconstituted materials, manufactured boards.
- (c) Know how to prepare for manufacture ensuring economical use of material:
- use of appropriate section/size of materials.
- (d) Have an awareness of the importance of self-finishing and applied finishing:
- paint;
 - varnish;
 - polish;
 - stain;
 - preservative.
- (e) Understand that to achieve the best use of materials and components the interrelationship between material, form and manufacturing processes are considered carefully:
- matching the material to the desired form;
 - matching the material to the manufacturing process;
 - ensuring minimal waste.
- (f) Understand the use of pre-manufactured standard components:
- use pre-manufactured standard components and parts appropriately.

Plastics and Composites

- (a) Be aware of how to shape and join various types of plastics in a variety of forms:
- material preparation – marking out and checking;
 - wasting – filing, sawing, cutting, drilling, machining;
 - fabrication – joining, permanent/temporary;
 - deforming – bending, vacuum forming;
 - reforming – injection moulding.
- (b) Know how to prepare for manufacture ensuring economical use of material:
- material preparation – marking out;
 - use of appropriate type, section and size of materials.
- (c) Have an awareness of the importance of self-finishing and applied finishing:
- polishing;
 - fine finishing (using silicone carbide paper).
- (d) Understand that to achieve the best use of material and components the interrelationship between material, form and manufacturing processes must be carefully considered:
- matching the material to the desired form;
 - matching the material to the manufacturing process;
 - ensuring minimal waste.
- (e) Understand the use of pre-manufactured standard components:
- use pre-manufactured standard components and parts appropriately.

'Smart' and Modern Materials

- (a) Know that some 'Smart' materials respond in a certain way to changes in temperature, light, or pressure:
- shape memory alloy (e.g. nitinol) used to give mechanical movement when a set temperature is reached;
 - low temperature setting plastic (e.g. polymorph) can be moulded or reshaped using hot water.
- (b) Be aware of other 'Smart' and modern materials, as they become commercially available.

5.2.2 Systems and Control

(5a) (5a, 5c, 5d)

Candidates should develop a basic understanding of control systems, to include:

- the knowledge that a system has three elements; input – process – output;
- the ability to recognise and use simple systems such as:
 - mechanical, for example, door catch, cycle brakes;
 - electro-mechanical, for example, drilling machine;
 - industrial processes, for example, commercial production in batches;
- the importance of feedback to control their own batch production system. i.e. jig, former, template, pattern, mould or computer system.

Candidates should:

Have an awareness of and be able to use simple systems as follows:

- a mechanism that transforms an input motion and force into a desired output motion and force e.g. the rotating handle on a drilling machine lowering/raising the chuck;
- mechanisms that change and control movement eg linear, reciprocating, rotary, oscillating.

5.2.3 Products and Applications

(6a)

Candidates should be able to carry out a product analysis of a commercially manufactured product and its application. The process should include the following:

- establishing the function and application/s of the product;
- identifying the constituent parts of the product;
- establishing how the product works;
- identifying the materials from which the product is manufactured;
- identifying the manufacturing processes used to make the product;
- establishing the situation and intended users of the product.

5.2.4 Quality

(2c, 3d, 3c)

Candidates should understand how to distinguish between quality of design and quality of manufacture by drawing on their experience and understanding of existing products and applications including:

- an understanding of procedures that could be set during production to ensure control over quality;
- how far existing products satisfy their needs and fulfil their purpose e.g. a well made child's toy that is of no interest to a child;
- when assembling products, candidates should understand the importance of accuracy;
- the appropriate use of resources and materials in relation to manufacture and maintenance e.g. use of aluminium for ladders and plastics for buckets;
- social, moral, economic, environmental and aesthetic implications e.g. advantages and disadvantages of mobile phones, consideration of the style of the product, its disposal and recycling of materials and components.

5.2.5 Health and Safety

(2a)

Candidates should understand health and safety as designers, manufacturers and consumers to include:

- (a) As potential designers and consumers:
 - correct selection of materials and finishes;
 - safety in terms of function and product maintenance.
- (b) As workers within the production environment:
 - storage and use of tools and equipment.
- (c) Personal safety:
 - protective wear including eye protection, clothing;
 - machine guards;
 - dust and fume extraction;
 - disposal of waste;
 - use of barrier creams;
 - accident procedure.
- (d) Risk assessment – using information sources:
 - COSHH, vapours given off by some adhesives, finishes;
 - instructions relating to the use of potentially hazardous consumables, for example, ‘Tensol’ cement, impact adhesives, superglue, paints and other finishes;
 - instructions relating to the use of unfamiliar equipment i.e. portable power tools;
 - recognition and understanding of safety symbols (UK and European).
- (e) Environmental effects:
 - the disposal of chemicals used to manufacture products;
 - the reduction in the use of chemicals dangerous to the environment including bleaches, toxic materials;
 - the need to dispose of redundant products in a safe and environmentally friendly way.

