

Coursework guide

**Edexcel GCSE in Design & Technology
1970-1974 (Full Course)**

First examination 2003

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Introduction

This coursework guide should be read in conjunction with the Edexcel Full Course specifications for Design & Technology. It is written to help teachers and students when choosing appropriate coursework projects, developing coursework projects and when assessing and reporting.

The Full Course specification titles are:

- ÷ Food Technology
- ÷ Textiles Technology
- ÷ Graphic Products
- ÷ Resistant Materials Technology
- ÷ Systems & Control Technology.

The above titles are referred to using the following specification codes:

Full Course specification code	Material route
1970	Design & Technology: Food Technology
1971	Design & Technology: Textiles Technology
1972	Design & Technology: Graphic Products
1973	Design & Technology: Resistant Materials Technology
1974	Design & Technology: Systems & Control Technology

Coursework guide – key features of the Full Course

- ÷ Maximum coursework project weighting (60%).
- ÷ Single coursework project consisting of a design and make task and design portfolio (40 hours).
- ÷ Open ended choice of project or choose from an Edexcel set problem.
- ÷ Clear and easy to use, coursework assessment criteria.
- ÷ Coursework is internally assessed and standardised and externally moderated (postal moderation of portfolio, including photographic evidence of practical outcome).
- ÷ Full programme of INSET delivered by senior examiners and specialist technologists in each material area.
- ÷ Specialist ICT INSET for each specialist area.
- ÷ Exemplar material developed to support each material area.
- ÷ Signposting of key skills and the wider curriculum in coursework.
- ÷ Each material area gives direct progression to Edexcel AS/Advanced GCE.

Assessment requirements

Students are required to submit a single coursework design and make project that consists of a design folder of approximately 15-20 sheets of A3 pages and a practical outcome.

Students should spend up to 40 hours on coursework and their choice of project should allow access to the full range of grades available.

The scheme of assessment is designed to be flexible enough to allow students who wish to do so, to focus their main efforts on designing and also to provide an opportunity for those who prefer to concentrate on making to achieve similar credit for their efforts.

Ideally, project work will promote a good balance between designing and making and should produce quality outcomes that integrate both aspects of coursework.

Coursework projects should be generated by students under teacher supervision to ensure that they are appropriate to the abilities of individual students.

The level of demand of a coursework project should influence the interpretation of the assessment criteria. A successful project that makes greater demands on thinking and making skills and involves high levels of knowledge and understanding, should be more highly rewarded than a successful project with fewer demanding aspects.

Teacher intervention at the design stage is crucial to a successful outcome and should ensure that students are in control of their project and are working at a level that will result in the best grade possible for that student.

Any group work embarked upon by students must be carefully monitored to ensure that selected projects are appropriate and provide individual and separate evidence of a student's ability to design and make holistically, reflecting all assessment criteria.

Coursework project design folder

Coursework design folders should be concise and succinct and students should endeavour to complete their design work within the recommended 15-20 sheets of A3 paper.

An increased emphasis on industrial practices, particularly in the use of CAD/CAM and on the wider effects of technological activity on society and the environment is a feature of GCSE Design & Technology and should be evidenced in the project design folder.

Students must be selective when deciding on the content of design folders and padding should be avoided. A content page and page numbering are helpful organisational tools for both teacher assessment and moderation.

A suggested guideline for page breakdown of the design folder is provided on page 3, but this may change depending upon the content and emphasis attached to a project.

Coursework project design folder contents	Page breakdown
Identify needs, use information sources to develop detailed specifications and criteria.	4-5
Develop ideas from the specification, check, review and modify as necessary to develop a product.	6-7
Use written and graphical techniques including ICT and Computer Aided Design (CAD) where appropriate, to generate, develop, model and communicate.	Throughout
Produce and use a detailed working schedule which includes a range of industrial applications as well as the concepts of systems and control. Simulate production and assembly lines using appropriate ICT.	1-2
Select and use tools, equipment and processes effectively and safely to make single products and products in quantity. Use Computer Aided Manufacture (CAM) appropriately.	3-4
Devise and apply tests to check the quality of their work at critical control points. Ensure that their products are of suitable quality for the intended use. Suggest modifications that would improve their performance.	1-2

The nature of the coursework

Successful design and technology coursework demands the application of a wide range of skills that focus on a particular problem in order to meet detailed points of specification and a good understanding of the assessment criteria is necessary to give students control of their work and to enable them to target marks effectively.

Identify needs, use information sources to develop detailed specifications and criteria

Needs

Students should try to identify a realistic need that can be recognised as a potential project. They should explore the problem through analysis and investigation and use a systems approach to break the problem down into smaller sub-problems. Strategies for analysis and investigation may include asking a range of questions about the need or problem and carrying out analysis on existing products.

Information

Information researched from a wide range of sources will give the best balance of useful data, but it must be relevant and well targeted to be of use. Useless padding will gain no credit. Students may consider some of the following sources as useful in their collection of information:

- ÷ market research
- ÷ consumer surveys
- ÷ visits to manufacturers
- ÷ product test reports
- ÷ textbooks
- ÷ e-mail
- ÷ CD ROMs
- ÷ databases
- ÷ Internet
- ÷ data sheets
- ÷ magazines
- ÷ people in manufacturing industry.

Specification

A clear and detailed specification is essential to the success of any design project and students should refer to their specification when designing and developing ideas and when evaluating solutions both formatively and summatively. The specification should be written with precision and should contain important points of consideration for the proposed design.

Whereas statements of analysis are general questions related to design decisions such as ‘what materials are available’ or ‘what scale of production is the design aimed at’, points of specification will use statements that are specific ‘the material used will be acrylic’ or ‘the design must be suitable for batch production’.

The specification should contain quantitative information that can be measured against the performance of the final solution when it is evaluated.

Considerations in a specification may include:

- ÷ purpose
- ÷ user and performance requirements
- ÷ materials to be used
- ÷ size and cost limitations
- ÷ scale of production appearance
- ÷ safety factors
- ÷ product maintenance
- ÷ environmental issues.

Develop ideas from the specification, check, review and modify as necessary to develop a product

Ideas

This is a very important point in the design process, and up to now students will probably have followed well defined routes in their analysis and research of the problem in hand, but now they have the opportunity to use their creativity to present alternative solution to the problem and to display their design ability.

Several alternative design ideas (at least three) should be presented in this part of the design folder and each design should consider and meet the points of specification. Each idea should be realistic and workable and should be evaluated formatively to assess its potential.

Students should present a range of design proposals that explore distinctly different materials, processes and working techniques and allow the opportunity to use and display knowledge and understanding gained throughout the design and technology course of study.

Develop

Idea development brings together the best features of initial design ideas into a final solution to the problem that best fits the specification. Compromises may have to be made at this stage to allow for cost or material constraints, limitations in available processing equipment or other unforeseen problems and students should be encouraged to see this as a valid part of the design process.

Modelling and testing of ideas and sub-systems at this point will enable students to establish the feasibility of their proposed solution. Modelling techniques can be used to ‘mock up’ designs and may include the use of materials and processes that replicate the selected ones in a cheaper or more convenient way. Card could be used to create and test a mechanism for a toy, or to establish dimensions for food packaging. Rigid foam could be used to test the form and ergonomics of a torch design and a cheap fabric could be used to test the pattern design for a garment. Electronic circuits can be tested using a circuit modelling software package and Printed Circuit Board (PCB) drawing packages can be used to develop a final circuit diagram.

When using modelling, students should ensure that they record evidence of this aspect of their work.

The final developed idea should be presented with detailed information on all points given in the specification and should be justified through evaluation of each point.

Review

Throughout their ideas and development work, students should show evidence of having reviewed the design decisions they have made against the specification. This may take the form of evaluative comments made by themselves and ideally should include the views of others such as clients, experts on materials or techniques and potential users.

Reviewing work in progress is an essential activity in arriving at the optimum solution to a design problem.

Use written and graphical techniques including ICT and Computer Aided Design (CAD) where appropriate, to generate, develop, model and communicate

Written communication

Design and technology uses a technical language that is both precise and unique and students should endeavour to use accurate and appropriate terms when writing about their coursework project. High quality work will reflect a level of knowledge and understanding that is expressed through competent use of specialist terminology, presented in a well thought out and logical way.

Other media

Students should be encouraged to use a range of graphical media and techniques in their design work. Good quality communication skills are essential to the design process in order to relate ideas and concepts to others.

Students could choose to use some of the following in their work:

- ÷ effective and clear hand sketching
- ÷ formal technical drawing
- ÷ pictorial drawing
- ÷ exploded views
- ÷ perspective drawing
- ÷ rendering
- ÷ model making
- ÷ photography and other appropriate graphical techniques.

ICT

There are many opportunities throughout the coursework project for the use of ICT and students should be encouraged to use the resources at their disposal in a relevant way. ICT should be seen as another communication tool to be used appropriately within the context of the project and should not be used simply for effect, or in a contrived manner.

(Refer to *Appendix B* for *Use of ICT*)

Produce and use a detailed working schedule which includes a range of industrial applications as well as the concepts of systems and control

Simulate production and assembly lines using appropriate ICT

Systems and control

Manufacturing/making processes can be broken down into the sub-systems of inputs, processes and outputs. The purpose of such systems is to change inputs into outputs through the processes involved.

Students should be able to identify in their work a range of possible inputs and ones which should be investigated and considered for use. They should become familiar with any processes that will be used to shape and transform the inputs. They should also evaluate the outputs to determine whether the system is an effective and successful means of manufacturing.

Feedback in systems design is important and students should identify potential problems and difficulties within the system and suggest changes and modifications to improve its performance.

Schedule

Careful planning for manufacture is essential and should be detailed enough to enable another person to make the final outcome from the designed schedule.

The basis of a schedule could be a flow chart that includes the main stages in production, including collecting components and materials, the preparation of materials when measuring and/or marking out, processing, assembly and finishing.

The schedule is an aid to working, so it must contain the order in which parts and sub-systems need to be made and should be as detailed as possible. Details could include any jigs, mould or templates used, or CAD/CAM systems employed to produce identical parts or sub-systems.

Other considerations in a working schedule could be scale of production, timescales and quality issues.

Industrial applications

Students should demonstrate an understanding of industrial processes and use them in their work where appropriate. Having produced a one-off product, students might consider the demands on equipment and processes of using batch production to produce a few hundred of the same product.

Select and use tools, equipment and processes effectively and safely to make single products and products in quantity. Use Computer Aided Manufacture (CAM) appropriately

Select and use

Students should demonstrate their competence in selecting appropriate tools, equipment and processes with reference to their planning for manufacture schedule. They should use tools and equipment as expertly as possible and should show an ability to modify techniques and processes when necessary through their understanding of the limitations and flexibility of tools and equipment.

Make product(s)

Students should aim to produce a high quality product that is complete and fully functional and meets the requirements of the specification.

