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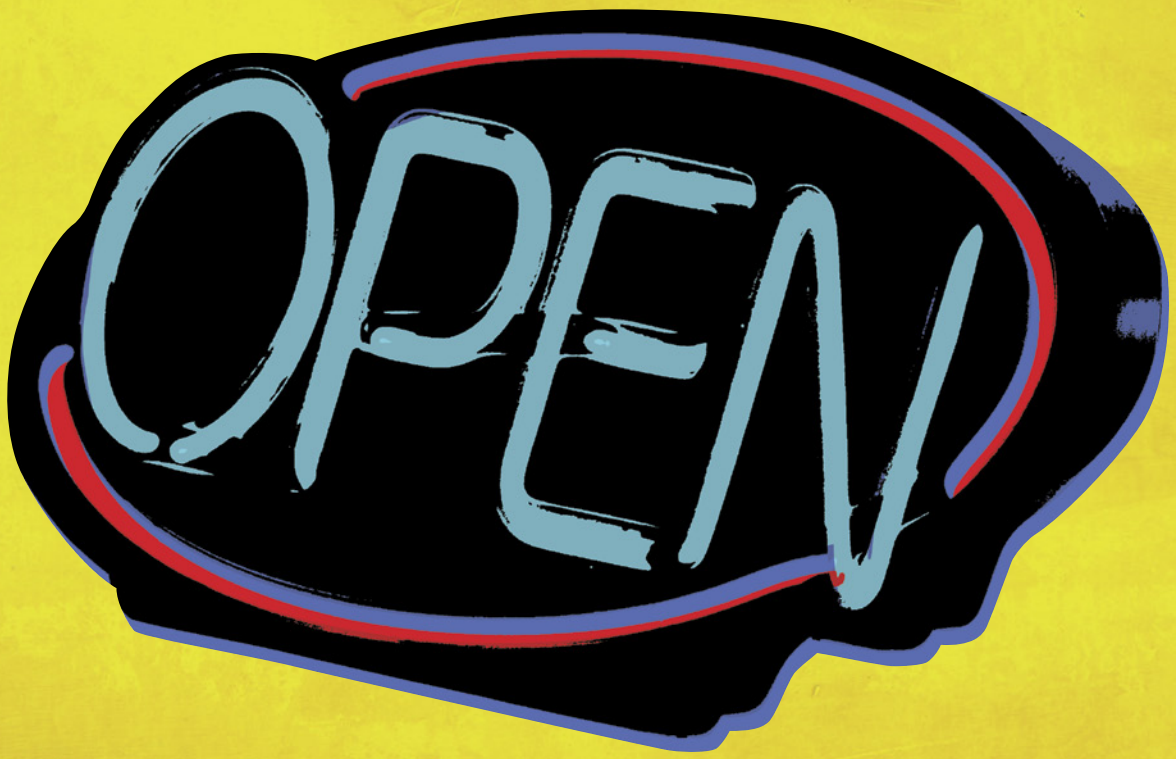
Teacher's Guide

Edexcel GCSE in Design and Technology: Graphic Products



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Contents

Delivery models

The following delivery models highlight three of the possible strategies that you could use when structuring your course.

- Traditional combined design and make activity.
- Separate design and make activities.
- Design and make activities related but separate.

Delivery model 1: Traditional combined design and make activity

This delivery model should be very familiar to centres. In Year 10 an induction period is used to develop basic skills leading to specific investigation, design and make tasks. The investigation task develops product analysis skills. A series of design tasks could be used to develop creativity and working to limited deadlines, and a making task used to develop modelling skills. All of these skills prepare students for the 'major coursework project' in Year 11.

	Autumn term		Spring term		Summer term		
Year 10	Induction tasks	Investigation task(s)	Design task(s)	Making task	Work related learning	Design task(s)	Making task
	Autumn term		**Spring term**		**Summer term**		
Year 11	Unit 1: Combined design and make activity ie packaging design				Unit 2 exam revision	Unit 2 June sitting	Summer vacation

Delivery model 2: Separate design and make activities

This model involves students designing one product and making another. As there is no requirement to produce both a 2D and 3D outcome, a pop-up book including graphics and pop-up mechanisms is a suitable product. The make activity could be an interior scale model of an existing room in your centre. For example, a scale model of the D&T workshop would require high-level modelling skills to produce all the individual benches and equipment.

	Autumn term		Spring term		Summer term		
Year 10	Induction tasks	Investigation task(s)	Design task(s)	Making task	Work related learning	Design task(s)	Making task
	Autumn term		**Spring term**		**Summer term**		
Year 11	Unit 1: Design activity ie pop-up book		Unit 2: Make activity ie interior model		Unit 2 exam revision	Unit 2 June sitting	Summer vacation

Delivery model 3: Design and make activities related but separate

Here, the make activity is tackled first by all students making, for example, a point-of-sale display from a manufacturing specification and set of working drawings provided by the teacher. All students produce a standard point-of-sale display that can be used in the design activity later on in the year. The design activity that follows can focus on, for example, concept design such as a mobile phone or an MP3 player that can be presented using the point-of sale display. The two could be further related by adding the appropriate brand identity to the point-of-sale display.

	Autumn term		Spring term		Summer term		
Year 10	Induction tasks	Investigation task(s)	Design task(s)	Making task	Work related learning	Design task(s)	Making task
	Autumn term		**Spring term**		**Summer term**		
Year 11	Unit 2: Make activity ie point-of-sale display		Unit 1: Design activity ie 3D concept design		Unit 2 exam revision	Unit 2 June sitting	Summer vacation

Teaching ideas

This section contains some ideas for teaching the content.

The following three tasks focus on how to develop important investigation, design and making skills needed for the coursework, whilst addressing key examination topics.

Investigation task

Lesson	Objectives	Appropriate Unit 1 content	Appropriate Unit 2 content
1	To disassemble a fizzy drink bottle. Components to include: bottle, cap and label. To outline the main factors affecting the specification criteria for the bottle.	**1.2: Research** Present selective and focused research. Students should be discouraged from presenting unnecessary research or 'padding'. Use product disassembly in order to analyse a relevant, existing product's performance, materials and components, processes, quality and sustainability issues. Product analysis is an ideal focused research activity as it enables students to understand the work of professional designers and uncover the problems that they had to solve.	**Topic 3.1: Specification criteria** When analysing a product, students should take into account the following specification criteria: • form – Why is the product shaped/styled as it is? • function – What is the purpose of the product? • user requirements – What qualities make the product attractive to potential users? • performance requirements – What are the technical considerations that must be achieved within the product? • material and component requirements – How should materials and components perform within the product? • scale of production and cost – How does the design allow for scale of production and what are the considerations in determining cost? • sustainability – How does the design allow for environmental considerations?
2	To discuss the materials used in the bottle, including, polymers versus glass.	**1.2: Research**	**Topic 1.3: Polymers** Aesthetic, functional and mechanical properties, application and advantages/disadvantages of the thermoplastic polyethylene terephthalate (PET) for graphic products and commercial packaging. **Topic 1.4: Glass** Aesthetic, functional and mechanical properties, application and advantages/disadvantages of glass for commercial packaging.

Lesson	Objectives	Appropriate Unit 1 content	Appropriate Unit 2 content
3	To discuss issues relating to mass production. To discuss the industrial processes for mass producing the bottle and cap.	**1.2: Research**	**Topic 2.1: Scale of production** Characteristics, application and advantages/disadvantages of mass production in the manufacture of graphic products. **Topic 2.3: Forming techniques** Characteristics, preparation, processes, application and advantages/ disadvantages of the following methods for the batch and mass production of graphic products and components: • blow moulding • injection moulding.
4	To discuss the commercial printing processes for colour printing the label and one colour brand name/logo on bottle cap.	**1.2: Research**	**Topic 2.6: Printing processes** Processes, application and advantages/ disadvantages of using the following printing methods to create graphic products: • offset lithography • flexography • screen printing.
5	To discuss sustainability issues relating to the extraction of materials, production, use and disposal of the bottle.	**1.2: Research**	**Topic 6.1: Minimising waste production** Principles, application, advantages/ disadvantages to society and the environment of minimising waste production throughout the product life cycle using the following 4 Rs: • reduce materials and energy • reuse materials and products where applicable • recover energy from waste • recycle materials and products or use recycled materials.

Design task

Lesson	Objectives	Appropriate Unit 1 content	Appropriate Unit 2 content
1	**Brief:** To design a next–generation hand-held games console. To discuss the specification criteria for a new games console.	**1.3: Specification** Produce realistic, technical and measurable specification points which address some issues of sustainability for their own product. The specification is an extremely important document as it focuses the designer and enables them to review their design ideas as they progress. Each specification point needs to be fully justified and not simply a statement.	**Topic 4.1: Specification criteria** When designing a product, students should take into account the following specification criteria: • form – How should the product be shaped/styled? • function – What is the purpose of the product? • user requirements – What qualities would make the product attractive to potential users? • performance requirements – What are the technical considerations that must be achieved within the product? • material and component requirements – How should materials and components perform within the product? • scale of production and cost – How will the design allow for scale of production and what are the considerations in determining cost? • sustainability – How will the design allow for environmental considerations?
2	To design **three** different initial ideas for the games console.	**2.1: Initial ideas** Present alternative initial design ideas that are realistic, workable and detailed. This is the opportunity for students to demonstrate their creativity and flair for design. A wide range of different initial design ideas should be explored. Demonstrate their understanding of materials, processes and techniques applicable to their initial design ideas. Annotation should clearly show students' knowledge and understanding of workshop or industrial applications relevant to each design idea. Address specification points through their initial design ideas. Annotation should be clearly related to the specification points.	**Topic 4.2: Designing skills** When designing a product, students should be able to respond creatively to design briefs and specification criteria, including: • clear communication of design intentions using notes and/or sketches • annotation which relates to the original specification criteria. **Topic 4.3: Application of knowledge and understanding** When designing a product, students should be able to apply their knowledge and understanding of a wide range of materials and/or components and manufacturing processes to each design idea, including: • the properties of materials and/or components • the advantages/disadvantages of materials and/or components and manufacturing processes • justification of the choice of materials and/or components and manufacturing processes.
3	To review all design ideas and select **one** for further	**2.2: Review** Present objective evaluative comments against their original specification criteria. Initial design ideas are 'raw' at this stage and it is therefore important to determine which design can be developed into workable solutions by testing against specification points. Use user group feedback and issues of sustainability to evaluate their initial design ideas. All design is concerned with people, and their opinions are extremely useful in gaining another perspective on further development of ideas.	

Lesson	Objectives	Appropriate Unit 1 content	Appropriate Unit 2 content
4–5	To develop one idea into a final design proposal.	**3.1: Development** Develop one of their initial design ideas into a single final design proposal that is significantly different, and improved, to any previous initial design idea. Development should refine technical aspects of the product design and not simply focus on cosmetic changes. Evaluate their ideas against relevant design criteria as they progress.	**Topic 4.2: Designing skills** When designing a product, students should be able to respond creatively to design briefs and specification criteria, including: • clear communication of design intentions using notes and/or sketches • annotation which relates to the original specification criteria. **Topic 4.3: Application of knowledge and understanding** When designing a product, students should be able to apply their knowledge and understanding of a wide range of materials and/or components and manufacturing processes to each design idea, including: • the properties of materials and/or components • the advantages/disadvantages of materials and/or components and manufacturing processes • justification of the choice of materials and/or components and manufacturing processes. **Topic 2.7: Health and safety** • How to understand/describe safe working practices. • How to identify workshop hazards and precautions.
6–8	To make a Styrofoam® model of the design proposal.	**3.1: Development** Use scale modelling in traditional materials to test important aspects of the design idea as it progresses. Simple mock-ups or block models can be invaluable in determining whether a design is workable. **5.3: Health and safety** Demonstrate a high level of safety awareness throughout all stages of manufacture. No other formal evidence is required.	
9	To **sketch** a third angle orthographic drawing of the final design. To outline industrial and commercial applications relating to the final design.	**3.2: Final design** Present a final design proposal in an appropriate format that communicates their design intentions. Present technical details of materials and/or components, processes and techniques relating to their final design proposal. Final drawings should be clearly annotated and dimensioned so that they can be understood by a third party.	
10	To test and evaluate the final design proposal objectively against measurable points of the product specification.	**6.1: Testing and evaluation** Devise and carry out a range of suitable tests to check the performance and/or quality of the final product. Tests should be measurable and refer to specification points, if appropriate, to determine the product's fitness for purpose. Evaluate their final product objectively with reference to specification points, user group feedback and sustainability issues. No product is ever perfect so students should discuss the positive and negative aspects of their final product. User group feedback should provide a further perspective.	**Topic 3.1: Specification criteria** When analysing a product, students should take into account the following specification criteria: • form – Why is the product shaped/styled as it is? • function – What is the purpose of the product? • user requirements – What qualities make the product attractive to potential users? • performance requirements – What are the technical considerations that must be achieved within the product? • material and component requirements – How should materials and components perform within the product? • scale of production and cost – How does the design allow for scale of production and what are the considerations in determining cost? • sustainability – How does the design allow for environmental considerations?