SECTION D: COURSEWORK

6 Coursework

6.1 NATURE OF COURSEWORK PROJECT

Candidates are required to use and study a simple manufactured and marketed resistant materials product and then design and make a resistant materials product.

This project requires a design and make activity related to industrial/commercial practices, and the appropriate application of systems and control.

The evidence required to be submitted for assessment must include a 3 dimensional product with a concise portfolio (including evidence of modelling) and/or appropriate ICT evidence. Centres are reminded that ICT evidence must address the requirements of the six Internal Assessment Objectives. Evidence that does not lead to a finished product can be assessed if it is felt that it represents work appropriate to the focus of the project.

This project will be assessed against the following six Internal Assessment Objectives, which are divided into three units:

Unit 1

- 1 *identify a need or opportunity that has led to a design brief for a marketed product;*
- 2 *study of a manufactured product which results in the identification of specification points;*
- 3 *study of a manufactured product which results in the identification and communication of simple design decisions that may have influenced the product development.*

(Candidates must use and study a simple manufactured resistant materials product. The chosen product must have been commercially produced to satisfy a need within the chosen context. The context should be one of those provided by OCR in the Exemplar Coursework Tasks given below)

Unit 2

- 4 *from a design brief and specification generate possible ideas that contribute to a solution;*
- 5 *contribute to developing and realising the product;*

Unit 3

- 6 *evaluate and test the product.*

Candidates or teachers must approach Units 2 and 3 from any of the routes given below:

- 1 *the three units are linked by a single product focus resulting in a 3 dimensional product with a concise portfolio and/or appropriate ICT evidence;*
- 2 *Units 1 and 2 have the same task and context but have a different product focus*
- 3 *Units 1 and 2 have a different task, context and product focus enabling candidates to make a fresh start in Unit 2. The evaluation of the candidate's realised product in Unit 3 must relate to the product developed in Unit 2.*

It is envisaged that the coursework project presented for assessment will represent 20 to 25 hours of work for the *Entry Level Certificate* course. Some of the work, by its very nature, may be undertaken outside school, for example, research work, testing etc.

6.2 EXEMPLAR COURSEWORK TASKS

Candidates *or teachers* may select one of the following statements as a starting point for the coursework project. Through investigating the statement, candidates (or candidates with the help of teachers) can *develop the task as a starting point for their coursework project* based on their interests and ability.

It is not compulsory to select a task from this list *but approval should be sought from OCR should the candidate or teacher wish to write their own task*. OCR Coursework Consultants are available for advice if required.

- 1 Mechanical toys continue to provide interest, humour and fascination for all ages.
- 2 Puppets have been used as a form of entertainment throughout history. Children gain great pleasure from making the puppet carry out different movements.
- 3 'Sit on' or 'push along' toys are very popular with toddlers. They can help develop the child's balance and co-ordination.
- 4 Puzzles are great fun for the whole family. They can be challenging and competitive.
- 5 An unusual money storage system may encourage children to save their pocket money.
- 6 Educational toys can help young children learn important information in a fun and pleasurable way.
- 7 There is an ever-increasing need for visual aids to help in the understanding of a process or concept.
- 8 Body adornment continues to be a mode of self-expression and individuality.
- 9 Mobiles and wind chimes are designed to be visually attractive and help to reduce the stress of modern living.
- 10 The storage of small items can be a problem in many homes.
- 11 Photograph frames and mirror frames can enhance interiors and become objects of desire.
- 12 Many pets become bored and their owners seek activities to amuse them.
- 13 A garden centre is considering launching a range of products suitable for a small town garden.
- 14 A city gallery is considering launching a range of products suitable for 'special occasion' presents.
- 15 Weather vanes / house signs / door furniture, provide decorative and functional features to the outside of the property.
- 16 Elderly people often have difficulty carrying out every day tasks due to reduced mobility from conditions such as arthritis.
- 17 Litter is an ever-increasing problem in today's society.
- 18 Expensive sports equipment is often dumped in the garage or in the corner of the bedroom when not in use.
- 19 The security of personal possessions can be a problem when camping or caravanning.
- 20 Displaying examples of student's work has become part of school life. It enhances the environment and provides an area of interest for parents, teachers and pupils. Display systems can be moved or adapted to cater for different demands.
- 21 The number of reported vehicle thefts is on the increase. It is important to deter the 'would-be-thieves' as well as preventing them driving the vehicle away.
- 22 During the re-building of motor vehicle, kart and model engines specialist tools are often required.
- 23 Vehicles occasionally breakdown during a long distance journey and an emergency tool kit can be very helpful.
- 24 When servicing a motorcycle, mechanics need to make sure that the motorcycle is stable and will not fall over.