Making, presents an opportunity for students to demonstrate skills in manipulating tools and equipment and in applying processes creatively. High quality outcomes demand high level skills and students should be encouraged to explore unfamiliar construction techniques if appropriate. Challenging work of good quality should be rewarded more highly than good quality work that is more straightforward.

The use of CAM in manufacturing should be encouraged if it is available and relevant, but should not be contrived in order to include it for its own sake.

Work safely

All students should demonstrate a regard for safety awareness for themselves and others by identifying and using safety procedures when working with materials, tools and equipment. Safety awareness should be recorded in the planning for manufacture schedule. The use of risk assessment and hazard analysis should be encouraged.

Devise and apply tests to check the quality of their work at critical control points. Ensure that their products are of suitable quality for the intended use. Suggest modifications that would improve their performance

Tests and checks

Testing a product against its specification, measures its fitness for purpose and gives guidance for further improvements and modifications.

Testing can be carried out during manufacture to inform students of their progress towards a successful outcome and after manufacture, to assess the product under realistic conditions.

Field testing under working conditions, testing over extended periods, third party user testing, testing against external standards and general sensory tests are all methods that students might employ in their checks.

Evaluate

Students should objectively evaluate their work summatively against the specification in order to justify and confirm the success of their product. Evaluation should include mention of problems encountered, how they were overcome and any modifications made during manufacture.

Third party evaluation is a valuable addition to a student's own assessment of their work.

Modifications

Testing and evaluation provide feedback on performance and fitness for purpose of a product and allows students to suggest design improvements and modifications for future development of the product.

Suggestions for improvement should relate to product performance, quality of manufacture and design, fitness for purpose, target market and larger scale production.

Key issues for delivery

The successful outcome of coursework depends on the consideration of a number of factors and the control that teachers and students have over those factors.

Time management

Most GCSE Design & Technology courses are taught in years 10 and 11, but should be seen as five terms long and not six terms as coursework projects must be submitted to Edexcel by 1 May in the year of the examination.

Terms 1 and 2 of the course should be spent on skills and knowledge building through short focused tasks that present students with differing experiences and demands from task to task.

The recommended time of 40 hours, for a coursework project implies a commitment from students of approximately two term's work based on 2 hours of practical work per week. Accompanying knowledge and understanding of the subject must also be covered during the course, so an early start to the coursework project is important if students are to have an opportunity to complete their work and test and evaluate it appropriately.

Students should be encouraged to decide upon a final project during term 3 of the course and should begin work in earnest no later than half term. Such an early start ensures that students are well prepared to continue their work in September of year 11 and are not coming to their projects 'cold'.

Students should aim to complete their coursework project by half term in term 5 of the course, so that final additions and refinements can be made with time to spare.

Project selection

It is essential that projects chosen by students can be supported by the resources of a department and by the expertise of teachers within those departments. It is a valid strategy to limit the range of projects that students can pursue, so that control can be maintained and resources can be standardised. A single theme can result in each student in a teaching group producing a unique and individual solution to the problem.

Projects must allow students to achieve their potential, but they should not be too daunting and students must always bear in mind the time constraints attached to their work.

Wherever possible, knowledge and understanding of the subject should be taught through project work as this adds relevance and cohesiveness to the course. Limiting the choice of project topics ensures that taught knowledge is directed at all students.

Targeting marks

Coursework assessment criteria statements are progressive in their demands from low, to medium, to high and it is clear from the content of each statement what students must do to achieve the next level of credit.

In order to enable students to achieve the best possible outcome from their work, they need to be familiar with the assessment criteria so that they understand what is required of their efforts and can resist for example, collecting inordinate amounts of research material where little credit is available for that activity.

From the coursework assessment criteria it can be seen that criteria 2 ‘developing ideas’ and criteria 5 ‘making’ carry a much heavier weighting than the other statements and students must ensure that they make an effort to produce high quality work in these areas as they are the most influential in achieving marks.

Targeting marks is an important skill that should be developed in all students so that they can use their time and effort as effectively as possible with the maximum gain.

Feedback to students

It is essential to their success that students understand how their work is assessed and what they have achieved as they progress through different stages in their project.

During a two-term project, it would be good practice to assess a student's work three times and to give feedback on their progress each time.

Using the coursework assessment criteria sheets gives teachers a convenient tool with which to report back to students on their progress. By highlighting the levels of achievement at the time of the first review of their work, students have a reference or baseline from which to make progress. Each subsequent review will plot progress and illustrate where efforts need to be focused. This exercise not only feeds back to students on their progress, but also makes final assessment very straightforward.

Some do's and don'ts in project work

- ÷ Do make sure students manage time properly – testing and evaluation cannot be carried out effectively on incomplete work.
- ÷ Do make sure projects are appropriate to the abilities of students and the time available.
- ÷ Don't be too ambitious in choice of project.
- ÷ Don't embark upon joint or group projects unless students can justify individual marks in **all** areas of assessment.
- ÷ Do target marks on the assessment grid – consider the weightings of each criteria.
- ÷ Don't award marks that cannot be justified.
- ÷ Do give regular feedback to students on their progress.
- ÷ Do take clear and effective photographs of practical outcomes.
- ÷ Do send completed coursework to Edexcel by 1 May.

Incorporating the wider curriculum

Key skills

The qualification in key skills requires students to demonstrate achievement levels in application of number, communication and information technology. Also available are units for the wider key skills of improving own learning and performance, working with others and problem solving.

Students following a course of study in design and technology have the opportunity to develop and generate evidence of attainment in all key skill areas through their coursework project.

The GCSE Design & Technology specifications signpost development and assessment opportunities that are based on the level 2 key skills units which identify the evidence that students must produce for their portfolio.

Application of number skills are required throughout the design process and activities such as calculating and measuring quantities of materials in research, the use of formulae in design development and production of accurate working drawings in planning for manufacture are examples of where key skills evidence could be found.

Communication skills underpin all design and technology work and activities such as brainstorming ideas and group discussion at the outset of a project, provide appropriate evidence in this area. When researching design problems, students will read extensively around a topic in order to collect relevant information that they will summarise for use. They may also use product analysis in their work and this will involve the use of images, providing further portfolio evidence.

Information technology is very widely used in design and technology work and many opportunities in all areas of design and making will occur for the collection of evidence for this key skill. Use of databases, the Internet and CD ROMs for research purposes are common applications of ICT in project coursework. Charts and graphs generated from spreadsheets as well as word processing and desk top publishing are used to present work and specialist software is used to present design and technology work that is focused on particular areas of the subject.

Refer to *Appendix B* for *Use of ICT*.

Working with others is an important part of design and technology and will involve cooperative efforts in collecting information, working in pairs and small groups, dividing tasks and exchanging information in order to improve a design or process. Evidence for this key skills area would be better collected in year 10, when students are more likely to be working in groups or pairs on short skills-building tasks. All GCSE project work submitted for assessment must be the student's own, so year 11 work is unlikely to generate appropriate evidence.

Improving own learning and performance evidence could be assembled through planning the final coursework project to set short-term targets such as dates for completion of each section of the design folder, times for review by the teacher, planning using time constraints, available materials and equipment and a production plan.

Problem solving is the holistic activity that is at the heart of all design and technology courses and is in evidence at every stage of the design process. Students who identify a need, analyse the problem, collect research, develop a specification, generate a range of alternative solutions, develop a chosen solution, produce a production plan and evaluate the outcome of their designing will generate appropriate evidence for this key skill.

Citizenship

In the Key Stage 4 (KS4) citizenship programme of study, the activities of developing skills of enquiry and communication and developing skills of participation and responsible action are directly reflected in the work of students involved in coursework projects.

The impact made on society by certain products, materials and processes is of interest to a designer and students need to consider this before making design decisions. The designer must also take into consideration the needs of the customer or client through market research and negotiate and compromise to achieve a mutually desirable outcome. Students approaching their work through a designer/client relationship would need to make such compromises.

Moral, ethical, social and cultural issues

Design and technology as a subject allows students to develop an understanding of moral, ethical, social and cultural issues as they underpin all design and make work.

Some products may have the potential to cause harm or injury, while others may have an impact on the way large groups of people live their lives. Automation has reduced the need for a large manufacturing workforce, but ICT has allowed people to work more flexibly.

When designing, students need to consider an increasing range of users of products in different societies who will have differing needs and these diverse and wider needs should be considered where appropriate.

Health and safety issues

Health and safety issues are implicit in all design and manufacturing and it is important that students ensure that their work is safe to use and safe to make and that it conforms to relevant safety standards.

Assessing students' work

The work of each student must be assessed using the coursework assessment criteria sheets, which contains criteria statements and levels of response, and the Candidate Mark Record Sheet which is used to convert achievement levels to marks.

Edexcel recommends using formative assessment during the development of projects, to provide students with feedback on their progress. Summative assessment should be made at the end of the coursework project.

Marking coursework projects

The six main assessment criteria for designing and making are further divided into three key features that have low, medium and high levels of response descriptors attached to them.

For each key feature, teachers should select the statement that is the best fit for a student's level of performance, transfer the selected level to the Candidate Mark Record Sheet and circle the mark relating to it. Marks for the six criteria should be added together and entered in the Final Total box.

In assessment criteria 2, 'Ideas' and 'Develop', mid-marks of 6 and 10 are available **to award to students whose performance easily meets one criteria, but does not fully fulfil the next higher statement.** In assessment criteria 5, 'Select and use' and 'Make product(s)' mid marks of 9 and 15 are available for similar use.

An example of a filled in Candidate Mark Record Sheet can be found on page 15.

Candidate Mark Record Sheet

Centre no: 32984	Specification no: 1970	Year of Entry: 2003
Candidate no: 7451	Candidate name: RUSSEL HOBBS	

Coursework title: COOK CHILL MEAL

Assessment criteria	Key feature	Annotation page number	LEVEL			Edexcel use only	
			L	M	H		
1 Identify needs, use information sources to develop detailed specifications and criteria	Needs	Pg 1	①	2	3		
	Information	Pg 1, 2, 3	1	2	③		
	Specification	Pg 4	①	2	3		
2 Develop ideas from the specification, check, review and modify as necessary to develop a product	Ideas	Pg 5, 6, 7	4	6	8	⑩	12
	Develop	Pg 8, 9, 10	4	⑥	8	10	12
	Review	Pg 5, 6, 8, 9	1	②	3		
3 Use written and graphical techniques including ICT and computer aided design (CAD where appropriate) to generate, develop, model and communicate	Written communication	Throughout	1	②	3		
	Other media	Pg 6, 8, 9	1	②	3		
	ICT	Pg 11	①	2	3		
4 Produce and use detailed working schedules, which includes a range of industrial applications as well as the concepts of systems and control. Simulate production and assembly lines using appropriate ICT	Systems and Control	Pg 11	①	2	3		
	Schedule	Pg 11	1	②	3		
	Industrial Applications	Pg 11	①	2	3		
5 Select and use tools, equipment and processes effectively and safely to make single products and products in quantity. Use CAM appropriately	Select and use	Pg 12, 13	6	9	⑫	15	18
	Make product(s)	Pg 14	6	9	12	⑮	18
	Work safely	Pg 12, 13, 14	1	②	3		
6 Devise and apply tests to check the quality of their work at critical control points. Ensure that their products are of suitable quality for the intended use. Suggest modifications that would improve their performance	Tests and checks	Pg 15	1	2	③		
	Evaluate product	Pg 15	①	2	3		
	Modifications	Pg 16	1	②	3		
FINAL TOTAL			67				

Annotation

Annotation is a compulsory requirement for coursework projects and is used to:

- ÷ help the moderator to understand how and where marks for each assessment criteria have been awarded
- ÷ describe where students have received help beyond normal learning support or where students have been rewarded for initiatives that are not immediately apparent from the evidence presented
- ÷ explain any other features of a student's work that will assist the moderator in understanding how a particular assessment was arrived at.