Making task

Lesson	Objectives	Appropriate Unit 1 content	Appropriate Unit 2 content
1	**Brief:** To make a scale model of a D&T workshop. To carry out a detailed site survey of the existing workshop.	**1.1: Analysing the brief** Analyse their design brief in enough detail to be able to clarify design needs. This will involve analysis of key words and phrases that help in understanding the issues related to the chosen/given design task.	
2	To produce a production plan for the making of the model.	**4.1: Production plan** Produce a detailed production plan that considers the stages of manufacture for their product. Charts should clearly communicate the correct order of making and timings. Identify and describe the stages during making where specific quality control procedures should take place. Feedback should state where quality control will take place.	
3–8		**5.1: Quality of manufacture** Attempt a challenging making task involving the manufacture of several different components using a range of materials, equipment, techniques and processes. Students must ensure that their product provides an opportunity to manufacture several different component parts from different materials using different processes. Select tools, equipment and processes, including CAD/CAM where appropriate, for specific uses. Demonstrate a detailed understanding of the working properties of materials they selected for a specific use. Students should use their work plan to justify their choices. Demonstrate a wide range of making skills with precision and accuracy. This is an opportunity for students to be rewarded for the range of making skills they demonstrate during the making activity. **5.3: Health and safety** Demonstrate a high level of safety awareness throughout all stages of manufacture. Marks will be awarded on the basis of your observations of students during the make activity.	A range of suitable materials including the following. **Topic 1.5: Woods** Aesthetic, functional and mechanical properties, application and advantages/disadvantages of the following woods for creating models and prototypes: • hardwoods – jelutong and balsa • softwood – pine. **Topic 2.2: Modelling and prototyping** Processes, application and advantages/disadvantages of the following 3D models and prototypes to aid the development of graphic products: • block modelling of medium density fibreboard (MDF) and Styrofoam™ • rapid prototyping using stereolithography (SLA) and 3D printing (3DP). Students should identify and understand the practical use of common workshop tools, equipment and components used in making graphic products.

Lesson	Objectives	Appropriate Unit 1 content	Appropriate Unit 2 content
9	To present the final model to the group. To discuss the performance and quality of the final model with peers.	**5.2: Quality of outcome** Produce high-quality components that are accurately assembled and well finished to produce a high-quality product overall. Where products are incomplete, it is the quality of the manufacture of individual components that will gain marks. Produce a completed product that is fully functional as a graphic product (for example, product model). The final product should be fit for purpose.	**Topic 2.4: Joining techniques** Preparation, application and advantages/disadvantages of using the following adhesives for joining like and unlike materials: • epoxy resin • polystyrene cement • Tensol® Cement • polyvinyl acetate (PVA). **Topic 2.7: Health and safety** • How to understand/describe safe working practices. • How to identify workshop hazards and precautions.
10	To test and evaluate the completed model to determine performance and quality factors.	**6.1: Testing and evaluation** Devise and carry out a range of suitable tests to check the performance and/or quality of the final product. Tests should be measurable and refer to specification points, if appropriate, to determine the product's fitness for purpose. Evaluate their final product objectively with reference to specification points, user group feedback and sustainability issues. No product is ever perfect so students should discuss the positive and negative aspects of their final product. User group feedback should provide a further perspective.	

Student guide

Is this the right subject for me?

Do you enjoy:

- Investigating food? ❑
- Problem solving? ❑
- Designing food products of the future? ❑
- Making models? ❑
- Testing and tasting your ideas? ❑

If you have ticked **any** of the boxes above, then this GCSE Food Technology course is the ideal subject for you.

What do I need to know, or be able to do, before taking this course?

Throughout Key Stage 3 you will have produced a wide range of exciting projects in Design and Technology, including graphics, textiles, food, electronics and RMT. If you particularly enjoyed the creative design side of design and technology then you now have the opportunity to specialise in one of those subject areas and follow a two-year GCSE course in Graphic Products.

What will I learn?

GCSE Graphic Products covers a wide range of products including, packaging, point-of-sale display, interior and garden design and 3D product (concept) design.

Over the course of two years you will develop a whole range of creative designing and making skills, technical knowledge and understanding relating to graphic products and invaluable transferable skills such as problem solving and time management.

How will I be assessed?

GCSE Graphic Products consists of two units:

Unit 1	Unit 2
Creative Design and Make Activities	Knowledge and Understanding of Graphic Products
Controlled Assesment	Examination
60%	40%

You will have the option of completing your coursework unit in two different ways:

- through a combined design and make activity where you design a product and then make a model of it OR
- through separate design and make activities where you design one product and make another.

The examination will be based on a structured exam paper which your teacher will be able to guide you through. Everything that you need to learn for this unit is set out in the specification so your teacher will know exactly how to prepare you for the exam.

What can I do after I've completed the course?

Many students have enjoyed studying GCSE Graphic Products so much that they go on to study A Level Graphic Products for a further two years. However, it is possible to study any design and technology related course post-16.

Creative students usually study one or more of the creative subjects including, A Level Art and Design, Media and/or Film, BTEC National Diplomas in Art and Design or Media, and the 14-19 Diploma in Creative and Media.

Of course, if post-16 is not for you, employers value this GCSE in Graphic Products as it develops creative, technical and transferable skills.

Next steps!

If you want to find out more about this GCSE Graphic Products course then you can visit the Edexcel website at **www.edexcel.com**

You should also talk to the Head of Design and Technology at your school who will be able to describe the course in detail and advise you of what you need to do next when it comes to your options.

Assessment overview

The following grid gives an overview of the assessment for this GCSE Graphic Products course. Edexcel recommend that you make this information available to students to help ensure they are fully prepared and know exactly what to expect in the assessment of Units 1 and 2.

From summer 2014 onwards students will be required to sit all of their examinations at the end of the course. Students may complete the controlled assessment task at any point during the course and controlled assessment work must be submitted for moderation at the end of the course.

Unit 1	Percentage	Marks	Time	Availability
Creative Design and Make activities This unit is internally assessed under controlled conditions. Students must complete a design and make activity. These activities can be linked (combined design and make) or separate (design one product, make another).	60%	100	40 hours Controlled assessment External moderation	June
Unit 2	**Percentage**	**Marks**	**Time**	**Availability**
Knowledge and Understanding of Graphic Products This unit is assessed through an examination paper set and marked by Edexcel. The examination paper will consist of multiple-choice, short-answer and extended-writing type questions.	40%	80	1 hour 30 minutes External assessment	June

Description	Knowledge and skills
The development of students' design folders and manufacture of the product(s) must take place under controlled conditions. Students must be supervised by a teacher at all times. Student work must be collected in at the end of the lesson and handed back at the beginning of the next lesson. Students' work must be produced individually. Centres will be given a list of five broad themes for task setting. Suggested graphic products tasks are: 1 **Packaging**, for example: • perfume packaging including bottle/container and box/outer packaging • a sports drinks bottle and label. 2 **Point-of-sale display**, for example: • a counter display for a new computer game including DVD case cover • a leaflet holder and leaflet promoting activities at a local leisure centre. 3 **Pop-up mechanisms**, for example: • pop-up book for young children to help them learn numbers or the alphabet etc • a pop-up musical greetings card for an occasion. 4 **Concept design**, for example: • a next-generation games console • a personal hand-held GPS navigation system 5 **Interior design**, for example: • a new specialist D&T room for your school • a contemporary loft apartment. Centres can contextualise the task(s) to best suit their specific circumstances, which includes the availability of and access to resources. See the controlled assessment guide on page 36 for more information.	The Assessment Objectives covered in this unit are: Recall of knowledge and understanding **AO1**: 6% Application of knowledge and understanding **AO2**: 45% Product analysis **AO3**: 9% Students will follow the basic creative design process. This includes research, product development, communication skills, application of knowledge and understanding of graphic products (materials, processes etc), planning and making a high quality product and testing and evaluating.

Description	Knowledge and skills
This unit is assessed through a 1-hour and 30-minute examination paper set and marked by Edexcel. The examination paper will: • be structured in the same way each year so that it is accessible to all students • be a question and answer booklet and all questions are compulsory • consist of multiple-choice, short-answer and extended-writing type questions. The total number of raw marks available is 80.	The Assessment Objectives covered in this unit are: **AO1**: 24% **AO2**: 8% **AO3**: 8% Students will develop a knowledge and understanding of a wide range of materials and processes used in design and technology. Students will learn about industrial and commercial practices and the importance of quality checks, and the health and safety issues that have to be considered at all times. The knowledge and understanding students develop in this unit can be applied easily to *Unit 1: Creative Design and Make Activities.*

Understanding Unit 1

Applying the assessment criteria

To support you in accurately and confidently applying the assessment criteria, Edexcel have written the mark bands like a mark scheme with key trigger points.

The table below shows how the descriptors in each mark band have been broken up into their individual marking points (denoted by bullet points). The marking points within each mark band are equally weighted. Edexcel suggest that you look at your students work for each criteria holistically and place it into the appropriate mark band. You must then determine the actual mark you wish to award.

For example:

b) Research	Level of response not worthy of credit.	0
	• Research is **superficial** and does not focus on the needs identified in the analysis. • Analysis of existing products is **insufficient** to aid the writing of specification criteria.	1-2
	• Research is **general**, focusing on some of the needs identified in the analysis. • Product analysis is used to inform the writing of **some** specification criteria.	3-4
	• Research is **selective** and focuses on the needs identified in the analysis. • The performance, materials, components, processes, quality and sustainability issues of relevant existing products are explored in **sufficient detail** to aid the writing of specification criteria.	5-6

1. Initially, I think the student's research is selective and worthy of the 'high' mark band.

2. However, I don't think that the student's product analysis is strong enough to warrant a high mark – more 'medium'.

Where a student's work does not fit perfectly to the descriptor statements in a band, a holistic (best fit) decision must be taken by the teacher when deciding upon the final mark. Look at the example above. The teacher cannot award the full 6 marks for research as the candidate has not fully met the criteria in the top band with one aspect (product analysis) achieving a level better described in the middle band. In this case the student is awarded 5 marks. If the product analysis was better described by the lowest band descriptor then the holistic decision taken by the teacher would be that the work was more appropriate to the middle band overall and would therefore be awarded 4 marks.

Design activity (50 marks)

Investigate (15 marks)

Sub-sections	Descriptor	Mark range
a) Analysing the brief	Level of response not worthy of credit.	0
	• Analysis is **superficial** leading to unclear design needs.	1
	• Analysis is **limited** with some design needs clarified.	2
	• Analysis is **detailed** with most design needs clarified.	3
b) Research	Level of response not worthy of credit.	0
	• Research is **superficial** and does not focus on the design needs identified in the analysis. • Analysis of existing products is **insufficient** to aid the writing of specification criteria.	1–2
	• Research is **general**, focusing on some of the design needs identified in the analysis. • Product analysis is used to inform the writing of **some** specification criteria.	3–4
	• Research is **selective** and focuses on the design needs identified in the analysis. • The performance, materials, components, processes, quality and sustainability issues of relevant existing products are explored in **sufficient detail** to aid the writing of specification criteria.	5–6
c) Specification	Level of response not worthy of credit.	0
	• Specification points are **superficial**. • Specification points are **not justified**.	1–2
	• **Some** specification points are realistic and measurable. • **Some** specification points are developed from research but are not justified.	3–4
	• **Most** specification points are realistic, technical, measurable and address some issues of sustainability. • Specification **fully** justifies points developed from research.	5–6

Design (20 marks)

Sub-sections	Descriptor	Mark range
d) Initial ideas	Level of response not worthy of credit.	0
	• Alternative design ideas are **similar**. • Ideas are **simplistic**. • Ideas are **superficial** and **limited** research is used. • **Limited** specification points are addressed.	1–4
	• Alternative design ideas are **realistic**. • Ideas are **workable**. • Ideas are **detailed** and **relevant** research is used. • Ideas address **most** specification points.	5–8
	• Alternative design ideas are **realistic**, **workable** and **detailed**. • Ideas demonstrate **detailed** understanding of materials, processes and techniques. • Ideas are **supported** by research information. • Ideas address **all** key specification points.	9–12
e) Review	Level of response not worthy of credit.	0
	• General and **subjective** comments against **some** specification points. • **Limited** use of user group feedback.	1–2
	• **Objective** evaluative comments, against **most** specification points. • Evaluation considers **user group** feedback and issues of **sustainability**.	3–4
f) Communication	Level of response not worthy of credit.	
	• Use of a **range** of communication techniques, including ICT where appropriate. • Demonstrate **sufficient** skill to convey an understanding of design ideas.	1–2
	• Use of a **range** of communication techniques and media, including ICT and **CAD** where appropriate. • Demonstrate **precision** and **accuracy**.	3–4