6.3 EXPANSION OF AN EXEMPLAR COURSEWORK TASK

Task 1: Mechanical toys continue to provide interest, humour and fascination for all ages.

(Teacher or candidate(s) to select a commercially produced toy for analysis).

Internal Assessment Objective 1

Identification of a need or opportunity that has led to a design brief for a marketed product.

- *Where might the product be used?*
- *Who would buy and use this product?*
- *Why was this product designed and made?*
- *Develop a simple design brief for this product?*

Internal Assessment Objective 2

Study of a manufactured product which results in the identification of specification points that the product meets.

- *What is the purpose of this product?*
- *What are the overall sizes of the product?*
- *Why do you think the product needs to be this size?*
- *Are there any special features and how were they added?*
- *How could this product be modified to function more effectively?*
- *Are there any safety factors affecting the design of this product?*
- *What benefits might there be in making more than one of these products?*
- *How would the manufacturer make more than one of these products?*
- *Do you think this product is well designed?*

Develop a specification that lists the design requirements of the product, including some reference to the manufacture of it in quantity.

Internal Assessment Objective 3

Study of a manufactured product, which results in the identification and communication of simple design decisions that may have influenced the product development.

- *What material(s) is the product made from?*
- *Why was the material chosen to make the product?*
- *What components are used in the manufacture of the product?*
- *How are the components joined to the product?*
- *Explain simply how the product works?*
- *What design considerations have been used to assist in quantity manufacture?*
- *Has a finish been applied and what might be the reasons for this?*
- *Why have certain safety decisions been made?*

Internal Assessment Objective 4

**From a given design brief and specification generate possible ideas that contribute to a solution;
(the design brief and specification could be provided by the teacher to help provide a focus for the development of the product and the evaluation).**

Candidates could:

- *Propose ideas for a product.*
- *Produce a collection of quick annotated sketches showing a range of appropriate solutions.*
- *Evaluate each idea against the specification.*
- *Produce two and / or three-dimensional models to help develop solutions.*
- *Give reasons for selecting one solution to make.*
- *Use computer modelling, or fabricate a prototype that may help develop the concept and improve the design.*
- *Contribute to a final drawing.*

Internal Assessment Objective 5

Contribute to product planning and realisation.

- *Explain how the design is going to be made (planning).*
- *List what materials and components will be needed.*
- *Produce a simple model or mock up of the design.*
- *Use a range of skills whilst making the product.*
- *Work safely and accurately.*
- *Produce a quality product.*

Internal Assessment Objective 6

Evaluation and product testing.

- The product is evaluated against the original specification.
- The product's fitness for purpose is tested in the situation it was designed for. Individuals from the user group should be given the opportunity to use the product and make comments.
- The success of the planned control system (jig, former, template) for the manufacture of the product is analysed against their production of a single product.
- As a result of the testing, proposals for further development are suggested and explained.

7 Regulations for Internal Assessment

7.1 SUPERVISION AND AUTHENTICATION OF COURSEWORK PROJECTS

OCR expects teachers to supervise and guide candidates who are undertaking work which is internally assessed (for example coursework project). The degree of teacher guidance in candidates' work will vary according to the work being undertaken *and the ability of the candidate*.

When supervising internally assessed coursework projects, teachers are expected to:

- Offer candidates advice about how best to approach their work;
- *Provide support, advice and guidance to enable the candidate to access the specification appropriately;*
- Exercise continuing supervision of work in order to monitor progress;
- Ensure that the work is completed in accordance with the specification requirements and can be assessed in accordance with the internal assessment objectives and procedures.

Internally assessed coursework projects should be completed in the course of normal curriculum time and marked by the teacher. Some of the work, by its very nature, may be undertaken outside the Centre, for example, research work, testing etc. The teacher must be satisfied that the marks awarded reflect the candidate's contribution.

7.2 PRODUCTION AND PRESENTATION OF INTERNALLY ASSESSED COURSEWORK PROJECT

Candidates must observe certain procedures in the production of internally assessed work.