The minimum requirement for annotation is to complete the annotation column on the Candidate Mark Record Sheet by listing the portfolio page numbers where evidence can be found for each of the assessment criteria.

Further comments can be carried out on the back of the Candidate Mark Record Sheet. Detailed annotation will help a moderator to agree a centre's marks.

Annotation should not be written directly onto students' work.

Standardisation within the centre

It is the centres responsibility to ensure that where more than one teacher has marked the work, internal standardisation has been carried out. This procedure ensures that the work of all students at the centre is marked to the same standards and that an accurate rank order is established.

Coursework project folders

Following assessment, all coursework folders must be available for inspection by Edexcel. Each student's folder should contain only the work used for awarding marks for the assessment.

Coursework project folders must have a title page with the relevant specification name and number, candidate name, candidate number, centre name, centre number, title of project and date. The first page of the folder should be a content list and pages should be numbered throughout the folder.

The work **must** be sent to Edexcel to arrive no later than 1 May in the year of the examination. No practical work is to be submitted to Edexcel unless specifically requested.

The moderated coursework will be returned to centres after 30 September in the year of the examination. Edexcel reserves the right to retain examples of folders for archive, grading or training purposes. Centres will receive feedback about the appropriateness of coursework projects and assessments made.

Procedures for moderation of internal assessment

This section can be lifted directly from the specification.

All centres will receive Optically-read Teacher Examiner Mark Sheets (OPTEMS) for each coursework component.

Centres will have the option of either recording marks on OPTEMS or recording marks on computer for transfer to Edexcel by means of Electronic Data Interchange (EDI).

OPTEMS will be pre-printed on three-part stationery with unit and paper number, centre details and candidate names in candidate number order.

The top copy is designed so that marks can be read directly by an optical mark reader, so it is important to complete the OPTEMS carefully, in accordance with the full instructions listed in the specification.

OPTEMS should be completed using an HB pencil, on a flat surface so that they are easily read by the computer and to ensure that figures written in the marks box go through to the second and third copies.

For each candidate, the total mark from the Candidate Mark Record Sheet should be transferred to the box labelled 'Marks' on the OPTEMS. Care should be taken to check arithmetic and to make sure that the correct candidate is credited with the correct mark.

The component mark should be encoded on the right hand side of the OPTEMS by drawing a line to the two dots inside the ellipse on the appropriate marks. Clear, dark HB pencil lines must be made but they must not extend outside the ellipses on either side of the two dots.

Every candidate listed on the OPTEMS must have either a mark or one of the following codes in the marks box.

- ÷ 0 (zero marks) should be entered only if work submitted has been found to be worthless. It should not be used where candidates have failed to submit work.
- ÷ ABS in the marks box and an A in the encoded section for any candidate who has been absent or has failed to submit any work.
- ÷ W should be entered in the marks box and the encoded section where the candidate has been withdrawn.

An example of a completed OPTEMS can be found on page 18.

Encoded section

Candidate name	Number	Marks												
NEW ALAN* SP	3200	0	(+0+) (+0+)	(+10+) (+1+)	(+20+) (+2+)	(+30+) (+3+)	(+40+) (+4+)	(+50+) (+5+)	(+60+) (+6+)	(+70+) (+7+)	(+80+) (+8+)	(+90+) (+9+)	(+100+) (+A+)	(+200+) (+W+)
OTHER AMY* SP	3201	5	(+0+) (+0+)	(+10+) (+1+)	(+20+) (+2+)	(+30+) (+3+)	(+40+) (+4+)	(+50+) (+5+)	(+60+) (+6+)	(+70+) (+7+)	(+80+) (+8+)	(+90+) (+9+)	(+100+) (+A+)	(+200+) (+W+)
SMITH JOHN AW	3202	47	(+0+) (+0+)	(+10+) (+1+)	(+20+) (+2+)	(+30+) (+3+)	(+40+) (+4+)	(+50+) (+5+)	(+60+) (+6+)	(+70+) (+7+)	(+80+) (+8+)	(+90+) (+9+)	(+100+) (+A+)	(+200+) (+W+)
WATTS MARK* SP	3203	ABS	(+0+) (+0+)	(+10+) (+1+)	(+20+) (+2+)	(+30+) (+3+)	(+40+) (+4+)	(+50+) (+5+)	(+60+) (+6+)	(+70+) (+7+)	(+80+) (+8+)	(+90+) (+9+)	(+100+) (+A+)	(+200+) (+W+)
STEVEN JANE AW	3204	102	(+0+) (+0+)	(+10+) (+1+)	(+20+) (+2+)	(+30+) (+3+)	(+40+) (+4+)	(+50+) (+5+)	(+60+) (+6+)	(+70+) (+7+)	(+80+) (+8+)	(+90+) (+9+)	(+100+) (+A+)	(+200+) (+W+)
JONES ANN* AW	3205	40	(+0+) (+0+)	(+10+) (+1+)	(+20+) (+2+)	(+30+) (+3+)	(+40+) (+4+)	(+50+) (+5+)	(+60+) (+6+)	(+70+) (+7+)	(+80+) (+8+)	(+90+) (+9+)	(+100+) (+A+)	(+200+) (+W+)
PATEL RAJ* AW	3206	98	(+0+) (+0+)	(+10+) (+1+)	(+20+) (+2+)	(+30+) (+3+)	(+40+) (+4+)	(+50+) (+5+)	(+60+) (+6+)	(+70+) (+7+)	(+80+) (+8+)	(+90+) (+9+)	(+100+) (+A+)	(+200+) (+W+)
WEST SARA SP	3207	W	(+0+) (+0+)	(+10+) (+1+)	(+20+) (+2+)	(+30+) (+3+)	(+40+) (+4+)	(+50+) (+5+)	(+60+) (+6+)	(+70+) (+7+)	(+80+) (+8+)	(+90+) (+9+)	(+100+) (+A+)	(+200+) (+W+)

Where more than one teacher has assessed the work, the teacher's initials should be shown to the right of each candidate's name as shown.

Once the authentication and internal standardisation statement on the OPTEMS has been signed, the three-part sets should be divided and dispatched, or retained as follows:

- ÷ the top copy must be sent direct to Edexcel in the envelope provided, to be received no later than 1 May. This form must not be folded or creased
- ÷ the second copy must be sent with the sampled coursework to the moderator. The name and address of the moderator will either be printed on the OPTEMS or sent separately
- ÷ the third copy must be retained by the centre.

Centres using EDI should follow the procedures laid out in the specification.

A blank copy of the Candidate Mark Record Sheet is provided in the appendices for centres to photocopy. The candidate mark record sheet, to be completed for each candidate, provides details for the moderator of how each candidate's total mark is reached. It is the centre's responsibility to ensure that:

- ÷ all marks are recorded accurately and that arithmetic is correct
- ÷ the total mark is transferred correctly onto the OPTEMS or via EDI.

Where the pre-printed OPTEMS is asterisked indicating the candidates whose work is to be sampled, this work, together with the second copy of the OPTEMS, must be posted to reach the moderator no later than 1 May. In addition, the centre must send the work of the candidate awarded the highest mark and the work of the candidate awarded the lowest mark, if these are not already included in the selected sample.

Candidate Mark Record Sheets must be attached to each candidates work in the requested sample.

If the pre-selected sample does not represent all parts of the mark range for the centre, additional samples should be sent to the moderator and indicated with a tick.

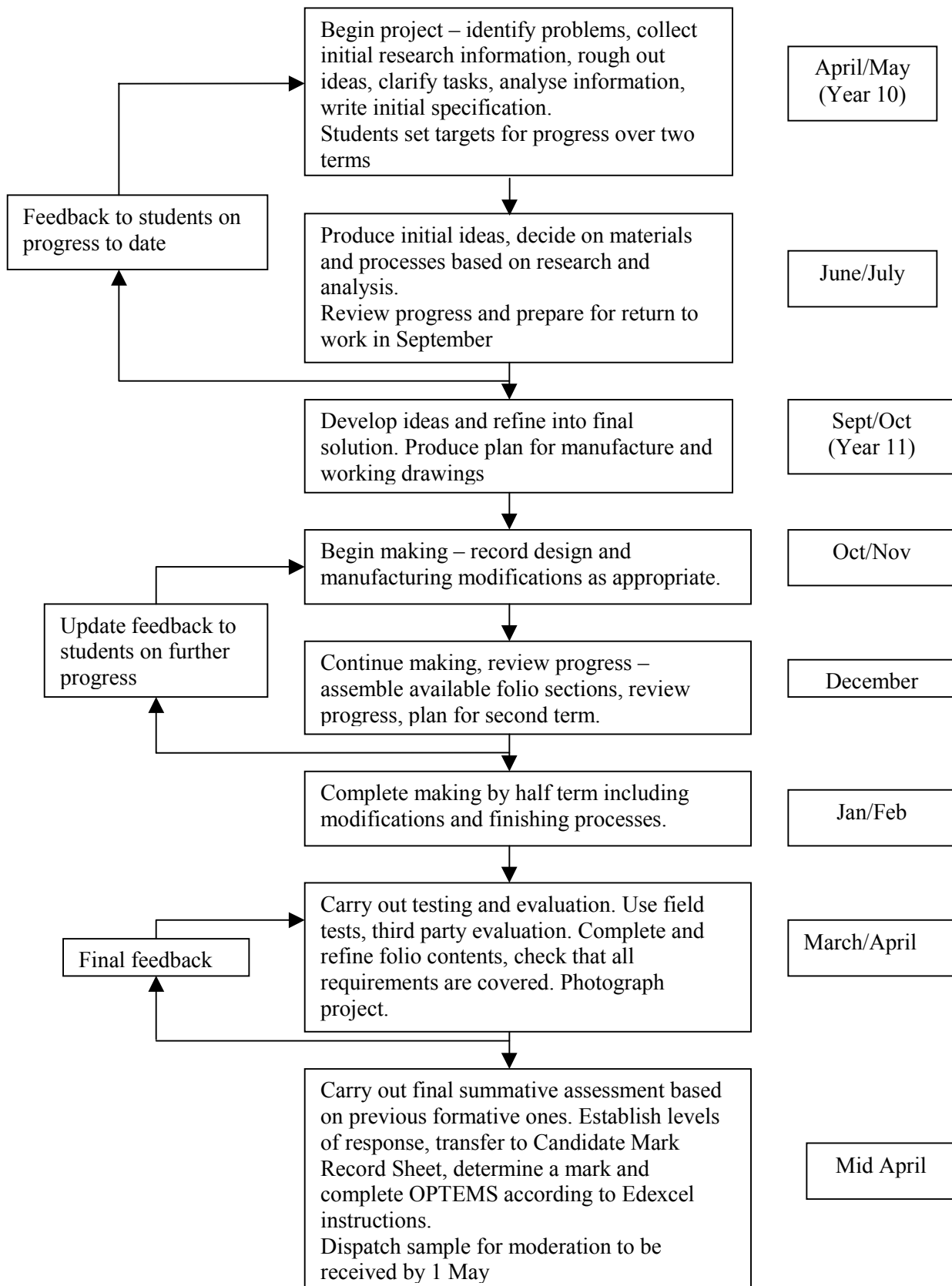
The moderator may request further samples of coursework, as required and the work of all candidates should be available for such a request.