Develop (15 marks)

Sub-sections	Descriptor	Mark range
g) Development	Level of response not worthy of credit.	0
	• Developments from alternative design ideas are **minor** and **cosmetic**. • **Simple** modelling is used. • Test **an** aspect of the final design proposal against a design criterion.	1-3
	• Developments are **appropriate** and use **details** from alternative design ideas to change, refine and improve the final design proposal. • Modelling using traditional materials and/or **3D computer modelling** is used. • Test **some** aspects of the final design proposal against **relevant** design criteria.	4-6
	• Development is used to produce a final design proposal that is **significantly different** and **improved** compared to any previous alternative design ideas. • Modelling to **scale** using traditional materials or 2D and/or 3D computer simulations is used. • Test **important** aspects of the final design proposal against **relevant** design criteria. **User group** feedback is used in final modifications.	7-9
h) Final design	Level of response not worthy of credit.	0
	• Final design proposal includes **limited** consideration • of materials and/or component parts, processes and techniques.	1-2
	• Final design proposal includes **details** • of **some** materials and/or component parts, processes and techniques.	3-4
	• Final design proposal includes **technical details** • of **all** materials and/or component parts, processes and techniques.	5-6

Make activity (50 marks)

Plan (6 marks)

Sub-sections	Descriptor	Mark range
a) Production plan	Level of response not worthy of credit.	0
	• **Superficial** production plan that outlines **some** stages of manufacture. • Plan shows **limited** reference to quality control.	1-2
	• **Limited** production plan that considers the **main** stages of manufacture. • Plan shows some reference to **appropriate** forms of quality control.	3-4
	• **Detailed** production plan that considers stages of manufacture in the **correct sequence**. • Plan includes **specific** forms of quality control.	5-6

Make (38 marks)

Sub-sections	Descriptor	Mark range
b) Quality of manufacture	Level of response not worthy of credit.	0
	• Tools are selected **with guidance**. • Equipment is selected **with guidance**. • Processes, including CAD/CAM where appropriate, are selected **with guidance**. • Limited understanding of the working properties of materials used when selecting for manufacturing a product. • The task is **undemanding**. • A **limited** range of skills is used. • A **limited** range of processes is used. • **Little** attention to detail in the use of skills and processes.	1-8
	• Tools are selected with **some** guidance. • Equipment is selected with **some** guidance. • Processes, including CAD/CAM where appropriate, are selected with some guidance. • **Some** understanding of the working properties of materials used when selecting for manufacturing a product. • The task offers **some** challenge. • A **range** of skills is used. • A **range** of processes is used. • **Attention to detail** in the use of skills and processes.	9-16
	• Tools are selected for specific uses **independently**. • Equipment is selected for specific uses **independently**. • Processes, including CAD/CAM where appropriate, are selected for specific uses **independently**. • An **appropriate** understanding of the working properties of materials used when selecting for manufacturing a product. • The task is **challenging**. • A **wide range** of skills is used. • A **wide range** of processes is used. • **Precision** and **accuracy** in the use of skills and processes.	17-24

Sub-sections	Descriptor	Mark range
c) Quality of outcome	Level of response not worthy of credit.	0
	• Product includes the manufacture of **some** good quality component parts. • Product remains either unassembled or **poorly** assembled. • Product/ components are **poorly** finished. • Completed product functions **poorly**.	1–4
	• Product includes the manufacture of **good** quality component parts. • Product is generally **well** assembled. • Product/components are generally **well** finished. • Completed product functions **adequately**.	5–8
	• Product includes the manufacture of **high-quality** component parts. • Product is **accurately** assembled. • Product/components are **well** finished. • Completed product is **fully functional**.	9–12

Test and evaluate (6 marks)

Sub-sections	Descriptor	Mark range
e) Testing and evaluation*	Level of response not worthy of credit.	0
	• One or **more simple** tests carried out to check the performance and/or quality of the final product. (1) • Evaluative comments are **subjective** and reference a **few** specification points **superficially**. **	1–2
	• A **range** of tests carried out to check the performance and/or quality of the final product. • Evaluative comments are **objective** and reference **most** specification points. ***	3–4
	• A **range** of tests carried out to check the performance and/or quality of the final product with **justifications**. • **Objective** evaluative comments, including **user group** evaluation, consider most relevant, measurable specification points in **detail**, including **sustainability** issues. ****	5–6

Notes

* Opportunity for students to be assessed on quality of written communication: strand (iii) – organise information clearly and coherently, using specialist vocabulary when appropriate.

** The student uses basic language and the response lacks clarity and organisation. Spelling, punctuation and the rules of grammar used with limited capacity.

*** The student uses some design and technology terms and shows some focus and organisation. Spelling, punctuation and the rules of grammar used with some accuracy. Some spelling errors may still be found.

**** The student uses a range of appropriate design and technology terms and shows good focus and organisation. Spelling, punctuation and the rules of grammar used with considerable accuracy.

Examination guide

This examination guide looks at the style of questions your students will be faced with when they sit the written paper. Those of you already familiar with the current format of Edexcel's GCSE D&T paper will clearly recognise the style of the majority of questions on the sample assessment material although clearly, to comply with QCA regulations there are some differences, notably the introduction of questions that require some extended writing. It should be highlighted, this change is a small percentage of the examination and therefore its impact on students should be minimal. Another change is the inclusion of some multiple-choice questions to give student confidence at the start of the paper.

The examination paper is 'ramped' and within each question the sub questions are ramped as well. The advantage of ramping the whole paper is that the questions at the beginning of the paper are accessible to the whole ability range, thereby easing the student into the paper and allowing them to work with confidence. As they work through the paper, the questions will get progressively more challenging as they move through the grade range G–A*.

However, candidates are advised to attempt all questions as there will be opportunities to gain marks throughout the paper.

The examination paper contains different types of questions:

- multiple-choice
- short-answer
- design questions
- extended-writing.

Each Graphic Products exam paper will be structured in the following way:

Questions 1-10	Question 11	Question 12	Question 13	Question 14
Multiple-choice.	Knowledge and understanding of graphic products. Structured questions based on a theme.	Designing products.	Analysing products.	Knowledge and understanding of graphic products. Short-answer and extended-writing type questions.
10 marks	19 marks	16 marks	16 marks	19 marks

(Total 80 marks)

Command words

Students should be reminded to always read each question carefully before they respond. They should always look at the amount of marks awarded for each question in brackets. This will give them a good indication of how many points need to be raised in their response. As a general rule of thumb, look at the following command words and what students have to do in order to gain the marks:

Command word	Marks awarded	Description
Give/state/name	(1 mark)	These type of questions will usually appear at the beginning of the paper or question part and are designed to ease students into the question with a simple statement or short phrase.
Describe/outline	(2 + marks)	These type of questions are quite straightforward. They ask students to simply describe something in detail. Some questions may also ask students to use notes and sketches, therefore, they can gain marks with the use of a clearly labelled sketch.
Explain/justify	(2 + marks)	These type of questions are asking students to respond in detail to the question – no short phrases will be acceptable here. Instead, students will have to make a valid point and develop/justify it to gain full marks.
Evaluate/discuss/ compare	(4 + marks)	These type of questions are designed to stretch and challenge students. They will always be awarded the most amount of marks because they require students to make a well-balanced argument, usually involving both advantages and disadvantages.

Questions 1-10: Multiple-choice (10 marks)

New to D&T exam papers – this paper starts off with ten multiple-choice questions which become gradually more demanding. These questions can cover any part of the specification. For example:

A printing company produced 1000 leaflets for a client.
Please mark a cross (X) in the correct box.
This scale of production is called:

☒ A one-off
☒ B batch
☒ C mass
☒ D rapid prototyping (RPT)

(Total 1 mark)

Answer

B batch

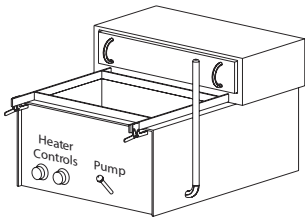
Examiner comment

An extremely straightforward question which applies knowledge and understanding from Topic 2.1 Scale of production and Topic 2.6 Printing processes.

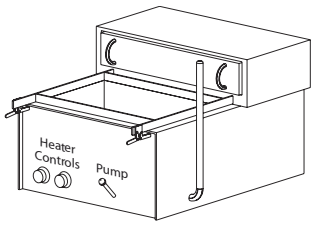
Question 11(a): Name and give the use of tools and equipment (4 marks)

Question 11 starts with four marks awarded to students for either naming or giving the use of tools and equipment related to graphic products. The tools and equipment will be laid out in a table format, for example:

The table below shows some tools and equipment.
Complete the table below by giving the missing names and uses.

Tools/Equipment	Name	Use
	(1)	Shaping plastic around moulds

Answer

Tools/Equipment	Name	Use
	Vac former (1)	Shaping plastic around moulds

Examiner comment

Here, the student has stated 'vac former' instead of vacuum former. An examiner would not penalise a student for shortening this word as the meaning is still very clear. However, Edexcel strongly encourages the correct use of specialist technical terminology throughout this paper to avoid any potential miscommunication. Students should be familiar with a wide range of specialist tools and equipment through the course of their design and make activities and Topic 2: Industrial and commercial processes. Specific technical drawing equipment is listed in Topic 1.8: Components.

Question 11(b–f): Knowledge and understanding of Graphic Products (15 marks)

Subsequent questions are comprised of parts questions combined to produce structured questions on a theme, for example:

> Jelutong and pine are both woods that can be used to make models from.
> Explain **one** advantage jelutong has over pine when used to produce models.
> **(Total 2 marks)**

Answer

Jelutong has a finer grain which means it can be sanded smoother.

Examiner comment

An `explain' type question requires a statement and then a justification in order to be awarded full marks. This question focuses upon Topic 1.5: Woods. An examiner would award the marks for the student discussing that jelutong can be sanded smoother and justifying it with the fact it has a finer grain. Students need to learn about the advantages/disadvantages and application of specific hardwoods (including jelutong) and softwoods (pine) as stated in the specification content.

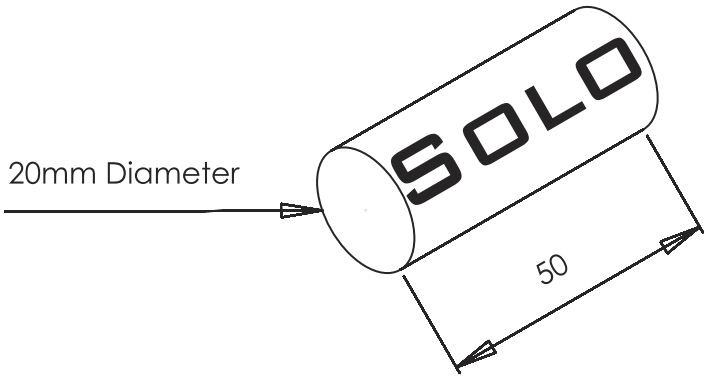
Question 12: Designing products (16 marks)

Question 12 enables students to respond creatively to a given need and detailed specification, for example:

A manufacturer requires a point-of-sale to display packs of sweets.

The point of sale will be placed on a counter in a shop.

The drawing below shows one pack of sweets.



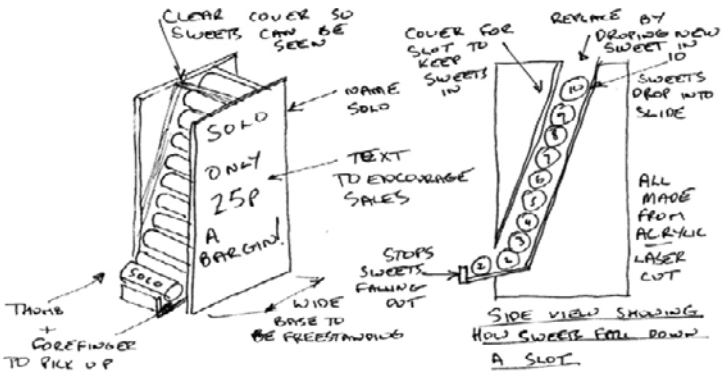
Design specification

The specification for the point-of-sale display is that it should:

- be freestanding
- hold at least 10 packs of the sweets
- allow customers to remove the sweets
- allow the point-of-sale display to be refilled
- display the name of the product 'Solo' when filled
- display a graphic or text to encourage sales
- be manufactured using appropriate materials
- be manufactured using processes suitable for batch production.