- Any copied material must be suitably acknowledged.
- Quotations must be clearly marked and a reference provided wherever possible.
- Work submitted for moderation must be marked with the:
 - Centre number
 - Centre name
 - Candidate Number
 - Candidate Name
 - Specification title and code
i.e: OCR Entry Level Certificate in Design and Technology
(Resistant Materials Technology) (3962)
 - Coursework project title.

7.3 MINIMUM REQUIREMENTS FOR INTERNALLY ASSESSED WORK

There should be clear evidence that work has been attempted and some work produced.

If a candidate submits no work for an internally assessed component, then the candidate should be indicated as being absent from that component on the mark sheets submitted to OCR. If a candidate completes any work at all for an internally assessed component then the work should be assessed according to the internal assessment objectives and marking instructions and the appropriate mark awarded, which may be zero.

7.4 MARKING CRITERIA FOR INTERNALLY ASSESSED WORK

This specification requires candidates to demonstrate fully their design and technology capability. They should combine skills with knowledge and understanding in order to design and make quality products.

The Assessment Objectives:

- of materials, components, processes, techniques and industrial practise (*Unit 1*);
- for designing and making quality products (*Unit 2*);
- for evaluating processes and products and examining the wider effects of design and technology on society (*Unit 3*).

are assessed through the six Internal Assessment Objectives shown below.

Coursework Assessment Objectives	Marks	
	Designing	Making
Unit 1		
1 <i>Identification of a need or opportunity that has led to a Design Brief for a marketed product</i>	4	0
2 <i>Study of a manufactured product which results in the identification of specification points that the product meets</i>	12	0
3 <i>Study of a manufactured product, which results in the identification and communication of simple design decisions that may have influenced the product development.</i>	10	0
Unit 2		
4 <i>Generation and communication of design ideas that contribute to a solution</i>	14	0
5 <i>Contribution to product planning, modelling and realisation</i>	0	52
Unit 3		
6 <i>Evaluation of the realised product</i>	0	8
Total Marks	Designing Making	40 60
Total Coursework Marks	100	

The weighting of the marks provides an indicator of the time that candidates should spend on each part of the project.

It is envisaged that the coursework project presented for assessment will represent 20 to 25 hours work. Some of the work, by its very nature, may be undertaken outside school e.g. research work, testing etc.

7.4.1 Guidance for Teachers

It is appreciated that for assessment purposes, the Internal Assessment Objectives have been written in a linear form. However, within focus areas of Design and Technology, some stages may interrelate and be cyclical in approach.

This specification requires candidates *to use and study a simple manufactured and marketed resistant materials product and then design and make their own resistant materials product.*

The type of project selected should be challenging, but realistic in terms of resources and time available.

In the product analysis required in Unit 1 candidates are actively encouraged to think about the needs/requirements of the user group and the situation the product would be used in and then extend their understanding of the situation and the product by collecting, documenting and analysing relevant information and data about the product.

Candidates should be encouraged to use ICT where appropriate. Digital cameras, scanned and down loaded images, internet and CD-ROM access, *data processing* can all provide opportunities for candidates to document information.

A resulting design brief and specification should take into account the users and the way in which the product may have been developed.

It will be helpful if at the beginning of Unit 2 a clear design brief and specification is established either by the centre or the candidate, to enable candidates to focus their own product design, realisation and evaluation.

Quick initial design sketches can be developed. Annotation can provide additional details about possible solutions. The final design selection needs to be discussed and justified against the original design specification. Where appropriate, candidates should consider the use of ‘smart’ and modern materials.

During the product development, candidates need to develop their idea towards a final product. They test materials, production methods and surface finishes. The results need to be recorded and decisions justified. Exact sizes and shapes of components are established. 3D modelling tools can create realistic representation of the finished product. Candidates may contribute to designing and making a simple device such as a jig, former or template that can be used as part of a system to maintain consistency during the manufacture of their product. The success of this device can be assessed during the evaluation report.

Prior to realisation, candidates need to *contribute to a plan* that considers the order of manufacture, the processes, tools and equipment to be used. Time plans help to keep the candidate on target. Using a range of skills and techniques, candidates are expected to make a quality product that meets the requirements of the design specification.

The evaluation report provides the opportunity for the candidate to analyse the outcome against the original specification and whether they have used the correct materials, equipment etc. *Simple* product testing will establish the success of the product and consumer/user group opinions will inform suitable modifications and further product development.