If an absent or withdrawn candidate is pre-selected, a substitute candidate's work should be sent for moderation and the word 'substitute' should be written against their name.

Photographic evidence of the practical outcome of the design and make task must be securely attached to the sampled candidates folios.

The centre should ensure that coursework is presented in an orderly fashion and that the work of all candidates is clearly identifiable. The use of bulky, heavy folders is not recommended.

Submission checklist



Support and training

Support materials

The following support materials will be available from spring 2001 onwards:

- ÷ specimen papers
- ÷ teacher guide
- ÷ exemplar materials
- ÷ student guide
- ÷ internal assessment guide.

Other materials will be available to centres during the lifetime of the specification in response to centres' needs.

Copies of these support materials may be obtained from Edexcel Publications at the address below.

Examiners' and moderators' comments and mark schemes

These will be issued to centres for Design & Technology after each examination series. Additional copies may be obtained from Edexcel Publications at the address below.

Edexcel Publications

Support materials and further copies of this publication can be obtained from:

Edexcel Publications
Adamsway
Mansfield
NG18 4FN

Tel: 01623 467467

Fax: 01623 450481

E-mail: publications@linneydirect.com

Training

Each year Edexcel provides a programme of training courses covering aspects of the specifications and assessment.

These courses take place throughout the country. For further information on what is planned, please consult the annual Training and Professional Development guide, which is sent to all centres, or contact:

INSET
Edexcel Foundation
Stewart House
32 Russell Square
London WC1B 5DN
Tel: 020 7758 5620
Fax: 020 7758 5950
Fax: 020 7758 5951 (second fax number)
E-mail: inset@edexcel.org.uk

Website

www.edexcel.org.uk

Please visit the Edexcel website, where further information about training and support for all qualifications, including this GCSE, can be found.

The website is regularly updated, and an increasing amount of support material and information will become available through it.

Regional offices and Customer Response Centre

Further advice and guidance is available through a national network of regional offices. For general enquiries and for details of your regional office please contact the Edexcel Customer Response Centre on:

Tel: 0870 240 9800

E-mail: enquiries@edexcel.org.uk

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Appendix A – Candidate Mark Record Sheet

Centre no:	Specification no:	Year of Entry:
Candidate no:	Candidate name:	

Coursework title:

Assessment criteria	Key feature	Annotation page number	LEVEL			Edexcel use only
			L	M	H	

1 Identify needs, use information sources to develop detailed specifications and criteria	Needs		1	2	3	
	Information		1	2	3	
	Specification		1	2	3	

2 Develop ideas from the specification, check, review and modify as necessary to develop a product	Ideas		4	6	8	10	12	
	Develop		4	6	8	10	12	
	Review		1	2	3			

3 Use written and graphical techniques including ICT and computer aided design (CAD where appropriate) to generate, develop, model and communicate	Written communication		1	2	3	
	Other media		1	2	3	
	ICT		1	2	3	

4 Produce and use detailed working schedules, which includes a range of industrial applications as well as the concepts of systems and control. Simulate production and assembly lines using appropriate ICT	Systems and Control		1	2	3	
	Schedule		1	2	3	
	Industrial Applications		1	2	3	

5 Select and use tools, equipment and processes effectively and safely to make single products and products in quantity. Use CAM appropriately	Select and use		6	9	12	15	18	
	Make product(s)		6	9	12	15	18	
	Work safely		1	2	3			

6 Devise and work at critical control points. Ensure that their products are of suitable quality for the intended use. Suggest modifications that would improve their performance	Tests and checks		1	2	3	
	Evaluate product		1	2	3	
	Modifications		1	2	3	

FINAL TOTAL						
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Appendix B – Use of ICT

Information and communication technology in design and technology

Within design and technology coursework, ICT should be used to support the process and activity of designing and making and it should enable students to enhance their design and technology skills and capabilities.

ICT in design and technology should be used to assist in researching and gathering information, generating, developing, modelling and communicating ideas, planning for and making what is designed, and to control products and systems.

The use of the term CAD/CAM should be interpreted in its broadest sense and should be appropriate to the material being used, the experience gained by students and the resources available.

Students should be selective in their choice and approach to the use of ICT and should always use it appropriately where it is available.

ICT is formally assessed in coursework projects in assessment criteria 3 but there are opportunities in most other assessment criteria to use a variety of ICT tools.

Use of ICT in Resistant Materials Technology

Students are encouraged to use ICT where it enhances the content and presentation of coursework in resistant materials technology. It is expected that generic software packages such as word processing and desktop publishing will be widely used, but also that students will consider using more specialist applications where they are available.

Students will not be penalised for non-use of ICT in areas where it is not assessed.

Students may choose to use some of the following when:

- ÷ researching information
 - . use a database ie Internet or CD ROM to seek information on materials available, technical information, existing products, lifestyles and environments
 - . use survey software to generate questionnaires and to present information gathered
 - . use grammar and spell checks to correct written coursework
 - . use e-mail to communicate with outside agencies when seeking information
 - . present and analyse information using charts generated in a database or spreadsheet
- ÷ generating ideas
 - . use a digital camera and scanned images to produce source material as a starting point for creative design ideas
 - . use 2D draw and paint packages and CAD software to generate, edit and communicate design ideas
- ÷ developing ideas
 - . use a CAD package to select and refine final designs and to produce dimensioned working drawings
 - . use a 3D modelling program to produce a visual image of the proposed completed product
 - . use a spreadsheet to cost a product and to determine the implications of quantity production
 - . use toolpath simulation to test for safe cutting when using a Computer Numerical Control (CNC) machine
- ÷ considering industrial application
 - . use a digital camera to record the sequence of making activities and to show processes used in producing a coursework project
 - . use computer-generated flowcharts to plan the sequence of activities in manufacturing the designed product
 - . use CNC software to simulate graphically the machining process for a design
- ÷ making
 - . use a 2D draw program to produce a template or jig design to be printed out for use in accurate repeat drilling
 - . use a 2D draw program to produce images to apply to the surface of a flat wooden puzzle
 - . use a cutter/plotter to produce shapes in thin materials for attaching to nursery furniture as decoration

- . use a CNC machine to produce products of repeatable quality ie use a milling machine to cut patterns in small acrylic puzzles
- . use a CNC router to make a wooden former for use in vacuum forming.

Use of ICT in Graphic Products

Students are encouraged to use ICT where it enhances the content and presentation of coursework in graphic products. It is expected that generic software packages such as word processing and desktop publishing will be widely used, but also that students will consider using more specialist applications where they are available.

Students will not be penalised for non-use of ICT in areas where it is not assessed.

Where design work is aided by the use of a computer then details of the software, used or devised, should be included.

Where initial ideas are explored using a computer it may not be practical or realistic to present all computer variations of the ideas, however it is important to describe the variations and the thinking behind the ideas.

Where ideas are developed using a computer it may not be practical or realistic to present all of the stages of the process, however it is important to include a description, diary or log of the stages together with details of the thinking that produced the development.

Where part of the final solution is a computer programme it is important to include details of how to operate the programme, the nature of the programme and, as a result of testing, how well it works.

While the subject of graphic products is seen as an ideal medium for the exploitation of all forms of ICT, it is not intended that any candidates should be advantaged, or disadvantaged, by the availability of particular resources.

CAD and CAM resources are considered to be part of the range of techniques available for the completion of the Design and Make task.

As with all available techniques, candidates will gain credit for the appropriate and successful application of the technique.

Candidates should be warned of the dangers of locking all of their work into a single technique approach.

Where the final graphic product solution is presented as a prototype model it is also important to provide a high quality 'concept' representation of the solution in its intended setting. Where appropriate this presentation can be in the form of a CAD generated visual.

There should be encouragement to exploit the use of CAM machines currently available in schools, however, where these facilities are not available candidates must be able to show an understanding of the appropriate application, in both coursework and terminal test of computer prototyping, computer aided manufacture, computer numerical control, and computer integrated manufacture.

Students may choose to use some of the following when:

- ÷ researching information
 - . use a database, ie Internet or CD ROM, to seek information on materials available, technical information, existing products, lifestyles and environments
 - . use survey software to generate questionnaires and to present information gathered
 - . use grammar and spell checks to correct written coursework
 - . use e-mail to communicate with outside agencies when seeking information
 - . present and analyse information using charts generated in a database or spreadsheet
 - . use a digital camera to record disassembly and analysis of existing products

- ÷ generating ideas
 - . use a digital camera and scanned images to produce source material as a starting point for creative design ideas
 - . use 2D draw and paint packages and DTP, CAD and web design software to generate, edit and communicate design ideas
- ÷ developing ideas
 - . use a CAD package to select and refine final designs and to produce dimensioned working drawings
 - . use a 3D modelling program to produce a visual image of the proposed completed product
 - . use a spreadsheet to cost a product and to determine the implications of quantity production
- ÷ considering industrial application
 - . use a digital camera to record the sequence of making activities and to show processes used in producing a coursework project and/or an industrial visit
 - . use computer generated flow charts to plan the sequence of activities in manufacturing the designed product
- ÷ making
 - . use a cutter/plotter to produce shapes in thin materials for structural packaging designs and vinyl stickers
 - . use 3D fax machines for rapid prototyping
 - . use DTP software to produce printed materials ie leaflets, menus, business stationary etc
 - . output designs to colour bubble-jet or laser printers to produce products of repeatable quality.