In the boxes opposite, use sketches and, where appropriate, brief notes to show **two different** design ideas for the tea light candle holder that meet the specification points above.

Answer



Examiner comment

Students must use the annotated sketches in the boxes provided in order to design a product that satisfies the criteria outlined in the design specification.

The second design solution must be conceptually and technically different in design and construction and not simply variations on a theme. The student has used sketches and notes (annotation) to convey their design idea. No drawing equipment needs to be provided for this exam so clear annotated sketches are sufficient. The marks are for the student's solution to the design specification and no marks are awarded for the quality of drawings. Students should ensure that they have communicated the important aspects of their design by either the notes and/or sketches. The annotation is extremely important for showing the examiner how the design idea satisfies each of the specification criteria.

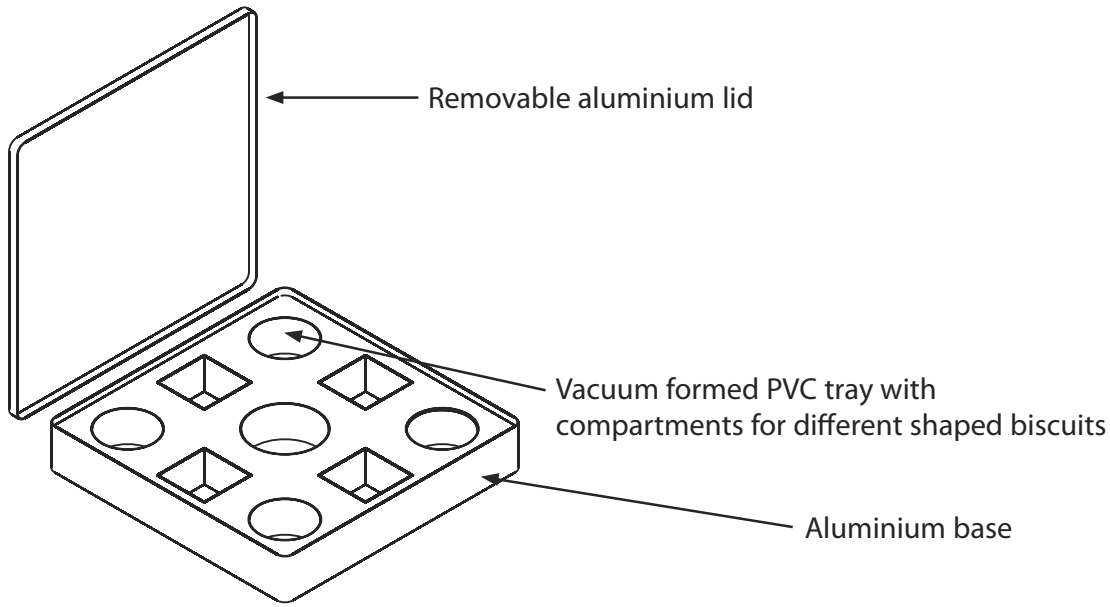
For example, annotation point 'All made from acrylic – laser cut' addresses two criteria:

- be manufactured using appropriate materials (acrylic is a suitable material for this product)
- be manufactured using processes suitable for batch production (laser cutting is an ideal batch production process).

Question 13: Analysing products (16 marks)

In question 13, students will be given a labelled diagram of a specific product and are required to answer a series of questions relating to it, for example.

The drawings below show an aluminium box used to package chocolate biscuits.



Give **two** properties of aluminium that make it a suitable material for packaging. For each property, justify your answer.

(Total 4 marks)

Answer

Aluminium is lightweight. Justification: This means that transport costs could be reduced as cargo weight is reduced. Aluminium is a malleable material.

Justification: Therefore, it can be easily formed into interesting packaging shapes

Examiner comment

This short-answer type question is very similar to an 'explain' question. An explanation type question requires a statement followed by a development/justification to gain full marks. The student must state two properties of aluminium and justify both. This question requires students to apply their knowledge and understanding of Topic 1.2: Metals to the given product, in particular aesthetic, functional and mechanical properties.

Question 14: Knowledge and understanding of Graphic Products including extended-writing style questions (19 marks)

Some part questions will require an extended writing response. This is designed to stretch and challenge students, for example;

> Environmental issues are a growing concern both locally and globally. The Kyoto protocol was agreed by many countries in response to a particular global environmental issue.
>
> Discuss the global environmental issues that require the Kyoto protocol.
>
> **(Total 6 marks)**

Answer

Gases released by human activity (carbon dioxide, nitrous oxide and methane) are released in large amounts into the Earth's atmosphere and trap heat. These 'greenhouse' gases are contributing to global warming and climate change and need to be reduced before too much damage is done.

The Kyoto protocol was set up between developed and developing countries in order to address climate change. Between them, each country has agreed to cut greenhouse gas emissions on a yearly basis. The majority of countries have also agreed that developing countries are allowed lower targets as they need to produce more food/products for their increasing populations ie China (although the USA does not agree entirely with this and has not signed up).

All countries, therefore, must develop a global sustainable development policy including educating its population into using less resources and energy. The UK also has a government department called 'Envirowise' that offers advice to companies on how to save money by using cleaner design and technology.

Examiner comments

This 'discuss' question requires a student to write an extended-writing style response. This question has a levels mark scheme. The student response clearly fits into Level 3 (5-6 marks):

Student identifies a range of impacts with associated developments showing a detailed understanding of the impacts. Writing communicates ideas effectively, using a range of appropriately selected D&T terms and organising information clearly and coherently. The student spells, punctuates and uses the rules of grammar with considerable accuracy.

Controlled assessment

About controlled assessment

Controlled assessment is similar to coursework except that controls have been added to ensure that all of the work is the student's own.

The level of control for each of activity in each subject is specified by QCA. This section explains the level required for each activity and what it means for teachers and students, and the frequency of change.

Task setting

What is the level of control?

High

What does this mean?

Tasks will be set by Edexcel and centres will choose from a list available on our website in September at the start of each academic year. Centres can contextualise the task(s) to best suit their specific circumstances, which includes the availability of and access to resources. Suggested Graphic Product tasks are given on page 12–17.

How often will the tasks change?

Edexcel will review the tasks every two years. Edexcel will look at the tasks in the light of student performance and make any amendments necessary to make the tasks clearer.

Any students wanting to retake the controlled assessment unit will need to use the one available for the session in which they are retaking, regardless of what task they did originally. If students are taking the same task, they must start from scratch, and do the whole task again.

Task taking

The task taking controls have been designed to ensure that the task is done by the student and that all work is their own. This means that students cannot carry out work at home and bring it to the classroom.

The task is split into two phases:

- Initial research
- Design and make tasks

The levels of control and the effect are different for each part.

What is the level of control?

Initial research:

Low

Design and make tasks

Medium

What does this mean?

Initial research

Students can undertake research to locate sources outside of the classroom without supervision. They can locate as many sources to take into the write-up phase as they wish.

Design and make tasks

The student must complete the following under classroom supervision:

- write up of their portfolio
- making of their product.

However, students are allowed to use the following to help them with completing their task:

- the initial research they have undertaken outside of the classroom to produce focused selective research for their portfolio
- sources the centre provides.

A student can bring in additional research notes at any time provided the write up of their research is done under the same supervised conditions.

Students cannot take any information away from the classroom to complete. They can make an outline plan for the task beforehand and bring it to the classroom.

You will need to monitor the student in the classroom to ensure the whole of the task is their own work. You can answer questions but you must not guide students along a particular path or advise on how to approach the task.

This stage is not an exam and requires supervision not invigilation. There is no need to set up the room like an exam or for the room to be silent. The key requirement is that students are supervised at all times.

The task must be taken during curriculum time.

Task marking

This is similar to the current arrangements, so will be familiar.

What is the level of control?

Medium

What does this mean?

You will mark all the tasks. You then fill in a form to show all the marks achieved. Edexcel will ask for a sample of the work to moderate, including student work with the highest and lowest scores.

Edexcel will moderate the work and you will receive a summary report on results day.

Training courses on marking tasks will be available to help you mark the work effectively. Our specification experts can also provide support, just email dandt@edexcelexperts.co.uk

Controlled assessment exemplars

Centres will appreciate that no student has actually submitted controlled assessment work under the new specification at the time of publication. Existing examples of student work have, therefore, been modified by the Principal Moderator for illustrative purposes only.

Suggested timings

As a guideline only, Edexcel have suggested times for each of the stages in the design and make activities. Obviously, you will be best suited to gauge the time needed to complete each task as you know your students best.

Design activity

Stage	Tasks	Suggested times
1. Investigate	1.1 Analysing the brief	1 hour
	1.2 Research	3 hours
	1.3 Specification	1 hour
2. Design	2.1 Initial ideas	5–6 hours
	2.2 Review	1 hour
	2.3 Communication	Evidenced throughout
3. Develop	3.1 Development	5–6 hours
	3.2 Final design	1–2 hours

Make activity

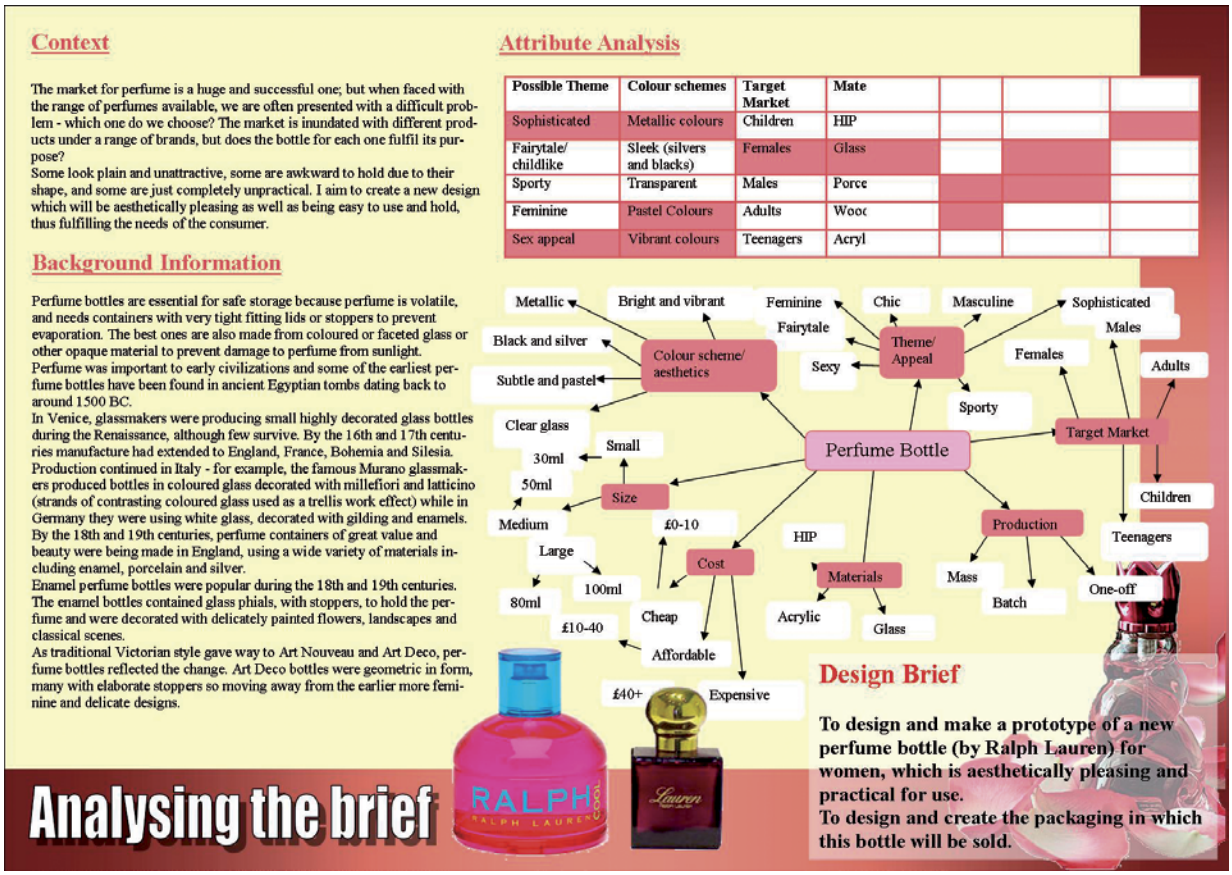
Stage	Tasks	Suggested times
4. Plan	4.1 Production plan	1–2 hours
5. Make	5.1 Quality of manufacture	16 hours
	5.2 Quality of outcome	
	5.3 Health and safety	Evidenced throughout
6. Test and evaluate	6.1 Testing and evaluation	1–2 hours

Student outcomes

The following examples of student work are to show indicative content only.