7.4.2 Applying the internal assessment objectives to candidates' work

Each internal assessment objective has a number of 'level of response' boxes containing hierarchical statements. Initially a 'best fit' should be established and the mark awarded within the appropriate mark range.

The marks have been broken down into ranges of marks for the hierarchical statements within each level of response box. A candidate should have a mark against each strand in the level of response boxes depending upon the level they have reached.

This breakdown enables positive marking of a coursework project by allowing the teacher to match statements from any of the level of response boxes against the evidence offered by the candidate. This approach can be applied to each assessment objective using the marks in brackets [] as indicated.

For example when marking Internal Assessment Objective 5, a project may reflect:

Planning	<i>'Some record of activity undertaken'</i>	[3]
Modelling	<i>'Simple, poor quality modelling presented but complete'</i>	[8]
Skills, techniques, health and safety	<i>With some guidance has used a range of skills and techniques appropriate to the task. Worked safely most of the time.</i>	[13]
Outcome	<i>The outcome will be of a reasonable standard and will be mainly complete.</i>	[13]
	Total	[37]

This candidate has a mark against each of the elements, planning, modelling, skills and techniques and product outcome.

The candidate has evidently produced some record of the making of the product although it has probably not been forward planning.

Some modelling has been presented and although of poor quality it was completed and presented for assessment.

With some guidance from the teacher the candidate has successfully used a range of skills and techniques and has worked safely.

The outcome was complete and of a reasonable standard.

EXEMPLAR MARKING

Internal Assessment Objective 5

Total Marks: 52

Contribution to Product Planning, Modelling and Realisation	Level of Response	Mark Range
<p><i>Planning</i></p> <p><i>Modelling</i></p> <p><i>Skills, techniques, health and safety</i></p> <p><i>Outcome</i></p>	<p><i>Some record of activity undertaken</i></p> <p><i>Simple modelling of very poor quality and probably incomplete.</i></p> <p>With frequent prompting uses basic skills and techniques appropriate to the task. Little understanding of safe working practices.</p> <p><i>The outcome will be of a very low standard and will not be completed.</i></p>	<p>(3)</p> <p>[3]</p> <p>0-12</p> <p>[3]</p> <p>[3]</p>
<p><i>Planning</i></p> <p><i>Modelling</i></p> <p><i>Skills, techniques, health and safety</i></p> <p><i>Outcome</i></p>	<p><i>Evidence of some contribution to planning as a result of prompting.</i></p> <p><i>Simple, poor quality modelling presented but complete.</i></p> <p>With guidance has used basic skills and techniques appropriate to the task. Reasonable understanding of safe working procedures.</p> <p><i>The outcome will be of a low standard and will be mainly complete.</i></p>	<p>[8]</p> <p>(8)</p> <p>13-32</p> <p>[8]</p> <p>[8]</p>
<p><i>Planning</i></p> <p><i>Modelling</i></p> <p><i>Skills, techniques, health and safety</i></p> <p><i>Outcome</i></p>	<p><i>Evidence of a contribution to planning.</i></p> <p>Reasonable standard of modelling presented.</p> <p>With some guidance has used a range of skills and techniques appropriate to the task. Worked safely most of the time.</p> <p><i>The outcome will be of a reasonable standard and will be mainly complete.</i></p>	<p>[13]</p> <p>[13]</p> <p>33-52</p> <p>(13)</p> <p>(13)</p>
Total		52

Internal Assessment Objective 1

Total Marks: 4

Identification of a need or opportunity that has led to a design brief for a marketed product.	Level of Response	Mark Range
<p>Candidates will need to:</p> <ul style="list-style-type: none"> • <i>communicate by simple means, a description of the situation where the product could be used, for example, text, drawings, graphs, photographs;</i> • <i>identify the range and type of users for which the product is intended;</i> • <i>write a design brief that the marketed product satisfies.</i> 	<p>Some consideration of the situation of the intended users that has led to a design brief.</p>	0-2
	<p>Consideration of both the situation and the intended users that results in a design brief of the marketed product.</p>	3
	<p>Description of both the situation and users leading to a clear design brief of the marketed product.</p>	4
Total	4	