Use of ICT in Textiles Technology

Students are encouraged to use ICT to enhance the content and presentation of coursework in textiles technology. It is expected that generic software packages such as drawing, desk-top publishing and word-processing will be appropriately used and also that students will consider using specialist CAD and CAM applications where they are available.

Students will not be penalised for non-use of ICT in areas where it is not assessed.

Students may choose to use some of the following when:

- ÷ researching information
 - . use the Internet or CD ROMs to find information on available materials and their properties, existing products, lifestyles and environments
 - . use databases to find information on fibres, fabrics, properties and safety data
 - . use software to generate questionnaires and to present gathered information in graphs and pie-charts
 - . use grammar and spell checks to correct written coursework
 - . use e-mail to link candidates with professional designers and outside experts
 - . use e-mail for individual study by sharing ideas with other students
- ÷ generate ideas
 - . use a camcorder, digital camera and scanned pictures to generate, develop model and communicate design proposals
 - . use 2D and 3D drawing packages to present and edit design ideas
 - . use specialist programs to design stitch patterns, such as cross stitches
 - . use specialist programs to view knitting patterns
- ÷ considering industrial application
 - . use a camcorder or digital camera to record the one-off process of making a fabric item or to record an industrial production system
 - . use software to grade patterns into different sizes or to produce pattern lays
 - . use computer-generated flowcharts to plan the sequence of manufacture
 - . use spreadsheets for costing the process of making fabric items
- ÷ making
 - . use CAM equipment such as computerised sewing machines, embroidery machines and knitting machines
 - . use a 2D drawing program to produce an image which can be printed and transferred on to fabric
 - . scan images for printing on to fabric or for the manufacture of stencils.

Use of ICT in Food Technology

Students are encouraged to use ICT where it enhances the content and presentation of coursework in food technology. It is expected that generic software packages such as word processing and desktop publishing will be widely used, but also that students will consider using more specialist applications where they are available.

Students will not be penalised for non-use of ICT in areas where it is not assessed.

Students may choose to use some of the following when:

- ÷ researching information
 - . use a database ie Internet or CD ROM to seek information on food materials, technical information, existing products, lifestyles and environments
 - . use survey software to generate questionnaires and to present information gathered
 - . use grammar and spell checks to correct written coursework
 - . use e-mail to communicate with outside agencies when seeking information
 - . present and analyse information using charts generated in a database or spreadsheet
- ÷ generating ideas
 - . use a digital camera and scanned images to produce source material as a starting point for creative design ideas
 - . use 2D draw and paint packages and CAD software to generate, edit and communicate design ideas
- ÷ developing ideas
 - . use a CAD package to select and refine final designs and to produce dimensioned working drawings
 - . use a 3D food modelling program to produce a visual image of the proposed completed product
 - . use a spreadsheet to cost a product and to determine the implications of quantity production
- ÷ considering industrial application
 - . use a digital camera to record the sequence of making activities and to show processes used in producing a coursework project
 - . use computer-generated flowcharts to plan the sequence of activities in manufacturing the designed product
 - . use HACCP and HASAP software simulation to test proposed manufacturing processes for 'safe' food production
- ÷ making
 - . use a 2D draw program to produce a template or food cutting design (eg biscuits, burgers) to be printed out for use in accurate repeat drilling
 - . use a 2D draw program to produce images to apply to the surface of food packaging
 - . use a cutter/plotter to produce shapes in thin materials for attaching to nursery furniture as decoration
 - . use of CAM in food production to produce items of repeatable quality ie use of a bread machine to produce identical loaves and microwave ovens to ensure uniform cooking times.

Use of ICT in Systems and Control Technology

Students are encouraged to use ICT where it enhances the content and presentation of coursework in systems and control technology. It is expected that generic software packages such as word processing and desktop publishing will be widely used, but also that students will consider using more specialist applications where they are available.

Students will not be penalised for non-use of ICT in areas where it is not assessed.

Students may choose to use some of the following when:

- ÷ researching information
 - . use a database ie Internet or CD ROM to seek information on electronic circuitry, mechanisms and materials available, technical information, existing products, lifestyles and environments
 - . use survey software to generate questionnaires and to present information gathered
 - . use grammar and spell checks to correct written coursework
 - . use e-mail to communicate with outside agencies when seeking information
 - . present and analyse information using charts generated in a database or spreadsheet
- ÷ generating ideas
 - . use a digital camera and scanned images to produce source material as a starting point for creative design ideas
 - . use circuit-modelling software to test and simulate ideas. Use CAD software to generate, edit and communicate design ideas
- ÷ developing ideas
 - . use an electronic circuit-modelling program to develop component values and theoretically test the performance of the final circuit design
 - . use a Printed Circuit Board (PCB) design package to develop and refine final electronic circuit board designs
 - . use 'autorouting' facilities to simulate industrial applications in electronic circuit board design
 - . use a 3D modelling program to produce a visual image of the proposed completed mechanical or electronic product
 - . use a spreadsheet to cost a product and to determine the implications of quantity production
 - . use toolpath simulation to test for safe cutting when using Computer Numerical Control (CNC) machinery
- ÷ considering industrial application
 - . use a digital camera to record the sequence of making activities and to show processes used in producing a coursework project
 - . use electronic auto-routing to highlight advantages and drawbacks of this facility
 - . use computer generated flowcharts to plan the sequence of activities in manufacturing the designed product
 - . use CNC software to simulate graphically the machining process for design details of a product

÷ making

- . use a 2D draw program to produce a template or jig design for use in mechanical construction
- . use a PCB design program to produce printed images of circuit board designs to apply to acetate sheets for photo-etching
- . use a cutter/plotter to produce logos and shapes in thin materials for attaching to cases for electronic or mechanical products
- . use a CNC machine to produce products of repeatable quality ie use a milling machine to produce cut-outs for speakers and switches, or a lathe to manufacture identical sets of wheels
- . use a CNC router to make a wooden former for use in vacuum forming.

Appendix C – Ideas for projects

Resistant Materials Technology

Project outlines

- 1 Young children of nursery school age often learn through playing with educational toys.

Identify some ways in which children of this age learn and design and make an appropriate educational toy that could be used at home or at school.

Your solution should focus on the capabilities of the children who will use it, and the educational value of the toy.

Your design should be appropriate for small batch production.

- 2 After manufacture, packaging and transportation of fully assembled pieces of furniture can be an expensive addition to the final cost of products.

Design and make a small item of knockdown furniture that can be flat-packed and distributed by a mail order company.

The final package should be no bigger than 450mm x 450mm x 150mm and should contain simple assembly instructions.

Your design should be suitable for high volume production.

- 3 All shops, stores and supermarkets supply customers with plastic carrier bags in which to carry their purchases. These bags are usually discarded after initial use and are considered to have no further usefulness. Some families however, use these plastic bags to collect small items of household rubbish.

Design and make a device that will hold plastic bags open while they are being filled over a period of time.

The device will be used inside and must have a lid for hygienic reasons, which should ‘flip’ or swing open for easy access. Changing bags easily should be a feature of your design.

- 4 Accessories are an important part of fashion wear for young people and may include head and neckwear, wrist and ankle jewellery and items that are attached to clothing.

Design and make a range of personal adornment that would be appropriate to wear to a party or night-club. Your designs should be coordinated and based on a chosen theme and should explore a range of materials.

Your designs should be suitable for limited edition manufacture by self-employed designer/craftspeople.

- 5 Disabled people often meet difficulties in their everyday activities. Simple tasks such as retrieving objects from the floor, or placing them on high shelves can be impossible to achieve. Opening jars and containers or removing and replacing electric plugs are other examples of difficulties they experience.

Identify some typical problems associated with day to day living for the disabled and design and make a useful aid that will help them.

An essential requirement of your design solution is that it should be easy to use.

- 6 Mechanical toys are a source of interest to children. The mechanisms involved and their ingenious use, provide differing levels of interest.

Research some methods of converting types of input movement to other types of output movement and design and make a pull-along toy that uses two of these different mechanisms to create interest.

Your design should be aimed at a particular target market and should be suitable for large batch production.

Safety will be of great importance in your design.

- 7 Music, computer games and films are commonly stored on CD ROMs and DVDs. Most homes have many of these discs and experience problems in storing them.

Design and make a storage system for CDs and DVDs that will enable the easy identification of discs and allow further storage space to be added as more discs are acquired.

Your design should appeal to a wide range of users and be suitable for large-scale production.

- 8 Most companies and businesses like to promote themselves through advertising and often present gifts to customers.

Choose a local company and design and make a distinctive clock on their behalf that uses appropriate materials to reflect a high quality image.

Your design should be suitable for standing on an office desk and should be a reminder to users of where it came from.

The timepieces will be presented to only the most valued customers, so the emphasis must be on high quality skills and presentation.

- 9 Storage of small items of jewellery and makeup, or components and parts for hobbyists can be a problem, particularly if they need to be transported and used in a number of locations.

Design and make a storage system for small items that is portable. Your design should consider the number and range of items that need to be stored, the ease with which they can be selected for use and the weight of the designed system when full. The stored items should be secure from unauthorised use.

- 10 Gardening is an ever-increasing hobby and people are spending more and more time relaxing in this way.
- Research some gardening activities and design and make a device that will assist gardeners to do their work in some way.
- You should consider the kind of use your product will be put to, where it will be stored and how easy it is to use.
- Your design should be suitable for medium batch production.
-

- 11 When relaxing in their gardens, people enjoy looking at and listening to things that are attractive and stress relieving and are linked to natural elements such as wind.
- Design and make a wind driven mobile sculpture or a set of wind chimes that would be suitable for use in the calm atmosphere of a quiet garden.
- Consider materials, their weather resistance and ease of installation in your designs.
- Your design should be produced for manufacture by a studio producing 'one-off' work.
-

- 12 Items of play for young children are often based on toys that can be sat on or pushed along. This type of toy encourages children to play together as well as developing their strength and balance.
- Design and make a toy that can be sat on or pushed along by small children. It must be comfortable and easy to use.
- A very important feature of your design must be safety of construction and use.
- Your design should be suitable for small batch production.
-

- 13 When carrying out maintenance and repairs on bicycles it is important to ensure that they are held securely, particularly when they need to be turned upside down.
- Design and make a device that will allow basic repair and maintenance work to be carried out on bicycles safely. The device should accommodate a range of different sizes of bike and should be easy to use.
-

- 14 A popular hobby among students and adults is sketching and painting and many people do this outside, but holding a sketchbook securely can be awkward and difficult in some circumstances.
- Design and make a free-standing device that will hold a sketchbook so that an artist has both hands free. The device should be adjustable for comfortable use and it must be portable and light for easy transportation.
-

- 15 Lighting is used in interior design to do much more than simply light a space. The materials used, their colour and finish, the shape of the bulb and shade all add to the visual qualities of the light.