Investigate

TASK I.1: Analysing the brief



Moderator comments

Students do not need to write essays on how they have identified the problem. It is sufficient for them to state the design brief and get on with the task of determining what needs to be considered in order to start designing the product. A range of techniques can be used. Here, the student has used an attribute analysis table and a 'brainstorm' of key words in order to organise their thinking. This sheet is intended to focus the student on the specific issues related to the design of their chosen product.

PRODUCT DISASSEMBLY

Looking at the results of my survey, the Xbox 360 controller appears to be the favourite of the three controllers and it is also my personal favourite. Therefore this is the controller that I plan to disassemble as it would make sense that I based my controller around the most popular product on the market.

All of the components of the controller are both injection moulded and mass produced using polystyrene. This makes the manufacture extremely cheap which in turn allows the units to be sold at relatively low price on the market, £24.99 for a wired controller, £32.99 for a wireless version.

The buttons are placed inside the casing and when pushed, they are pressed against the circuit board setting off certain in game actions.

The printed circuit board is placed inside the casing with the rumble motors and thumb sticks attached to peripherals built onto the board itself. The brown circles are the connectors for the rest of the buttons. All of the wiring is in the back near to the power connections so that the whole thing can be powered and therefore used.

The D-pad has not been removed from the controller as it is still an effective way of doing simple actions within games. Things such as switching between a number of weapons or even choosing certain actions. This is attached in the same way as the rest of the buttons, by resting it within the casing so that it is touching the connecters on the circuit board.

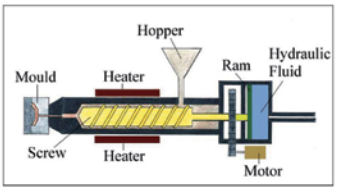
The thumb sticks/ analogue sticks are the easiest and most comfortable way of aiming or moving a character in game in any number of directions, which was not possible when the only available form of movement was the D-Pad.

The LB and RB buttons have been added to replace the badly positioned 'black and white' buttons that were on the original Xbox controller. The triggers have been sculpted to be smooth and fit comfortably under the index fingers which settle in that position automatically. Wires are soldered onto the contacts on the bottom of the circuit board.

Possibly one of the most used and cheapest ways of creating plastic casings nowadays is injection moulding. Coloured plastic chips are fed into the hopper at the top. These are then dropped down into the Archimedean screw. Whilst in the screw mechanism which is powered by a hydraulic ram, the plastic chips are heated until they become a liquid plastic. This is then forced into the mould through a narrow tube to form the required shape. This can also be done with clear or tinted plastic chips such as those used to create the buttons. There are generally mould lines left on products which have been injection moulded. These can be simply removed by a machine making the whole process extremely quick and quite cheap.

ERGONOMICS

This is the size of the Xbox 360 controller compared to a hand. It is relatively small and when held properly the fingers wrap comfortably around the hand holds shown here. The buttons on the front of the controller are all within reach of the thumb on the corresponding side of the controller. I.e. the A,B,X,Y and start buttons are all within reach of the right thumb whereas the D-pad and back buttons are within reach of the left thumb. The Xbox guide button can be easily reached with either thumb.



PRODUCT COMPARISON

The Xbox 360 was the first of these three consoles to be released, meaning that this was the first of the controllers to be released as well. It is similar to the Xbox controller.

Aesthetics	The controller is a clean, smooth shape with easy to reach buttons and comfortable hand holds. However the white can get dirty quite easily.	4/5
Size	The controller fits perfectly into your hands making it extremely comfortable and easy top play games with.	5/5
Weight	The controller is not extremely heavy but the weight makes it feel as if it is a quality product, unlike something which may be lighter and break more easily.	4/5
Connection	You can buy both wired and wireless Xbox 360 controllers. The wired ones restrict the distance you can sit away from the screen but the wireless controllers are battery powered and can cut out halfway through a game if the batteries happen to run out at any point. This can be rectified by buying a play and charge kit which comes with a rechargeable battery pack but basically converts the wireless controller into a wired one whilst the piece of kit is being used.	4/5
Method of Power	2AA batteries, a play and charge kit with rechargeable battery pack or a wired controller (does not require batteries etc as it uses the console).	4/5
Ergonomics and Price	A very comfortable controller which fits carefully into the users hands. All of the buttons are quite easy to reach with no real problems unless you happen to have particularly small hands. £24.99 for wired £32.99 for wireless.	5/5

The PS3 controller was released most recently and has the newest controller. It is similar to the PS2 controller.

Aesthetics	Again, this controller has a nice look to it and as it is not white, it will not get dirty quite as easily.	5/5
Size	This controller is slightly smaller than the Xbox 360 controller making it lighter but it is just as easy to hold.	5/5
Weight	This is slightly lighter than the Xbox 360 controller as it has not got a force feedback system (vibration) built into the controller and it is smaller.	4/5
Connection	It is only possible to buy wireless Playstation 3 controllers. They are powered by a built in power source which can be recharged by connecting the controller to the console with the provided wire.	3/5
Method of Power	A built in battery pack that can be recharged by connecting the controller to the console.	4/5
Ergonomics and Price	The controller has a gloss finish and the handholds are slightly thinner than those on the Xbox 360 which makes it slightly less comfortable. They cost around £35—£45.	3/5

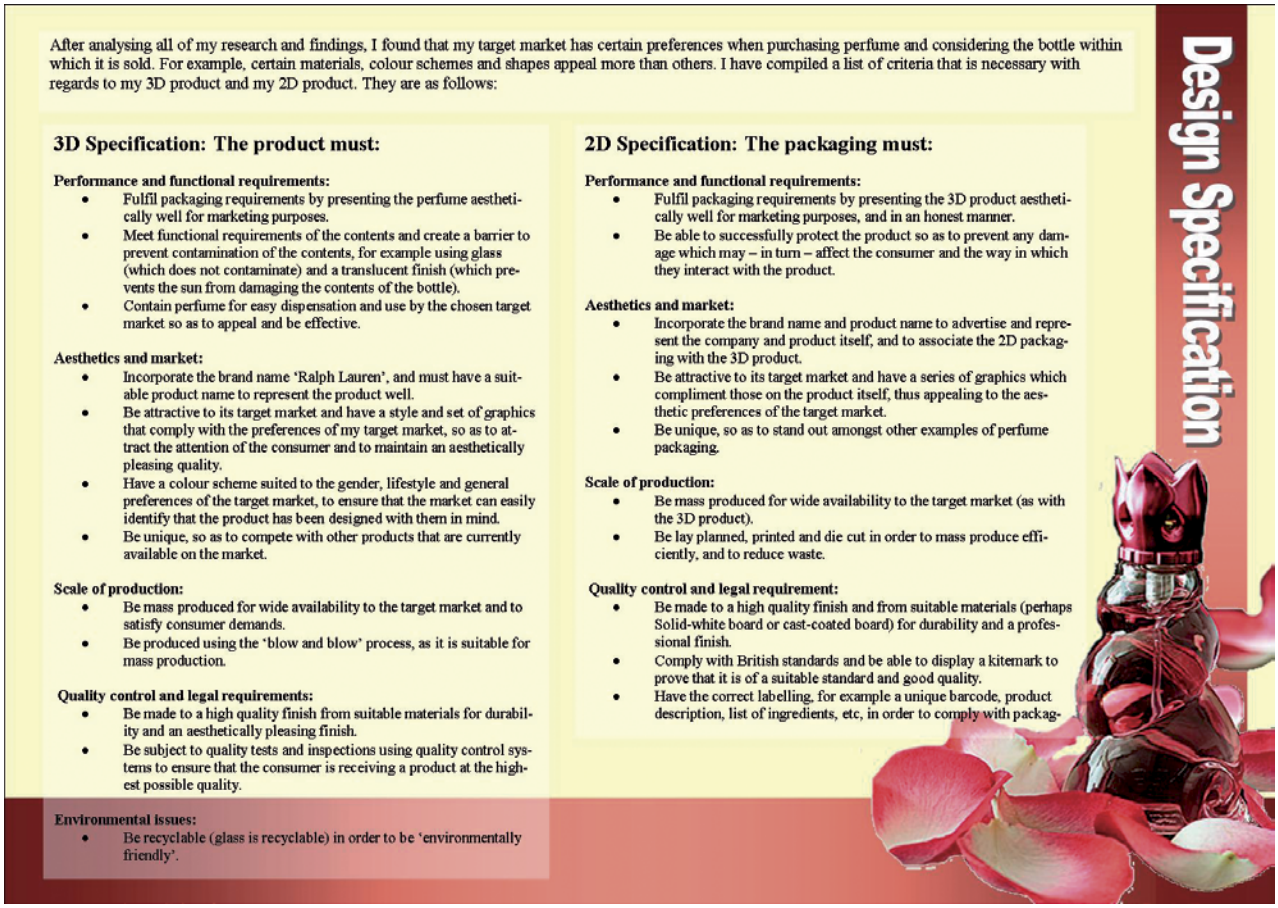
The Nintendo Wii was released in between the other two and has one of the most innovative and exciting controllers to date.

Aesthetics	The Wii controller has a nice intuitive design which is stylish and sleek. It has a second "part" of the controller and this is connected with a single wire.	4/5
Size	The controllers are both hand held with a wrist strap attached to one in case you let go whilst waving it around.	5/5
Weight	The controllers are probably the lightest of the three separately and both together are only just heavier than the PS3 controller.	4/5
Connection	The controllers are connected to the console via a Bluetooth connection system. The "Wiimote" takes two AA batteries or a rechargeable battery pack which can be brought separately and the Nunchuk, which the secondary attachment takes it's power from the Wiimote as if it were a single controller.	5/5
Method of Power	2AA batteries or a rechargeable battery pack which can be purchased separately.	4/5
Ergonomics and Price	The controllers are both shaped to fit comfortably into your hands, yet they are not as comfortable as the Xbox 360 controller. They have matt backs and gloss fronts making them comfortable to hold whilst still looking clean and smooth on the topside.	5/5

Moderator comments

Teachers should encourage students to undertake focused research work that is succinctly presented. Product disassemblies and investigations enable students to gain a greater technical understanding of their project than 'lifestyle' issues and contrived questionnaires. The results of research should directly affect the writing of the specification for the next task. For example, this student has disassembled a games controller to determine its components, materials and manufacturing processes which will be highly beneficial when writing a detailed specification for his own games controller. The product comparison research compares technical and aesthetic issues of the main competitors in this market.

TASK 1.3: Specification



Design Specification

After analysing all of my research and findings, I found that my target market has certain preferences when purchasing perfume and considering the bottle within which it is sold. For example, certain materials, colour schemes and shapes appeal more than others. I have compiled a list of criteria that is necessary with regards to my 3D product and my 2D product. They are as follows:

3D Specification: The product must:

Performance and functional requirements:

- Fulfil packaging requirements by presenting the perfume aesthetically well for marketing purposes.
- Meet functional requirements of the contents and create a barrier to prevent contamination of the contents, for example using glass (which does not contaminate) and a translucent finish (which prevents the sun from damaging the contents of the bottle).
- Contain perfume for easy dispensation and use by the chosen target market so as to appeal and be effective.

Aesthetics and market:

- Incorporate the brand name 'Ralph Lauren', and must have a suitable product name to represent the product well.
- Be attractive to its target market and have a style and set of graphics that comply with the preferences of my target market, so as to attract the attention of the consumer and to maintain an aesthetically pleasing quality.
- Have a colour scheme suited to the gender, lifestyle and general preferences of the target market, to ensure that the market can easily identify that the product has been designed with them in mind.
- Be unique, so as to compete with other products that are currently available on the market.

Scale of production:

- Be mass produced for wide availability to the target market and to satisfy consumer demands.
- Be produced using the 'blow and blow' process, as it is suitable for mass production.

Quality control and legal requirements:

- Be made to a high quality finish from suitable materials for durability and an aesthetically pleasing finish.
- Be subject to quality tests and inspections using quality control systems to ensure that the consumer is receiving a product at the highest possible quality.

Environmental issues:

- Be recyclable (glass is recyclable) in order to be 'environmentally friendly'.

2D Specification: The packaging must:

Performance and functional requirements:

- Fulfil packaging requirements by presenting the 3D product aesthetically well for marketing purposes, and in an honest manner.
- Be able to successfully protect the product so as to prevent any damage which may – in turn – affect the consumer and the way in which they interact with the product.