Internal Assessment Objective 2

Total Marks: 12

<i>Study of a manufactured product which results in the identification of specification points that the product meets.</i>	Level of Response	Mark Range
<p>Candidates will need to:</p> <ul style="list-style-type: none"> examine the intended purpose of the product; identify data relevant to the product and its users, for example, dimensions; <i>identify and evaluate how the existing product fulfils the needs of the intended users and describe, in simple terms, how the product works;</i> <i>list design specification points that the product meets including reference to manufacturing in quantity.</i> 	<p><i>Intended use of existing product identified but no evaluation.</i></p> <p>A specification identifying some basic requirements.</p>	<p>[2] 0-4</p> <p>[2]</p>
	<p><i>Intended use of product examined with some functions identified, evaluated against the needs of the user and with a limited description of how it works.</i></p> <p>A specification identifying some key features including a suggestion of how more than one has been made.</p>	<p>[4] 5-8</p> <p>[4]</p>
	<p><i>Intended use of product examined with most functions identified, evaluated against the needs of the intended users and with a clear description of how it works.</i></p> <p>A specification containing some reference to a system required to manufacture in quantity.</p>	<p>[6] 9-12</p> <p>[6]</p>
Total	12	

Internal Assessment Objective 3

Total Marks: 10

<p>Study of a manufactured product which results in the identification and communication of simple design decisions that may have influenced the product development.</p>	<p>Level of Response</p>	<p>Mark Range</p>
<p>Candidates will need to:</p> <ul style="list-style-type: none"> • <i>as a result of investigation and testing a manufactured product, make reasoned decisions about why:</i> <ul style="list-style-type: none"> <i>materials</i> <i>production methods</i> <i>finishes</i> <i>components</i> <p><i>were used in its manufacture.</i></p> <p><i>For example, hinges, fastenings, appearance, scientific principles to ensure function, product aftercare and health and safety;</i></p> <ul style="list-style-type: none"> • <i>identify and consider the product design opportunity and implications of quantity manufacture (simple examples only);</i> • <i>present their findings using a combination of text, simple graphical techniques and computer images.</i> 	<p>Some materials and production methods identified.</p> <p>One design opportunity given or one implication for quantity manufacturing</p> <p>The work presented displays a very low standard of communication techniques</p>	<p>[1]</p> <p>[1]</p> <p>[1]</p> <p>0-3</p>
	<p><i>Evidence of investigation of the product with most materials, production methods, finishes and components identified.</i></p> <p><i>Some details of design opportunities or some implications of quantity manufacture presented.</i></p> <p>Communication will be of a <i>low standard</i> using a limited number of techniques</p>	<p>[2]</p> <p>[2]</p> <p>[2]</p> <p>4-6</p>
	<p><i>Evidence of some testing of the product in use resulting in some valid reasons for the use of materials, production methods, finishes and components.</i></p> <p><i>Quantity manufacturing design features identified with some reference to the manufacturing system and its control.</i></p> <p>Communication will be of a <i>reasonable standard</i> using a <i>limited number</i> of techniques.</p>	<p>[3]</p> <p>[3]</p> <p>[4]</p> <p>7-10</p>
<p>Total</p>	<p>10</p>	

Internal Assessment Objective 4

Total Marks: 14

Generation and communication of design ideas that contribute to a solution.	Level of Response	Mark Range
<p><i>From a design brief and specification candidates will need to:</i></p> <ul style="list-style-type: none"> • <i>propose design ideas to contribute to an overall design;</i> • <i>evaluate design ideas against the specification;</i> <ul style="list-style-type: none"> • <i>consider whether ideas meet the need and its fitness for purpose;</i> • <i>choose their most suitable idea;</i> • <i>present design ideas simply using appropriate methods of communication, for example, text, graphical, computer techniques.</i> 	<p>One idea proposed. <i>Some evaluation of the idea.</i> The work presented displays a very low standard of communication techniques</p>	<p>[1] [1] 0-3 [1]</p>
	<p>Two ideas proposed. <i>A limited evaluation of their ideas with one reason given for their choice.</i> Communication will be of a low standard using a limited number of techniques.</p>	<p>[2] [3] 4-8 [3]</p>
	<p>Two or more ideas proposed. <i>An evaluation of ideas leading to reasons being given for choice of idea.</i> Communication will be of a reasonable standard using a limited number of techniques.</p>	<p>[4] [5] 9-14 [5]</p>
Total	14	