Design and make a lighting device that has a particular use such as an adjustable desk lamp, a wall, table lamp, or others.

The lamp should be suitable for batch production.

Your design should be suitable for use with a 12V DC power supply.

You must NOT use mains electricity.

- 16 Students of design and technology often do design work at home which can involve formal technical drawing. In order to do good work, the appropriate equipment is essential, but can be expensive.

Design and make an adjustable drawing board that gives four different angles of adjustment and does not require a separate tee-square. The device should be portable and should 'lock' in a flat position for transport.

Your design should be suitable for large batch production.

- 17 A small room like a bathroom can quickly become very cluttered with cosmetics, creams and other items that are in daily use.

Design and make a small storage cabinet suitable for use in a bathroom that will accommodate a range of shapes and sizes of containers, bottles and tubes. Your design should be suitable for wall mounting and should be safe in use.

Your design should be suitable for large batch production.

- 18 Magazines and newspapers are informative and entertaining and are in abundance in most households. Storage of these items can be a problem.

Design and make a storage system for magazines and newspapers that will allow easy access to them and keep them in good condition.

Your design should accommodate magazines of up to 350mm x 250mm in size and should be of 'knock-down' construction to allow for flat-pack delivery.

Your design should be suitable for large batch production.

- 19 Lifting and transporting heavy objects can be a difficult and potentially dangerous activity. Carrying heavy shopping bags or moving garden rubbish are examples of activities that could be made easier.

Design and make a device that will assist in carrying heavy objects short distances. The device should be light, strong and robust and it should be easy to use. It should fold up when not in use so that it can be stored easily.

Your design should be suitable for small batch production.

- 20 Sophisticated high quality loudspeaker systems ensure that the very best sound quality is produced when listening to music in the home. It is often desirable to move the location and height of individual speakers but in practice this is not always an easy thing to do.

Design and make a pair of free-standing loudspeaker stands that are adjustable for height. Safety and stability should be important considerations in the design. The stands should be designed for a particular type of speaker and should attach and detach from the speaker easily and quickly.

Your design should be suitable for medium batch production.

Graphic Products

Definition

The making in a graphic product should always result in **both** two dimensional (2D) and three-dimensional (3D) outcomes.

The 3D outcome must be supported by and linked to the 2D outcome. Together both of these outcomes will be assessed in a holistic way as the graphic product.

The two parts of the graphic product (2D and 3D outcomes) must be produced in addition to the work produced for the coursework design folder. The design brief, specification and subsequent design activities must relate directly to the proposed outcomes.

2D outcomes can be made from traditional or modern graphical media.

3D outcomes can be made from a range of appropriate materials.

One part (either 2D or 3D) or all of the graphic product must be commercial ie is capable of being produced in quantity either batch or volume production. However the graphic product (2D and 3D parts) can be produced by the candidate as a one-off prototype.

Project outlines

- 1 Consider the situation of conserving energy in the home.

Research how energy is lost or wasted and methods of conserving energy.

Research a small range of different forms of family games: computer, card, board, etc.

Develop designs for:

- ÷ a family game called ‘**Save it**’ together with the display packaging
- ÷ a high quality ‘concept’ drawing for promotional purposes showing the game in use.

The final designs should be suitable for high volume production.

- 2 Consider the situation where an outdoor family recreation area is to be developed.

Research the facilities and layout of one existing outdoor recreation area.

Research access; car and coach parking; eating, picnics and barbecues; play; land and water activities; walks; visits and places of interest; and nature conservation.

Identify an area in your locality suitable for development for recreational use.

Develop a design for a local outdoor family recreation area.

The final solution should be presented in the form of a model, together with a high quality ‘concept’ presentation drawing.

3 Consider the situation of road safety for Primary School children.

Research; crossing the road; bicycle safety; ball games in the street; vehicle stopping distances.

Research a small range of existing road safety campaign material for young children.

Identify one aspect of road safety.

Develop designs for either:

÷ a working model for teaching road safety, together with a high quality 'concept' presentation drawing of the model

or:

÷ a computer program for teaching road safety, explanatory leaflet and display package.

The final designs should be suitable for small batch production.

4 Consider the situation where a manufacturer of crisps and potato snacks is to market a new product.

Research the popularity of three potato snacks.

Research the design of three packages for potato snacks.

Identify a suitable market for the new snack.

Develop designs for:

÷ the package for the snack

÷ the three dimensional, flat-pack, shop display to promote the new product.

The final designs should be suitable for high volume production.

5 Consider the situation where an area of school playground is to be developed for additional play activities.

Research existing playground provision in your school.

Research the nature and requirements of playground activities for pupils in different year groups.

Identify a suitable location for development.

Develop designs for a range of new play facilities for the identified location.

The final solution should be presented in the form of a model, together with a high quality 'concept' presentation drawing.

- 6 Consider the situation where a new range of cosmetics is to be introduced onto the market.

Research the cosmetic needs of the 15 to 24 age group.

Research a small range of existing products in terms of: cost; container shape; packaging; product name; use of colour and commercial marketing.

Identify a suitable target market.

Choose one cosmetic item to promote.

Choose an existing container shape.

Develop designs for:

÷ container label

÷ container package.

The final designs should be suitable for high volume production.

- 7 Consider the situation where a local organisation (charity, youth group, drama group, play group, society or club) needs to promote its image, attract more members, raise funds or advertise events.

Contact a local organisation and identify a range of needs.

With the agreement of the organisation select one need for promotion.

Research a small range of promotional items: posters; leaflets; carrier bags; programmes; raffle tickets; novelty items; display items; etc.

Develop designs for:

÷ a two dimensional promotional item

÷ a three dimensional promotional item.

The final solutions should be suitable for high volume production.

- 8 Consider the situation of safety in the home.

Research recent accident figures and the recommended precautions for reducing injuries in the home.

Research a small range of commercial products for informing and educating about safety.

The target market for this product is 7 to 10 year old youngsters with limited reading ability.

Develop designs for a product to highlight and teach some of the basic rules of safety in the home; it can be either:

÷ a game and its packaging, together with a high quality 'concept' presentation drawing

or:

÷ a computer programme and its packaging, together with a high quality 'concept' presentation drawing.

The final designs should be suitable for low volume production.

- 9 Consider the situation where a new chocolate bar is to be introduced onto the market.
- Research a small range of currently available chocolate bars: their shape; name; packaging; price and the market that they are aimed at.
- Research the popularity of a small range of chocolate bars.
- Identify a suitable market for the new chocolate bar.
- Develop designs for:
- ÷ a special introductory pack to hold three of the new chocolate bars to be sold for the normal price of two
 - ÷ the three dimensional, flat-pack, shop display to promote the new product.
- The final designs should be suitable for high volume production.
-

- 10 Consider the situation where a visitors' guide is to be produced for a local town.
- The guide is to be made from a single sheet of A3 paper, folded to give an A5 format.
- The guides are to be available in a free-standing card display.
- Research a small range of existing guides, their format and information.
- Research local places of interest that may be suitable for inclusion in the guide.
- Develop designs for:
- ÷ a visitors' guide for a local town
 - ÷ a card display to hold 50 copies of the guide.
- The final designs should be suitable for low volume production.
-

- 11 Consider the situation where a compact disk (CD) is to be produced and promoted.
- Research current CD sleeves, their designs; lettering styles; graphics and other information included.
- Choose either a real or an imaginary recording artist for the CD.
- Develop designs for:
- ÷ the CD sleeve
- and either:
- ÷ a three dimensional stand, capable of being folded flat for storage and ease of posting, to display the new CD at the point of sale
- or:
- ÷ a vacuum pack presentation package for the CD.
- The final designs should be suitable for medium volume production.
-

12 Consider the situation where a new car is to be promoted at a major motor show.
Research a small range of exhibition equipment and lighting used at motor shows.
Choose a suitable model of car currently available for sale.
Develop a design for an exhibition stand that will enable the public to view the car from various angles, but not allow anyone direct access to the car.
The final solution should consist of a model, together with a high quality 'concept' presentation drawing.

13 Consider the situation of promoting aspects of health education to young people.
Research aspects of exercise, diet and abuse (drugs, smoking, alcohol, etc).
Research a small range of existing health promotion material.
Identify one specific health education issue and develop designs for:
÷ a logo
÷ a three dimensional model, capable of being folded flat for storage and distribution, to promote the health education issue.
The final designs should be suitable for low volume batch production.

14 Consider the situation where the Post Office is to issue a set of four commemorative stamps.
Research recent issues of commemorative stamps and their presentation packaging.
Research suitable topics that the stamps could commemorate.
Identify a suitable topic for the commemorative stamps.
Develop designs for:
÷ a set of four commemorative stamps
÷ a presentation package to display and protect the stamps.
The final designs should be suitable for high volume production.

15 Consider the situation where a television company is to produce a new quiz show based on an existing popular board game.
The show is to have a host and two teams.
Research stage set designs for three current television quiz shows.
Research three existing popular board games.
Identify a suitable format for the quiz show.
Develop a design for the stage set for the new quiz show.
The final solution should consist of a model, together with a high quality 'concept' presentation drawing.

16 Consider the situation where a pop group or artist is about to undertake a major tour.

At each concert venue a variety of souvenirs are to be available for fans to buy.

Research pop music souvenirs and promotional items.

Choose either a real or an imaginary artist for the tour.

Choose a product that could be sold at the concerts.

Develop designs for:

÷ one promotional souvenir

÷ vacuum pack presentation package for the souvenir.

The final designs should be suitable for high volume production.

17 Consider the situation where a new café is to be introduced into your area.

The café will be sited in existing shop premises and will be aimed at a particular market.

Identify a suitable shop in the area that could be developed as a café.

Identify a target market for the café.

Research a range of suitable themes for the café aimed at the target market.

Research the outer facades of three existing cafés.

Develop a design for the outside facade of a new café.

The final solution should consist of a model, together with a high quality 'concept' presentation drawing of the café facade.

18 Consider the situation where a greeting card manufacturer is to introduce a new range of cards onto the market.

The cards are to be packed flat, but by means of an elastic band, will trigger into a three-dimensional shape when removed from a normal envelope.

Research festivals and celebrations for which greeting card could be produced.

Research three pop-up cards and the mechanisms used.

Identify one suitable festival or celebration.

Develop a design for a new snap-up card together with its envelope and display packaging.

The final design should be suitable for low volume production.

19 Consider the situation where a major travel company wants to promote holidays in a foreign country.

The promotion is to take the form of a flat-pack model to be displayed in the windows of local travel agents.

Research three existing travel agent window displays.

Research points of interest for a chosen country suitable for inclusion in the display model.

Develop designs for:

- ÷ a travel agent window display to promote holidays in a foreign country
- ÷ a high quality 'concept' presentation drawing of the display.

The final design should be suitable for low volume production.

20 Consider the situation where a major food manufacturer wants to promote an ethnic food product.

The promotion is to take the form of a television advertisement and super-market display.