Aesthetics and market:

- Incorporate the brand name and product name to advertise and represent the company and product itself, and to associate the 2D packaging with the 3D product.
- Be attractive to its target market and have a series of graphics which compliment those on the product itself, thus appealing to the aesthetic preferences of the target market.
- Be unique, so as to stand out amongst other examples of perfume packaging.

Scale of production:

- Be mass produced for wide availability to the target market (as with the 3D product).
- Be lay planned, printed and die cut in order to mass produce efficiently, and to reduce waste.

Quality control and legal requirement:

- Be made to a high quality finish and from suitable materials (perhaps Solid-white board or cast-coated board) for durability and a professional finish.
- Comply with British standards and be able to display a kitemark to prove that it is of a suitable standard and good quality.
- Have the correct labelling, for example a unique barcode, product description, list of ingredients, etc, in order to comply with packag-

Moderator comments

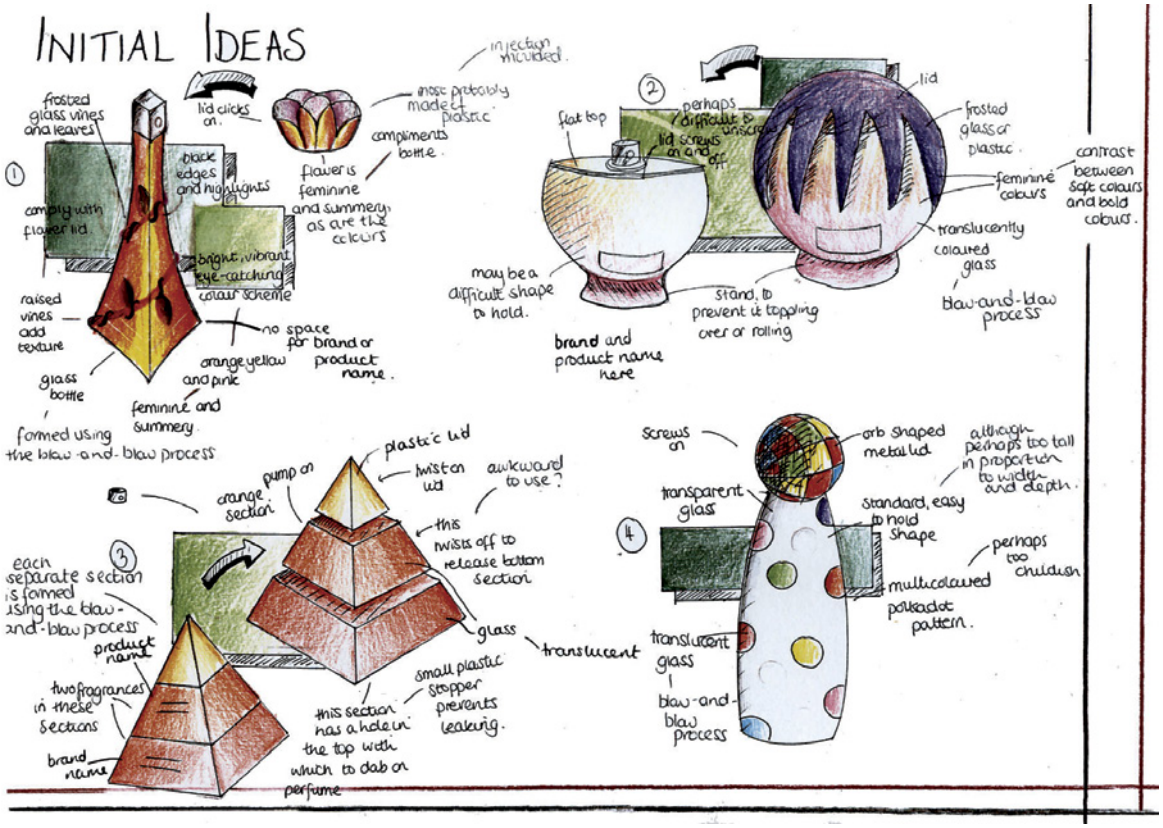
The design specification is arguably one of the most important documents in the design process. It should sum up the findings from focused research and form the ideal basis for designing and reviewing the product. Therefore, several drafts of the specification should be written and reviewed before it is included in a student's portfolio.

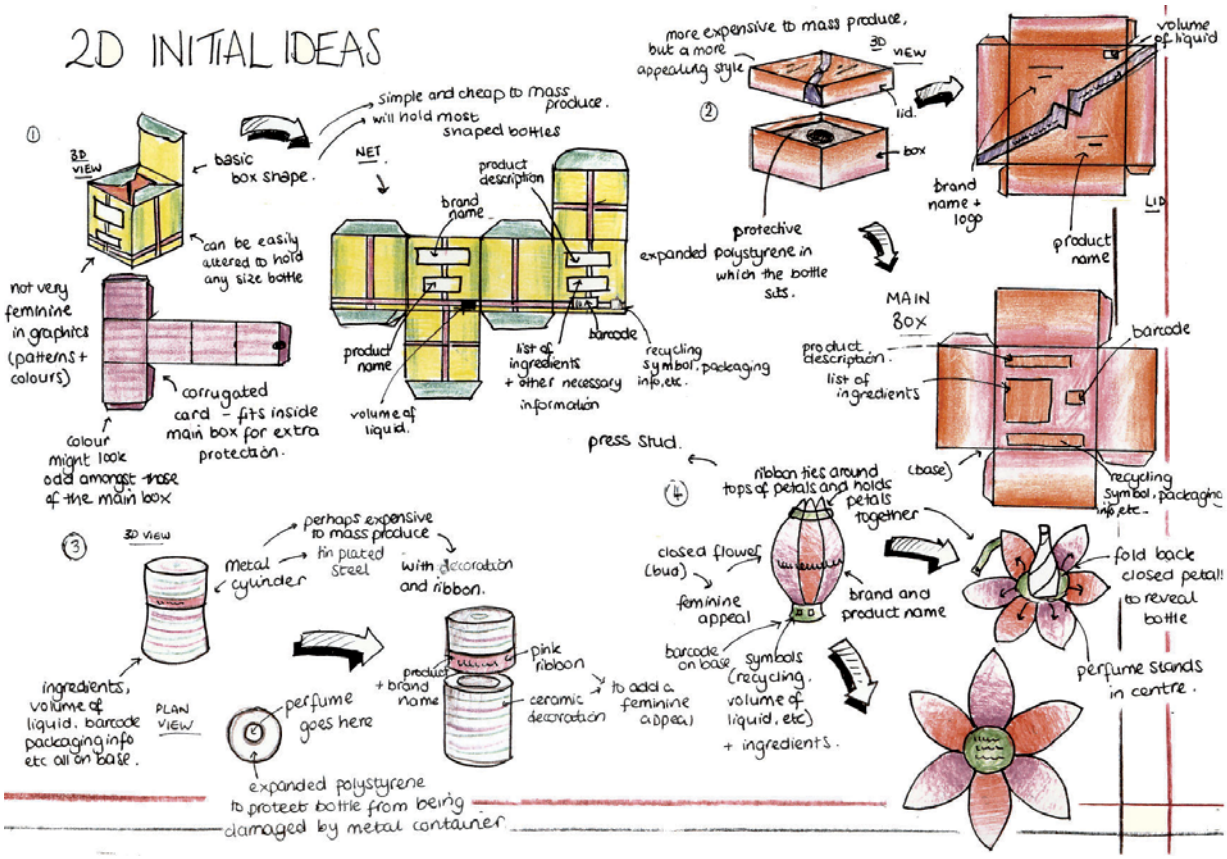
All specification points must be justified and, where possible, measurable. It is a good idea to divide the specification by using sub-headings to focus technical understanding of the product.

Here, the student has decided to write a separate specification for the perfume bottle and the box. Students do not need to produce both a 2D and 3D outcome but in this case the student considered them to be inextricably linked.

Design

TASK: 2.1 Initial ideas





Moderator comments

Teachers should feel very comfortable with this task as it is a fundamental aspect of the creative design process. Edexcel would expect to see 'busy' design sheets that have several **different** annotated design ideas rather than many sheets of repetitive ideas. Student annotation comments on technical issues relating to the initial design specification as well as descriptive personal comments on aesthetics.

Although it is not necessary to produce both a 2D and 3D outcome for graphic products anymore, this student feels that a perfume bottle and its packaging are inextricably linked and is, therefore, tackling both elements.

Task 2.3: Communication is evidenced throughout this stage and is the ideal opportunity for students to demonstrate their creativity and flair for graphics. A range of communication techniques should be used including different drawing styles, media and the use of ICT where applicable.

TASK 2.2: Review

Third-party feedback: I asked the class what they thought of my initial design ideas:

Design Number	Strengths	Weaknesses	Possible Improvements
1	great summer colours original design appealing to target market	lid might be too 'over-the-top'	simplify the lid, perhaps continue the vine pattern around the lid
2	colours look great original design	could be awkward to use and hold	
3	original idea of two fragrances summery colours	perhaps awkward to hold	smooth the edges to make it more comfortable to hold
4	fun and original shape	childish - may not appeal to older women	a more sophisticated colour scheme
5	good shape to hold appeals to target market lid compliments shape	bland colours	variety of colours
6	feminine idea	perhaps too childish and slightly awkward to hold whilst using	could use an atomiser spray
7	colours and design appeal to target market	could be awkward to hold	make the bottle taller and thinner

Testing against the specification

Design Number	Strengths	Weaknesses	Possible Improvements
1	• Being made of glass, the product successfully creates a barrier to prevent contamination of the its contents • Being frosted glass, it does not allow the quality of the contents to deteriorate due to exposure to sunlight • A simple pump mechanism allows the perfume inside the bottle to be easily dispensed • The colour scheme, graphics and general aesthetics of the product would appeal to my chosen target market • The product being made of glass would allow a high quality finish	• Space in which the brand and product name should be placed has not been marked, and the intricate pattern may not leave enough space for these names to be incorporated into the design • The straight edges and pointed corners may not necessarily be a safety hazard to the consumer, but may cause difficulty when holding and using the product • Although it complies with the aesthetics of the bottle itself, the lid may be too extravagant, and may not appeal to all of those included in my target market	• Alter the raised vines on the outer of the bottle so that space for the brand name and product name becomes available • Round off corners and edges to ensure easier handling for the consumer and less risk of harm to the consumer • Make the lid more subtle, perhaps by continuing the pattern which is around the bottle
3	• Being made of glass, the product successfully creates a barrier to prevent contamination of the its contents • Being translucent glass, it does not allow the quality of the contents to deteriorate due to exposure to sunlight • Potential contrast between materials (plastic and glass) would provide texture and variety to the bottle • A simple pump mechanism (on the orange component) allows the perfume inside the bottle to be easily dispensed, as does the hole in the red component • A combination of two fragrances within one product gives this product a unique selling point (USP) – good value for money	• The product may prove difficult to use and handle due to the shape and the straight edges and sharp corners • When the orange component is removes, there isn't a way to fix the lid onto the red component in order to protect it • Colour scheme is slightly bland **IDEA 3 SEEMS TO HAVE MORE POTENTIAL FOR DEVELOPMENT THAN THE OTHER TWO. THEREFORE, I WILL USE IDEA 3 AS THE STARTING POINT FOR THE DEVELOPMENT OF MY PERFUME BOTTLE. I WILL ASLO INCORPORATE THE BEST BITS OF OTHER DESIGNS.**	• Smooth the edges and round off the corners to make handling easier • Add a screw top to the red component so that the lid can be screwed onto here • The above would mean a small plastic cap would be necessary for the orange component, to protect it when it is separated from the base • Add graphics or raised parts onto the components to add texture and make the design less plain
4	• Being made of glass, the product successfully creates a barrier to prevent contamination of the its contents • A simple pump mechanism allows the perfume inside the bottle to be easily dispensed • The product being made of glass would allow a high quality finish • Simple, standard shape makes the product easy to hold	• Space in which the brand and product name should be placed has not been marked, and the pattern may make it awkward to place these names, and may make them difficult to incorporate • Transparent glass means to contents of the bottle may deteriorate in quality due to exposure to sunlight • The colour scheme of the bottle may prove too childish for the liking of my target market	• Make space on the bottle (by removing or repositioning the polka dots) for the brand and product name • Make the glass frosted or translucent as opposed to transparent • Change the colour scheme - perhaps even the pattern itself – to something more feminine and sophisticated