Internal Assessment Objective 5

Total Marks: 52

Contribution to Product Planning, Modelling and Realisation	Level of Response	Mark Range
<p>Candidates will need to:</p> <ul style="list-style-type: none"> contribute to a plan of action from the following: materials, manufactured items, equipment, and processes against an order of work; use modelling to help ensure the product will be fit for its purpose; complete an outcome suitable for the intended user or users; 	<p>Some record of activity undertaken</p> <p>Simple modelling of very poor quality and probably incomplete.</p> <p>With frequent prompting uses basic skills and techniques appropriate to the task. Little understanding of safe working practices.</p> <p>The outcome will be of a very low standard and will not be completed.</p>	<p>[3]</p> <p>[3]</p> <p>0-12</p> <p>[3]</p> <p>[3]</p>
<ul style="list-style-type: none"> use tools and equipment accurately safely and effectively; be prepared to adapt working procedures in response to changing circumstances; 	<p>Evidence of some contribution to planning as a result of prompting.</p> <p>Simple, poor quality modelling presented but complete.</p> <p>With guidance has used basic skills and techniques appropriate to the task. Reasonable understanding of safe working procedures.</p> <p>The outcome will be of a low standard and will be mainly complete.</p>	<p>[8]</p> <p>[8]</p> <p>13-32</p> <p>[8]</p> <p>[8]</p>
<ul style="list-style-type: none"> use a range of skills and techniques appropriate to the task. 	<p>Evidence of a contribution to planning.</p> <p>Reasonable standard of modelling presented.</p> <p>With some guidance has used a range of skills and techniques appropriate to the task. Worked safely most of the time.</p> <p>The outcome will be of a reasonable standard and will be mainly complete.</p>	<p>[13]</p> <p>[13]</p> <p>33-52</p> <p>[13]</p> <p>[13]</p>
Total		52

Evaluation of the realised product.	Level of Response	Mark Range
Candidates will need to: <ul style="list-style-type: none"> • <i>use the product for its intended purpose to test its suitability;</i> • evaluate the <i>product</i> against its fitness for purpose and original need; • review whether resources have been used appropriately for example, time, materials and processes. 	<p>Some reference to the materials used</p> <p>Minimal evidence of using the product with unsupported comment relating to the given specification/criteria</p>	<p>[1]</p> <p style="text-align: center;">0-2</p> <p>[1]</p>
	<p><i>Simple review of materials used.</i></p> <p>Limited evidence of using the product to test its suitability leading to:</p> <p>Some relevant and supported comment with reference to the given specification/criteria.</p>	<p>[2]</p> <p style="text-align: center;">3-5</p> <p>[3]</p>
	<p>Comments upon the use of their time, materials and the processes used.</p> <p>Clear evidence of the use of the product to test its suitability leading to:</p> <p>A range of relevant and supported comment with reference to the given specification/criteria.</p>	<p>[3]</p> <p style="text-align: center;">6-8</p> <p>[5]</p>
Total	8	

7.5 MODERATION

All internally assessed work is marked by the teacher and internally standardised by the Centre. Marks are then submitted to OCR by a specified date, after which moderation takes place in accordance with OCR procedures. The purpose of moderation is to ensure that the standard of the award of marks for internally assessed work is the same for each Centre and that each teacher has applied the standards appropriately across the range of candidates within the Centre.

The sample of work which is presented to the Moderator for moderation must show how the marks have been awarded in relation to the Internal Assessment Objectives defined in Section 7.3.

Where it is not clear within a project folder, by the candidate’s own presentation of work, where the marks have been awarded, annotation must be carried out by the person marking the work.

SECTION E: FURTHER INFORMATION

8 Arrangements for Candidates with Special Needs

Arrangements for Candidates with Special Needs for Entry Level Certificate specifications are based on the principle that the Centre is best able to assess the needs of the candidate and the appropriateness of the arrangement required. Arrangements for candidates with special needs should not advantage nor disadvantage a particular candidate, nor should they reduce the reliability and validity of the assessment.

The arrangements for candidates with special needs are more flexible than those currently available at GCSE and as such it should **not** be assumed that any arrangements made at Entry Level Certificate level will automatically be available at GCSE or GCE Level.

The following arrangements can be made for candidates without permission being sought:

- mechanical and technological aids may be used by candidates who are physically dependent on them;
- instructions regarding the conduct of any In-Course tests may be simplified;
- language support staff may provide linguistic help;
- bilingual dictionaries and word lists may be used.

For information relating to permission to use the following special arrangements, please consult the Handbook for Centres. Under certain circumstances:

- the teacher may act under the candidate's instructions to perform simple physical actions which the candidate is unable to undertake;
- mechanical and technological aids may be used by candidates who generally use them in their normal work;
- communicators or signers may be used;
- readers and amanuenses may be used.

Centres must apply to OCR for the provision of modified terminal examination papers. Applications should be made on the Special Arrangements Form (JEB/SA) and be submitted by 15 January in the year of the terminal examination.

It is expected that, generally, the candidate's own teacher will act as a communicator, a signer, a reader or an amanuensis.