Research three existing television advertisements for food products.

Research three existing super-market promotional displays.

Choose one suitable ethnic food product.

Develop designs for:

- ÷ the television story-board advertisement for the ethnic food product
- ÷ the super-market display model to promote the ethnic food product.

The final design should be suitable for low volume production.

Textiles Technology

Project outlines

- 1 Hotels often sell fabric products as mementoes to their visitors.
Investigate gift products which could be sold in hotels in a particular country.
Design and make a fabric gift product which reflects the culture of a country.
The product should be suitable for batch production by local craftspeople.

- 2 Kitchen manufacturers often display their designs in showrooms.
Investigate fabric products used in the kitchen.
Design and make a range of coordinated fabric accessories to be displayed in a show kitchen.
The products should be suitable for small batch production.

- 3 A local charity is organising a fun run to raise money for good causes.
Design and make an amusing but practical outfit for a team of runners.
The design should be suitable for manufacturing by a group of home sewers.

- 4 Household pets need their own sleeping accommodation.
Investigate what makes a satisfactory pet's bed.
Design and make a customised bed for a pet of your choice to be manufactured in small quantities by a mail order company.

- 5 Airlines dress their employees in uniforms which reflect the image of the company and the culture of the country they operate in.
Design and make a uniform or a part of a uniform for a cut-price airline.
The company requires the uniform to be worn by all its employees and therefore it must be produced in quantity.

- 6 Skiing is a popular sport which requires participants to be kept warm and comfortable.
Design and make a range of fashionable ski hats for a sportswear company to be sold in a ski resort shop.

- 7 Supporters of competitive team games often wear clothing to identify themselves with a particular team.
Design and make an item of clothing to be worn by a team game's supporters.
The item of clothing must be manufactured in large quantities.

- 8 Children's libraries often have storytimes for young children.
Design and make a fabric product which could be used to illustrate characters and events in a children's story.
The item should be suitable for small batch production.
-
- 9 Many people now own and carry their own laptop computers and mobile phones.
Design and make a fashionable fabric container for the safe carrying of an electronic product.
The product must be designed to be sold in a fashion accessory shop.
-
- 10 Young people often require comfortable seating in their bedrooms.
Design and make a fabric seat which could easily be converted to a put-me-up bed.
The seat/bed must be made to be sold by a mail order company.
-
- 11 A theme park requires its staff to be identifiable by the public visiting the park.
Design and make a uniform or item of uniform to be worn by employees in a theme park.
The items of clothing must be coordinated and manufactured in quantity.
-
- 12 Secondary schools often organise a party at the end of term for school leavers.
Design and make a party outfit to be worn at a discotheque.
The outfit must be designed so that it could potentially be adapted for manufacturing by a small boutique.
-
- 13 A shop specialising in outdoor pursuits has commissioned you to design and make a sample outfit for a hill walker.
The items of the outfit must be manufactured in quantity.
-
- 14 A company selling personal beauty products has asked you to design a range of small fabric containers in which to display and sell its products.
Design and make a series of coordinated fabric containers in which to present and sell beauty products.
The items must be manufactured in quantity.
-
- 15 A national fast food restaurant chain is refurbishing its establishments.
Choose an appropriate theme for the refurbishment and design and make a range of coordinated fabric items to be fitted in the company's dining rooms.
The products must be manufactured in quantity.
-

16 Party wear requires special kinds of handbags.

Design and make a range of glamorous evening bags to be sold in a high street store. The bags must be coordinated with different fashion fabrics.

17 Summer holidays abroad in a warm climate require particular items of clothing.

Design and make item(s) of clothing to be worn in a hot seaside resort.

The items must be manufactured as a small batch.

18 Teenagers often have work experience placements during their school career.

Design and make an outfit suitable for a teenager to be worn during work experience in an office.

The outfit must be designed to be sold in a clothing store.

19 Young children like dressing up, for example as medical staff or fire-fighters.

Design and make an outfit for a young child to encourage imaginary play.

The outfit should be designed and produced to be sold by a mail order firm.

20 Many towns have carnivals where participants parade in fancy costumes.

Design and make a costume to be worn by people presenting themselves as butterflies.

The design should be produced as a small batch by home sewers.

Food Technology

Project outlines

- 1 Large supermarket chains are always looking to increase their range of ready prepared meals. Research has shown that there is a gap in the market for vegetarian ready-prepared products for one.

Design and make a suitable vegetarian dish.

Your design should be suitable for high volume production and your presentation to the supermarket chain should include reference to packaging, storage, transportation and marketing strategy information.

- 2 Soup is a quick and convenient food. There has been a large increase in the range of ready-prepared soups available.

A small chain of new 'eat in' soup food outlets has opened in your area.

Research the range of soups available in such outlets.

Design and make a soup that could be manufactured and served in such an outlet.

Consider the possibilities of packaging your soup and selling fresh soup from the chill cabinet for use at home later that day.

- 3 A local company specialising in the manufacture and delivery of meals to the elderly, is looking to extend its range.

Research the needs of the elderly.

Design and make a food product that would be suitable for a midday meal for an elderly, person.

The product must be suitable for large-scale mass production. Its distribution to the company's other outlets must be considered, along with the implications of having to store, transport and reheat the food prior to delivery to the elderly person at home.

- 4 Pasta is a cheap, filling and nutritious food.

Design and make a cook-chill pasta dish that could be manufactured by a leading food company as an addition to their present range.

Your product must be suitable for mass production and it should be packaged to appeal to a wide range of consumers.

- 5 The proportion of people who are overweight in the UK is increasing. A large number of these people wish to lose weight in an attempt to prevent associated health disorders and simply to feel happier with their appearance.

There are already some weight-loss products on the market but a major food retailer wishes to develop its own range of products.

Design and make a healthier food product that could be included in the range.

- 6 The government has identified the need to increase the quantity of fresh fruit and vegetables eaten by school children today to ensure that their diets meet the latest government dietary guidelines.

Your school canteen is looking for ways to improve their weekly menu to address this new directive from the government.

Research the needs and requirements of school children and consider the needs of the school canteen manager.

Design and make a range of food products that could be introduced to the existing menu to increase and enhance the quality and quantity of fresh fruit and vegetables available to school children from the school canteen.

Consider how these products may be marketed to make them appealing to your peers.

Your product must be designed for quality batch production.

- 7 There is a hugely popular and profitable range of take-away ready-prepared, filled sandwiches in food outlets nowadays. They meet the needs of people's lifestyles of having to 'eat on the go'.

Research the range of take-away sandwiches available and alternative foods offered by food outlets.

Design and make an alternative food product to the basic sandwich that meets the needs of the 'eat as you go' lifestyle.

Your design should be suitable for mass production. A range of alternative fillings should be considered. Packaging, transportation, distribution and storage should also be considered.

- 8 A new charter airline flying to European destinations has decided to include a meal for longer-distance flights. The meal should reflect the airline's low-cost ticket price, but still maintain a quality profile for the company.

Design and make a three-course meal suitable for inclusion in the airline's varied menu.

Your designs should be suitable for daily batch production in the airline's own kitchen unit. Storage of meals on board for the return flight should be considered.

- 9 A local hospital is to open a fresh food bar for people who attend their day centre. They need a new range of snack foods to meet the needs of the people attending.

Research fresh food bars, healthy food products and the possible needs of people attending the centre.

Design and make a food product that meets the needs of both the hospital and the people in the day centre.

Your design should be suitable for high-volume production in a hospital kitchen. It is envisaged that some people may want to purchase items to take home with them, so suitable packaging should be considered. Items not sold on the day of manufacture will need storing prior to being offered for sale the next day.

- 10 Many cultures celebrate festivals and special occasions with sweet foods.

A major food manufacturer is looking to develop a range of novelty sweet food items to celebrate special occasions.

Research a range of cultures and festivals.

Consider sweet items used to celebrate special occasions already available on the market.

Design and make a special occasion food product that would be suitable for inclusion in the manufacturer's range of products.

Your design must be appropriate for mass production.

- 11 In the food industry manufacturers frequently buy standard components to save preparation time. They also help guarantee a uniform look and taste.

Research standard component parts.

Design and make a food product incorporating component parts suitable for adding to the supermarkets' cook and chill range. Consider the possibility of adapting your initial design to include a variety of flavours in the range.

Your design should be suitable for mass production.

- 12 The incidence of dietary intolerance is on the increase in the UK. It is especially prevalent in children. Many parents are then faced with the problem of providing nutritional and appealing packed lunches for these children to take to school.

With the increase in dietary intolerance, manufacturers are continually trying to increase their range of suitable foods that are available to consumers.

Design and make a baked food product that could be sold in a chain of health food shops that would be suitable for inclusion in a lunch box of a child suffering from a particular food intolerance.

Your design should be suitable for industrial batch production.

- 13 The health authority in your area, in conjunction with local schools, wants to promote healthy eating. It wants to make people aware of the government's latest dietary guidelines.

The local hospital hopes to promote healthy eating by introducing a new range of healthier options in their patient meal menu, showing patients that small modifications to traditional recipes can help to improve the nutritional value of dishes and so help dietary-related diseases.

Research recent dietary guidelines.

Design and make a food product modified from an original recipe that promotes good health and that could be used in a new hospital menu.

Your design should be suitable for mass production in a hospital kitchen.

- 14 A local delicatessen sells fresh pasta and is looking to increase the volume it sells.

It hopes to introduce a range of fresh ready-made pasta meals that can be sold with an accompanying fresh sauce. It is hoped these ready meals could be sold by other outlets, also selling fresh pasta.

Research suitable pasta and sauce dishes and consider both the needs of the consumer and the delicatessen owner.

Design and make a pasta-based ready meal complete with accompanying sauce. Your design must initially be suitable for daily quality batch production but with a view to being mass produced if sales go well.

- 15 There has been an increase in the range of healthy cereal snack bars available in supermarkets in recent years. These help 'fill the gap' between meals and even sometimes replace a meal when time is short.

Research the range of 'fill the gap' snacks available on the market and consider the needs of the people who purchase such foods.

Design and make a snack bar that could be marketed and sold in vending machines at sports centres, schools, bus stations etc.

Your design should be suitable for mass industrial production.

- 16 The range of frozen fast foods specifically produced for children is vast, but in these days of health awareness, parents often wish to provide a less processed diet for their children.

Research the range of frozen fast foods on the market that are designed specifically for children's consumption.

Design and make a new alternative fast food item that helps address parents concerns over health, whilst still popular with children.

Your design should be suitable for the frozen food market.

- 17 Meat alternatives are becoming ever more popular.

Research the range of meat alternatives on the market.

Design and make a main course dish that uses an alternative to meat.

Your design should be suitable for quality batch production by a vegetarian food manufacturer.

- 18 People living in bedsits may have a low income and limited cooking facilities. They may also have few culinary skills.