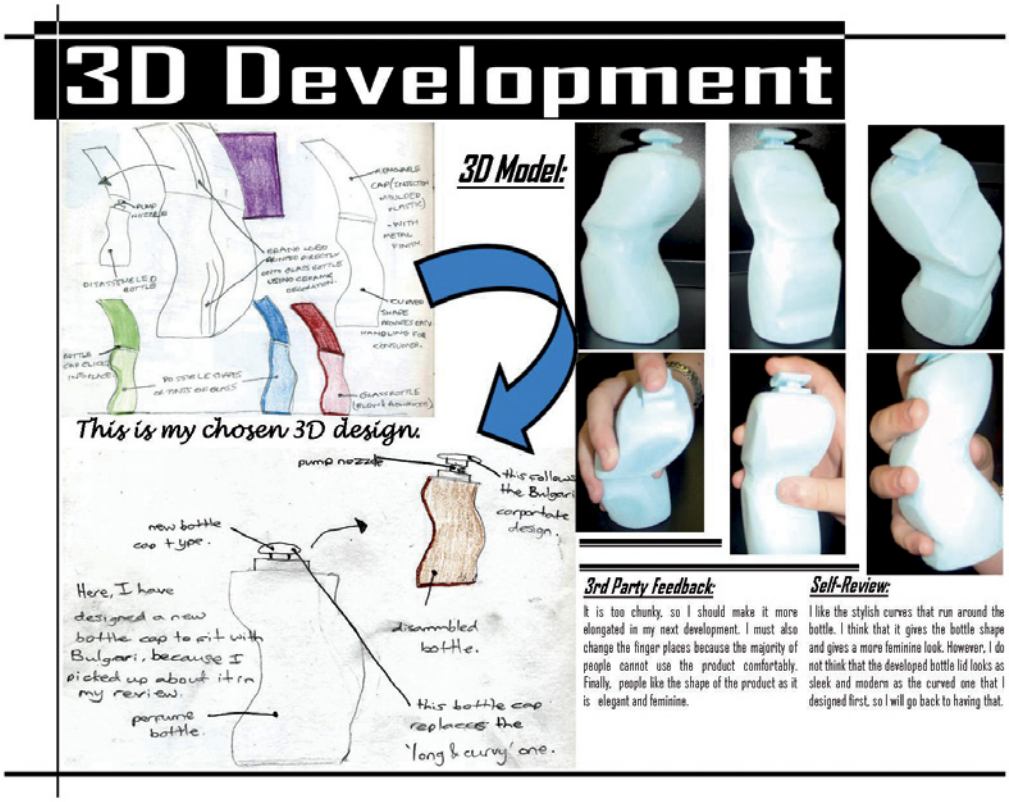
Review

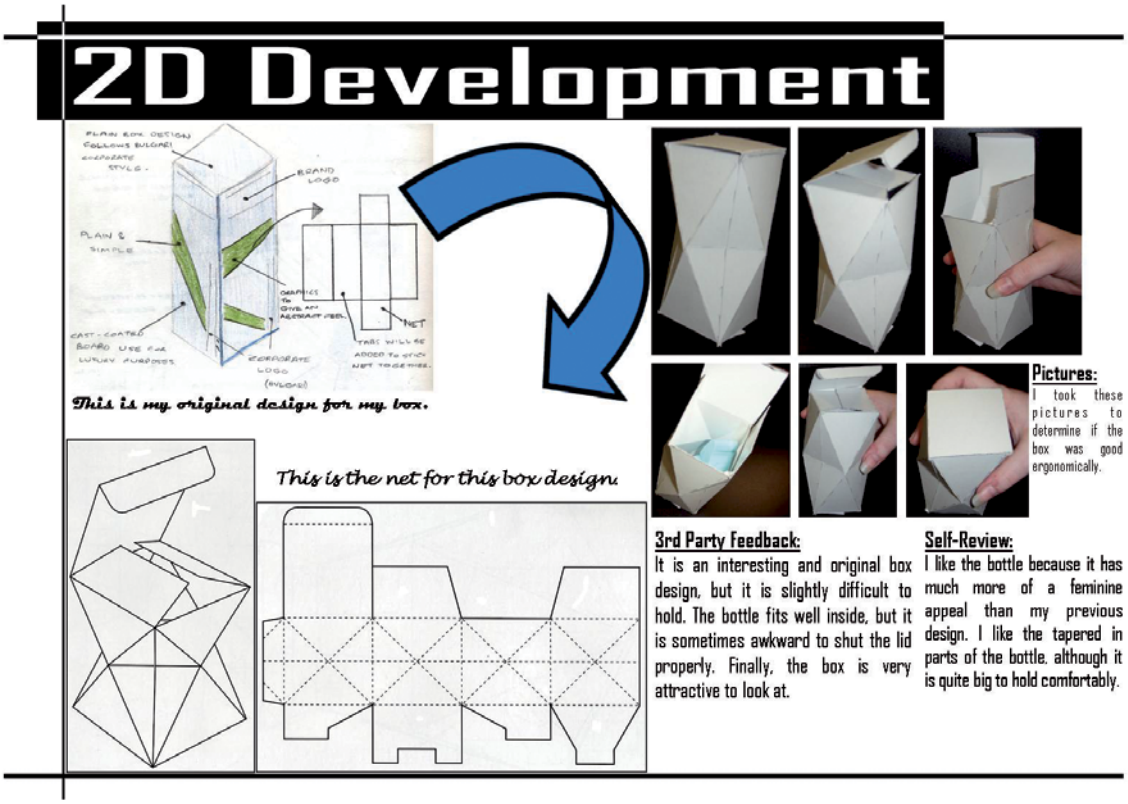
Moderator comments

Once all initial design ideas have been presented, it is important for students to formally review their effectiveness and determine which one has more potential to develop in detail. Here, the student has asked for third-party feedback from peers on a number of the initial design ideas and presented the key findings. The main aspects of the design specification have also been objectively considered using positive and negative factors before deciding on the best idea to develop.

Develop

TASK: 3.1 Development



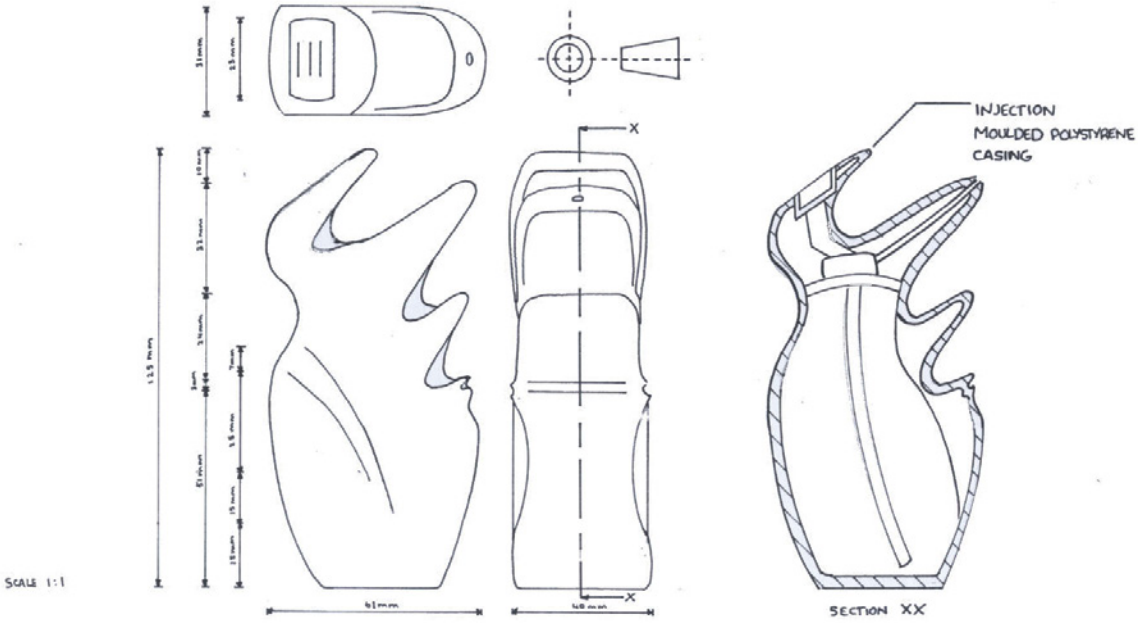


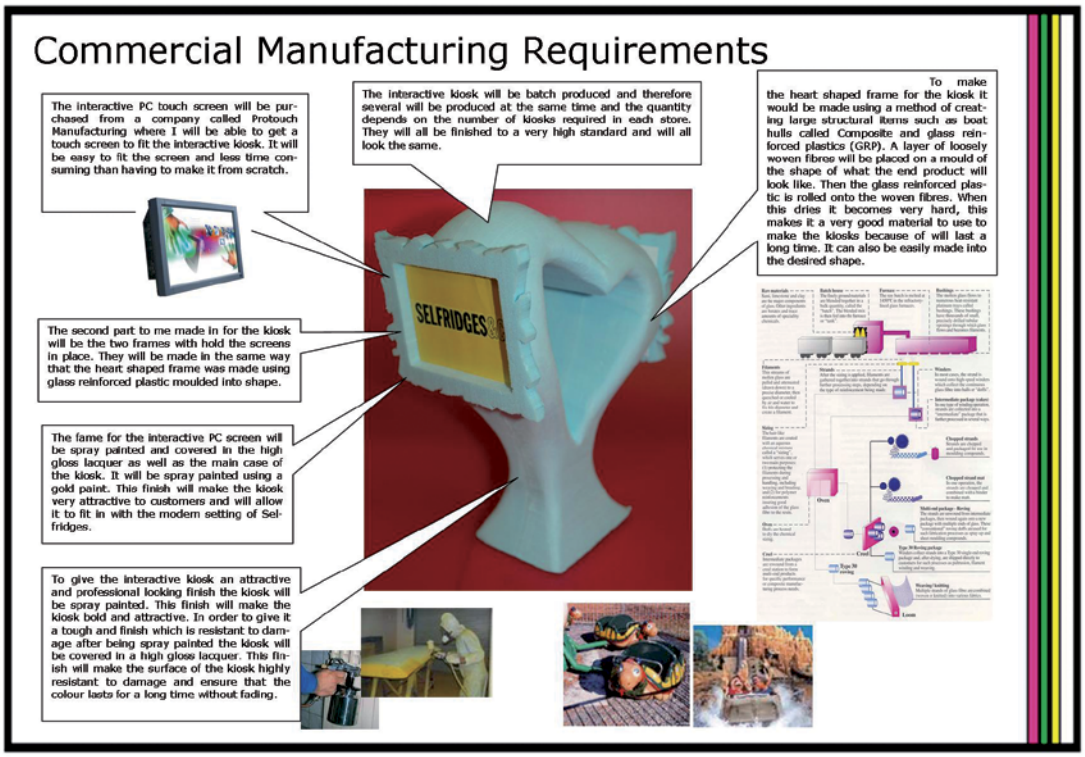
Examiner comment

Students often find the development stage difficult. This is where Edexcel expect them to focus upon one design and develop it in detail addressing the technical issues as well as cosmetic refinements. Styrofoam models are a quick and easy way of gaining important feedback on the development of 3D designs and card modelling for 2D designs. A 3D model can tell you more about the effectiveness of a design than a 2D sketch on a piece of paper ever can.

Here, the student uses a development cycle of design, model and review to progress the design further. Third-party feedback is also sought where the physical handling of a model can be used to great potential.