Further clarification of any special arrangements may be obtained by consulting the section on "*Special Arrangements for Entry Level Certificate*" (Section 6C) in the Handbook for Centres or by contacting OCR.

9 Results Enquiries and Appeals

Under certain circumstances a Centre may wish to query the grade awarded to one or more candidates or to submit an appeal against the outcome of such an enquiry.

For procedures relating to enquiries on results and appeals, Centres should consult the Handbook for Centres and the document “*Enquiries about Results and Appeals - Information and Guidance for Centres*” produced by the Joint Council for General Qualifications. Further copies of the most recent edition of this paper can be obtained from OCR, or from the Joint Council for General Qualifications website: www.jcgq.co.uk.

10 Support and In-service Training for Teachers

To support teachers using this specification, OCR will make the following materials and services available:

- a full programme of In-Service training meetings arranged by the Training and Customer Support Division (telephone 01223 552950);
- written advice on coursework proposals;
- a report on the examination, compiled by senior examining personnel after each examination session;
- individual feedback to each Centre on the moderation of internally assessed coursework.

COURSEWORK ADMINISTRATION PACK

This Coursework Administration Pack is designed to accompany the OCR Entry Level Certificate Design and Technology (Resistant Materials Technology) specification for teaching from September 2001.

The forms in this pack are for use with the following specification:

- **Design and Technology (Resistant Materials Technology) (3962)**

Guidance on the assessment of coursework will be found in Section 7 of the specification.

A master copy of all Entry Level Certificate Administration Packs will be sent to Examinations Officers during 2001.

Centres are permitted to copy materials from this booklet for their own internal use.

Contents:

Compulsory Recording Materials

Coursework Summary Form

These materials will not automatically be sent out annually.

All forms may be photocopied and used as required. Additional copies may be downloaded from the OCR website www.ocr.org.uk.

Compulsory Recording Materials

Coursework Summary Form: This records the mark for each piece of work across the assessment objectives and the total mark for each candidate entered by the Centre. When the Centre is notified of the address of the Moderator, this form should be forwarded. Centres should keep a copy of the completed form. A print-out from a suitable software package is an acceptable alternative to this form if the same information is given.

Internal Standardisation

Where more than one teacher in the Centre has marked the work for a particular coursework component, the Centre must standardise the marking in order to ensure that candidates who have demonstrated the same level of attainment receive the same mark. It is the responsibility of the Centre to produce a single, valid and reliable order of merit which reflects the attainment of all the candidates.

Submission of Marks

OCR will send Centres internal assessment mark sheets (MS1) for the submission of coursework marks, along with instructions for completing and returning the mark sheets. Coursework marks may also be submitted electronically by EDI. The dates for despatch of MS1 mark sheets and for submission of coursework marks are given on the Key Dates poster for each session. Centres must ensure that they keep a copy of their coursework marks.

Moderation

Moderator address labels will be sent to Centres shortly before the coursework mark submission date. Where the Centre has six or fewer candidates entered for a coursework component, all the candidates' work should be sent to the Moderator with a copy of the internal assessment mark sheet(s) (MS1).

Where there are more than six candidates, the Centre must choose a representative sample of the work of six candidates including work from the top, middle and bottom of the mark range. Where appropriate, work from the classes of different teachers should be included. Any guidance or instruction sheets that the candidates have received should also be included.

In addition, any correspondence relating to arrangements for candidates with special needs should be sent to the Moderator, together with the work of these candidates.

A report on the outcome of the moderation will be sent to Centres at the time results are issued.

General Coursework Regulations and Procedures

General coursework regulations and procedures including those concerning lost or incomplete coursework are given in the OCR *Handbook for Centres*.

INSTRUCTIONS FOR COMPLETION

A. Marking and Internal Standardisation

1. Teachers must be thoroughly familiar with the appropriate sections of the specification and with the general coursework regulations.
2. Complete the information at the head of the form.
3. List the candidates in an order which will allow ease of transfer of information to a computer-printed mark sheet (Form MS1) at a later stage (i.e. in candidate number order). The teaching group/set should also be shown.
4. Mark the coursework for each candidate according to the notes for guidance given in the current specification.
5. Carry out internal standardisation to ensure that the total mark awarded to each candidate reflects a single, valid and reliable order of merit.
6. Enter the marks and total marks in the appropriate spaces.
7. Ensure that the addition of marks is independently checked.

B. External Moderation

Send this form to the Moderator **with the MS1**. A print-out from a suitable software package is an acceptable alternative to this form if the same information is given.