Design and make a 'one pot' meal that can be produced by a chain of fast-food manufacturers specialising in low cost, no frills ready meals.

Your design should be suitable for quality batch production.

- 19 As lifestyles are getting increasingly busier, food manufacturers have taken the opportunity to produce quality ready-made dishes suitable for use at social gatherings. This saves the host from having to find time to prepare food.

Research the range of ready-prepared foods presently on the market, suitable for serving at a dinner party.

Design and make a dish suitable for inclusion in the speciality range of a food manufacturer's pre-prepared food section.

Consider the marketing you would use to promote the dish.

Your design must be appropriate for mass production.

- 20 Vegans often find it difficult to eat out, as restaurants rarely offer suitable dishes on their menus.

Design and make a savoury dish suitable for a vegan, that could be included in a works canteen menu.

Your design must be suitable for batch production. Short-term and long-term storage of excess portions should be considered.

Systems and Control Technology – Electro/Mechanical

Project outlines

- 1 Many householders enjoy watching the wildlife that visits their gardens and actively encourage visits by building feeding stations.

Design and make a device that will electronically count the number of times a bird feeding station is visited by small species such as finches, tits and sparrows. If the device is visited by larger species, a mechanism should prevent these birds from gaining access to the food.

Your design should consider circuit protection and the effect that weather may have on the system.

Your design should be suitable for one-off specialist production.

- 2 Conservatories are often used as extra rooms, where families can enjoy relaxing together, or spending quiet times reading or studying. A drawback of such rooms is that they can become extremely warm and uncomfortable.

Design and make an oscillating fan that will switch on and off automatically at pre-set temperatures. The temperature sensing and switching circuitry should be adjustable for a range of temperatures. The fan should sweep back and forth through an angle of approximately 120°.

Your design should be suitable for small-batch production.

- 3 Programmable ‘buggies’ are used in schools to teach computer control using a simple programming language.

Design and make a buggy and interface that would be suitable for plugging into a commercially-produced ‘buffer-box’, or suitable for control by a PIC microprocessor.

The motors used on the buggy should be suitably geared.

Your design should include a leaflet explaining how to construct simple control programs.

- 4 People who suffer from hearing difficulties experience obvious troubles when using an alarm clock to wake them.

Design and make a device that will electronically detect when an alarm clock is sounding and convert the sound to a mechanical vibrating output. The output must continue once triggered until it is manually turned off. The device must be suitable for use in a pillow or on the body of the sleeper.

Your design should be suitable for small-batch specialist production.

- 5 Wear tests on fabrics are used to help choose the most appropriate materials when designing some textiles products for school projects.

Design and make a device that will clamp samples of fabric and test their rate of wear over comparable periods of time. The device should switch off automatically when the fabrics wear through. The testing motion should be a linear reciprocating one and the timing should be done electronically.

Your design should be suitable for one-off production.

- 6 As an aid to helping babies to fall asleep at night, a rocking motion is often useful.

Design and make an electrically-driven mechanical device that could be attached to a model cot to produce a gentle rocking motion. The length of time that the cot is rocked for should be controlled electronically and be adjustable between 5 and 15 minutes.

Your design should be suitable for small-batch production.

- 7 There are many security devices available for use when a house is empty that give the impression that the opposite is true.

Design and make a model of an electronically-controlled mechanical device that will automatically close and open a blind or curtain when darkness falls or daylight breaks. Your design should consider the potential problems that passing traffic could cause as headlights illuminate the sensing circuitry.

Your design should be suitable for small-batch production.

- 8 Gardeners sometimes collect rainwater in a plastic barrel for use where there is no mains supply readily available, or as an environmental consideration.

Design and make a device that uses a mechanical method to trigger an electronic alarm when the water level in a rainwater barrel reaches its capacity. The alarm's output should be latched and requires a manual reset. Attention should be given to the problems of protecting the electronic circuitry from nearby water and weather.

Your design should be suitable for medium-batch production.

- 9 Some games requiring more than one player can be practised with the use of electro-mechanical equipment.

Design and make a table-tennis ball server that delivers balls at a rate of one every five seconds.

Your design should be suitable for small-batch production.

- 10 Action toys tend to sustain the interests of their users for longer than those that are less dynamic.

Design and make an action toy that uses electronics and mechanisms to create an attractive and interesting outcome. Your design should place great importance on the safety aspects of the toy.

Your design should be suitable for medium-batch production.

Systems and Control Technology – Electronics

Project outlines

- 1 Many students own expensive bicycles, which sometimes become targets for thieves. Protecting a bike by alarming it would help to deter potential thieves.

Design and make an electronic bicycle alarm that will attach to the frame and be triggered when the bike is moved.

Your design should consider how the alarm sensor is triggered and what kind of output would be most effective. Once activated, the alarm should latch on and must be reset to deactivate it. The case for the electronics must protect the circuitry and be weatherproof.

Your design should be suitable for large-volume production.

- 2 Rear warning lights are an essential safety feature for cyclists out at night and the display should be visible from as far away as possible for maximum effectiveness. Design and make a warning night light that uses several superbright red LEDs that flash in a chasing sequence. The frequency of the chasing sequence should be adjustable.

Your design should consider the conditions the device is likely to be used in and how it will attach to the bicycle.

Your design should be suitable for large-batch production.

- 3 Scorecards for individual and team games are kept using various methods.

Design and make a scorecard for a golfer that uses seven segment LED displays to record scores and displays up to a total of 99. The electronic scorecard should be capable of being carried in a pocket in a golf bag or jacket.

Your design should consider the problem of de-bouncing the inputs to the scorecard and resetting the score.

Your design should be suitable for medium-batch production.

- 4 Millions of people gamble on the National Lottery each week. Many have numbers that they use every time they play, while others rely on a random selection of new numbers each week.

Design and make an electronic random number generator that uses either a seven segment LED display, or liquid crystal to display the result.

Your design should be suitable for small-batch production and should be aimed at the novelty marketplace.

- 5 Greenhouses need to be controlled so that their environments always provide the best conditions for plant growth.

Design and make a device that will sense when the soil in growing pots is too dry and will switch on a watering system automatically. The water must switch off automatically when the soil is moist again. The sensitivity of the device must be adjustable for the demands of different plants.

Your design should be suitable for medium-batch production.

- 6 Electronic games are popular pastimes and can be used at school open days to help raise money.

Design and make a steady hand game that allows players three lives before switching on a latched buzzer to indicate that the game is over. The game should also have a time limit for completion, to raise the level of difficulty.

Your design should be robust and capable of withstanding the heavy treatment of many players in a short time.

- 7 Smoke fumes are extremely dangerous and can cause death without fire if they are inhaled for long enough.

Design and make an electronic device that will detect smoke fumes and which gives out a loud audible alarm signal. The output should stay on until it is manually reset. The device should allow for sensitivity adjustment for smoke levels and should include a battery test facility.

Your design should be suitable for high-volume production.

- 8 Quiz games between rival teams are a popular pastime and competitive leagues exist. It is important to ensure that the fastest team were 'first to the buzzer'.

Design and make an electronic device that will determine which person or team pushed their button first. The device should accommodate up to four players.

Your design should include a method of resetting the indicator ready for the next question.

- 9 When playing board games, scoring is usually done by rolling dice, but electronic scoring is easier, involving a simple push of a button.

Design and make an electronic dice that displays numbers between 1 and 6. Your design should consider how to reset the count after the number 6 has appeared and how to blank the zero.

Your design should be suitable for low-volume, specialist-market production.

10 Novelty electronics is an area of production that remains popular and is used to help children learn, or to form good habits.

Design and make a challenging educational toy that will output an audible or visual reward when a task has been successfully achieved. A target market should be identified for your product.

Your design should be safe to use and access to the battery should be convenient.

Your design should be suitable for medium-batch production.

Systems and Control Technology – Mechanisms

Project outlines

- 1 Photography is a popular pastime with many students, but can be expensive when accessories are needed for the serious user.

Design and make a device that will support a camera securely, leaving the photographer's hands free when it is in use. The device must be adjustable for height and should allow the camera to be adjusted through a wide range of angles.

The device should be portable and light and suitable for medium-batch production.

- 2 School GCSE Design & Technology projects are sometimes given a spray paint finish from cans that require a thorough shaking before they are ready for use.

Design and make a motorised mechanical device that will agitate spray cans in preparation for their use. The device must accommodate a range of can sizes.

You should consider the safety aspects of your design, which should be suitable for small-volume production.

- 3 When assembling circuit boards in electronics work, it is useful to have both hands free and the circuit board securely held in place.

Design and make a device that will hold an electronic circuit board securely in place while it is worked on. The device should be adjustable so that the board can be angled to a wide range of positions. A small magnifying glass should be included as part of the device.

Your design should be suitable for medium-batch production.

- 4 Children enjoy toys that they gain exercise from and those that can be self-propelled.

Design and make a toy that can be sat upon by a small child and propelled using pedal power. The toy must be capable of being steered and should be safe to use.

Your design should be suitable for high-volume production.

- 5 Some activities in a kitchen involve sieving ingredients to separate out lumps from finer powder or grains.

Design and make a motor-driven device that will convert rotary motion to short linear reciprocating motion. A sieve should attach easily to the device for convenient use.

Your design should be suitable for small-batch production.

- 6 On golf courses, water obstacles such as lakes and streams, and thorny areas can provide a good source of free golf balls for enterprising enthusiasts.

Design and make a device that will allow golf balls to be retrieved from water and other inaccessible places. The reach of the device should be adjustable and consideration should be given to materials used and the continued working of any mechanisms that are likely to be frequently wet.

Your design should be suitable for medium-batch production.

- 7 Everyday tasks that most people find simple to carry out can be very difficult for the elderly or those suffering from physical disabilities.

Design and make a device that will grip, remove and replace a 3-pin plug, without the user having to bend down to carry out the task. The device should be lightweight and easy to use.

Your design should be suitable for small-scale production.

- 8 Many schools have large greenhouses that are used to grow a range of plants and fruits. Maintaining the correct environment for good growth is essential and one aspect of this is temperature control.

Design and make a model of a mechanical device that will open a high roof ventilator when a handle is turned at ground level. Your design should be capable of operating several ventilators from one input handle.

Your design should be suitable for one-off production.

- 9 Kite flying can involve letting out very long lengths of line that have to be brought in and let out according to flying conditions.

Design and make a mechanical device that will reel in or let out line under control. The device should use the concept of mechanical advantage to make it easier to use and should use a ratchet and pawl mechanism to help control the line.

Your design should be suitable for small-batch production.

- 10 When drilling small pieces of material or components, it is often difficult to hold them securely and safely and this can result in accidents or damaged items.

Design and make a mechanical device that will securely grip small items without damage, while they are drilled. The device should be adjustable for different sized items.

Your design should be suitable for medium-batch production.

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