TASK 3.2: Final design



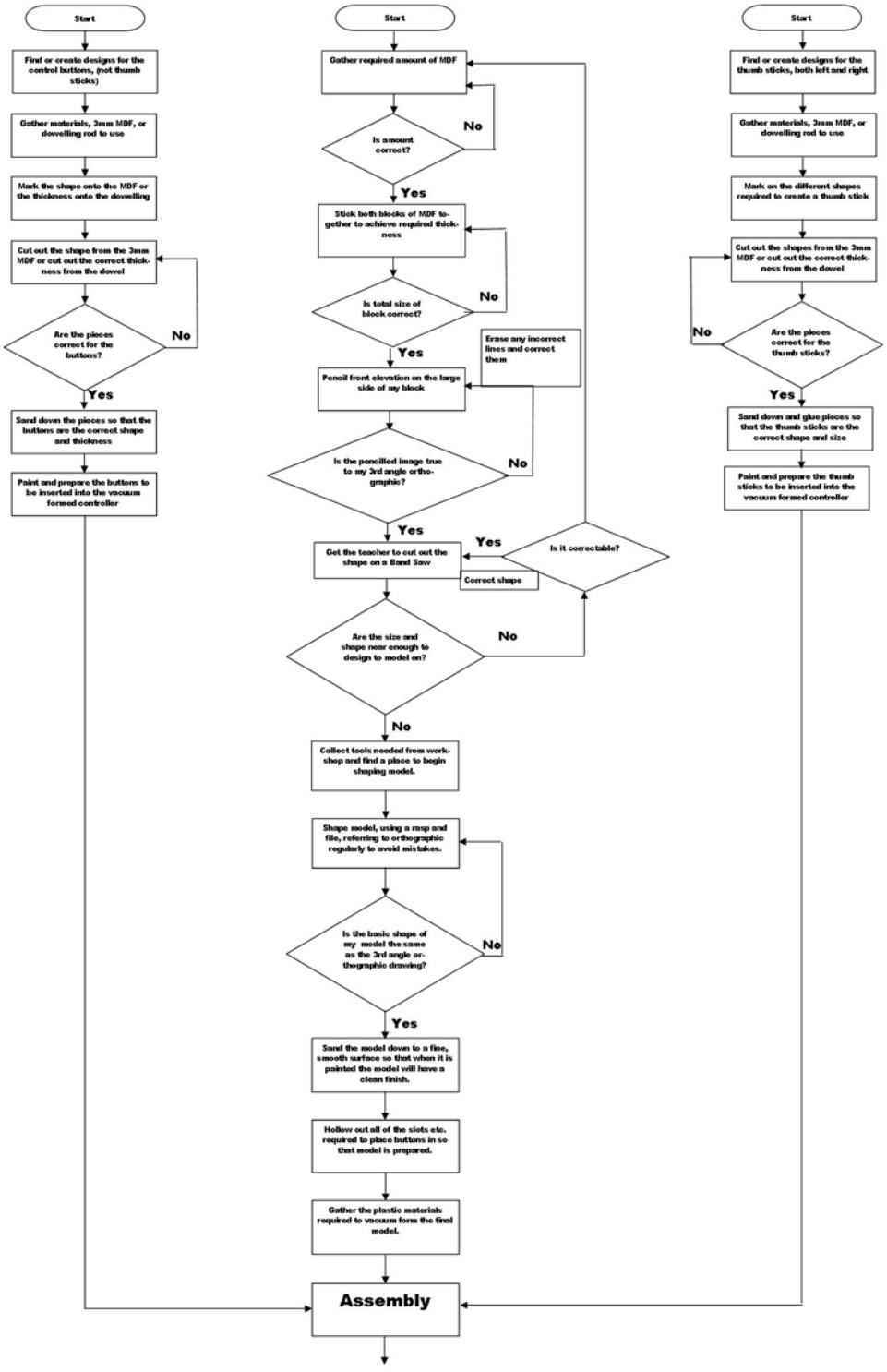


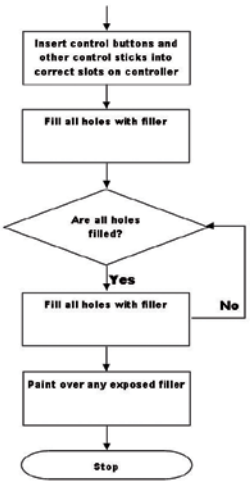
Examiner comment

At the end of the development stage students should present their final design in a manner which communicates its intentions effectively. This could be done in a number of ways including detailed working drawings with annotations regarding materials and constructional details (cross-sectional views) and an outline of how the product would be manufactured in 'real-life' using commercial and industrial methods.

Plan

TASK: 4.1 Production plan





Task	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	Hour 9	Hour 10	Hour 11	Hour 12	Hour 13	Hour 14	Hour 15
Create designs for control buttons and thumb sticks															
Gather all materials required for the controller, buttons and thumbsticks															
Cut out correct shapes for buttons from 3mm MDF or dowel															
Stick 18mm MDF blocks together and wait for them to dry															
Pencil front view onto top of block and get teacher to cut out on the band saw															
Ensure that the shape is correct															
Collect tools required to sand dowel, smooth and shape the whole model															
Begin to shape the model, so that all major features are apparent															
Sand model down to a smooth finish															
Shape smaller details I.E. button hollows															
Gather the plastic materials required to vacuum form model															
Vacuum form model and allow plastic parts to set															
Sand buttons down so that they will fit into holes on model															
Sand down control sticks so that they will also fit into main model															
Paint buttons and control sticks and allow them to dry															
Glue all pieces in place and allow to dry															

Examiner comment

The production plan can comprise of two main elements; a flow chart and a Gantt chart. Students must complete a detailed flow chart that covers all of the main stages of production and clearly identifies points at which quality control can take place. The Gantt chart is to plan manufacturing stages against time.

Make

TASKS: 5.1 Quality of manufacture and 5.2 Quality of outcome

Examiner comment

It is really important that students provide detailed photographic evidence of the making process. Obviously, a moderator cannot be in the room when students are making their models so they must document all stages in order to fully illustrate the amount of work that they have put into their model.

Here, in these selected sheets, the student has provided evidence of the main stages of manufacture. It is clearly apparent that the model did not simply appear and that a wide range of skills and processes were implemented.

TASK 5.3: Health and safety will be assessed by the teacher and no separate evidence is required in the student's portfolio. Some students, however, may wish to flag up H&S issues as additional annotations to their making photographs where appropriate.

Test and evaluate

TASK: 6.1 Testing and evaluation

Testing Against the Specification

Specification Point	Have they been met?
• Fulfil packaging requirements by presenting the perfume aesthetically well for marketing purposes.	The bottle graphics and colour schemes comply with those on the box, and both have a suitable feminine appeal for my target market group.
• Meet functional requirements of the contents and create a barrier to prevent contamination of the contents, for example using glass (which does not contaminate) and a translucent finish (which prevents the sun from damaging the contents of the bottle).	Although my prototype is made of MDF, my actual product would be made of coloured glass, providing an excellent barrier against contamination and a translucency which protects the product inside from damage by sunlight.
• Contain perfume for easy dispensation and use by the chosen target market so as to appeal and be effective.	The pump and atomizer are suitably placed making them easy to use. However, they are slightly small, and this may make handling difficult. The product might be improved by making the pump larger, particularly as it splits in two.
• Incorporate the brand name 'Ralph Lauren', and must have a suitable product name to represent the product well.	Spanning over two faces of the bottle is the brand and product name; these are clearly visible. Also, the product name being 'Isis' represents the shape and style of the bottle itself. Isis is an Egyptian name and has meaning of femininity, sexuality and love – the exact message I wish to portray to my target market group. 3rd party Review: "I think the name is original and the name matches the product shape well."
• Be attractive to its target market and have a style and set of graphics that comply with the preferences of my target market, so as to attract the attention of the consumer and to maintain an aesthetically pleasing quality.	The style and graphics are sophisticated and feminine, and definitely stand out from the main body of the bottle - black against pastel shades of mauve and turquoise. Vine-like patterns and intricate detailing would appeal. 3rd party Review: "the design is feminine and is unique and will appeal to females".
• Have a colour scheme suited to the gender, lifestyle and general preferences of the target market, to ensure that the market can easily identify that the product has been designed with them in mind.	The colour scheme is unique, and despite consisting of pastel colours with black detailing, the two different colours contrast, making the product attention grabbing. The colours are both feminine, but are subtle so as not to look garish. 3rd party Review: "the colours go well together and are very feminine. The black gives a defined look of elegance".
• Be unique, so as to compete with other products that are currently available on the market.	The product consists of two separate bottles containing two separate fragrances, which is a unique selling point. The graphics and colours are also eye-catching, and the combination of pink and green is a rarity in such a huge market. 3rd party Review: "I haven't seen any other perfume like this on the market. It is unique".
• Be mass produced for wide availability to the target market and to satisfy consumer demands.	Using the blow-and-blow process, the product can be easily (and relatively cheaply) mass produced for wide availability. This is how the actual product will be manufactured.
• Be produced using the 'blow and blow' process, as it is suitable for mass production.	For the production of the actual product (not the prototype), the blow-and-blow process will be used to allow for efficient mass production.
• Be made to a high quality finish from suitable materials for durability and an aesthetically pleasing finish.	Glass allows a high quality, both in use/handling and in terms of aesthetics. Glass is also durable, being resistant to mechanical shock, and provides a long-lasting barrier against product contamination.
• Be subject to quality tests and inspections using quality control systems to ensure that the consumer is receiving a product at the highest possible quality.	The prototype has not and will not be subject to inspection or testing, but the actual product will be randomly sampled and inspected to ensure it remains within specific tolerances (regarding bottle size and capacity).
• Be recyclable (glass is recyclable) in order to be 'environmentally friendly'.	The actual product will be made of glass, except for the pump and ferrule which will be made of aluminium. However, both materials are recyclable, so the product can still be considered 'environmentally friendly'.

Evaluation

Good Points/What Went Well:
The model looked a lot better than I had imagined during the manufacturing stages, and although it doesn't necessarily look exactly as it does in the isometric or development drawings, it still meets the specification on most points.
I think that throughout the manufacturing process, I managed my time well, as I finished with time to spare. I also think that the product is generally of a high quality, particularly the fact that I achieved such a smooth finish using the files and glasspaper, and that the product was sprayed well to achieve the desired paint effect.
The unique selling point of the product (the fact that it consists of 2 bottles which form one product) has worked really well, and although there are small problems with the way in which the bottles are held together, the general conception is appealing.
The model is well detailed, and although I couldn't find the exact colours from my design concept, I managed to find two colours that were relatively similar, and this colour scheme and the model itself still appeal to my target market group.

Bad Points/Problems I Encountered and How I Dealt with Them:
During the manufacturing process, I tried a number of methods for certain stages of manufacture, and often had to alter my initial plans.
For example, I originally planned to make the raised pattern from polypropylene, but the design was too intricate and difficult to cut out. So, instead, I made the raised pattern from thick card, which I primed afterwards. Also, this raised pattern had to be thicker and less intricate than initially planned, as it would have kept bending and breaking.
I also tried to hollow out my MDF lid as opposed to vacuum forming one from PVC, to see if it might allow for a higher quality finish. However, when I tried to use the pillar drill or the dremmel to hollow out the MDF lid, it just split the sides, so I decided in the end that a vacuum formed lid might prove to be the easier option.
Even the vacuum formed lid proved difficult, particularly as when I tried to use the gerbil to cut the excess PVC off the base of the lid, the lid itself split, and had to be vacuum formed again. This time round I used a scalpel and glasspaper to smooth the edges on the base of the lid.

Another problem I encountered during the manufacturing process affected the overall size of my product. Whilst smoothing down the product, I accidentally caught the corner of the product with the end of the file, and a small part of the corner chipped off. To ensure that this would be noticed, I had to file off a small amount from around the whole product, reducing the product in size by a few millimetres, but concealing the mistake.
Also, when making the pump, I put it in a vice to smooth it down, and accidentally tightened the vice too far, which split the MDF. I had to make the pump again, and this time I was more careful.
Another setback with the pump and ferrule were the initial measurements, which were too small, and had to be altered. Rather than the ferrule being 5x20x20mm and the pump being 10x10x10mm, I made the ferrule 5x25x25mm, and the pump 15x15x15mm. However, despite these alterations, the pump is still slightly too small, which makes it difficult for use.
The final problem I encountered was the fact that I couldn't find the actual colours which I used during the design of my final model. Instead I had to use similar colours, replacing turquoise with green and mauve with pink.

Further Improvements:
If I were to make the 3D product again, I would ensure that I designed using colours which I know I can buy easily. I would also think more about anthropometrics and how the size of the pump and ferrule might be more suited for use by my target market group.
I would also consider making a lid with a mechanism which holds the two bottles in place, perhaps a screw on lid, or one with a click-lock mechanism.
I would also use printed vinyl stickers instead of adding detailing by hand, to ensure that the pattern and graphics on the bottle were identical the whole way round, as parts of the design on certain faces differ from those on others.
Finally, I would spend more time assessing my choice of materials and tools before beginning the manufacturing process, as this would have allowed me to know that polypropylene is not a suitable material for cutting out thin and intricate templates, and that a pillar drill is not the best option when hollowing out an MDF lid.

Review:
"The design is original, and appeals to the target market group".

Review:
"The model has a smooth finish, the colour scheme works well, the design is maintained throughout the whole bottle, the paint finish is to a high quality and the idea of two bottles is unique. However, the pump is too small and this makes it difficult to use. Also, the lid on the prototype bottle doesn't hold the two bottles together. The design is not perfectly symmetrical".

Examiner comment

It is important that final products are thoroughly tested. In this example, the student has completed a traditional combined design and make activity so the original design specification can be used to measure the performance of the final design and model.

However, if teachers set separate design and make activities then a manufacturing specification should be given to students against which they can test their final model. Students can also set their own criteria for testing their models in order to determine quality and performance issues.

An objective evaluation will always consider the positive and negative aspects of the whole design process and suggest areas for further development. Third-party feedback is invaluable in testing the opinions of the target market group.

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