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# **GCE EXAMINERS' REPORTS**

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**GCE (LEGACY)  
DESIGN AND TECHNOLOGY  
AS/Advanced**

**SUMMER 2018**

Grade boundary information for this subject is available on the WJEC public website at:  
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### **Online Results Analysis**

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### **Annual Statistical Report**

The annual Statistical Report (issued in the second half of the Autumn Term) gives overall outcomes of all examinations administered by WJEC.

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**DESIGN AND TECHNOLOGY**  
**General Certificate of Education (Legacy)**  
**Summer 2018**  
**Advanced Subsidiary/Advanced**  
**DT1 – PRODUCT DESIGN**

The paper was well received by candidates and the performance was consistent with previous years with regards to Section A, however Section B responses were considered to be better than had been shown in previous years. This indicates that centres have acted upon the advice given last year addressing the need for candidates to show more in-depth subject knowledge and its application to Product Design within their essay responses.

Candidate's use of terminology and technical language together with knowledge of materials and manufacturing processes is again improving with a number of scripts demonstrating this in their responses within Section A.

In Section B there is a clear indication that the weaker essay responses generally require more structure and planning, whilst ensuring that ALL elements of the question are covered. The better responses also show candidates using products as examples to illustrate the context of the question.

Centres should continue to advise candidates to use the mark allocation indicated at the end of each question to guide the depth of response required and manage time effectively.

Centres should also continue to advise candidates to read the front of the examination paper carefully and add the correct number of questions along with the question number to their answer booklet in the order they are attempted.

Centres should also be advised to remind candidates that answers could be amplified with sketches and/or diagrams where appropriate.

**General points**

- There were very few instances of rubric where candidates answered all questions on the paper.
- Candidates should be advised to read the question carefully in order to ensure that all elements are understood and are also included in their response.
- Where candidates are asked to select a number of responses from the question, there are an increasing number of candidates answering the entire question instead. E.g. select two responses from three.
- There were a number of instances where the responses throughout Section A were not detailed enough to gain the higher level of marks.
- Well-planned and structured responses (particularly in Section B) score well. These responses contain clear, and specific details relating to the question. They also show accuracy in terms of spelling, punctuation and grammar. However the quality of the stronger responses in Section B are generally better this year. The weaker candidates still require more structure and planning in order to organise information clearly and coherently.

- The length of responses in some cases were too short to show any real depth of understanding and subject knowledge.
- Candidates should be discouraged from using bullet points and extended prose should be used within Section B essay responses.
- Generic terms, particularly in naming materials (together with their characteristics or properties) are still used by candidates and are therefore not given credit. E.g. wood, plastic, metal, as apposed to oak, polypropylene and steel.
- Section A responses continue to improve however the weaker candidates continue to provide very brief responses in Section B and are consequently not achieving beyond Level 1. This indicates a decrease in candidate's breadth and depth of subject knowledge in Product Design.

### **Section A**

- 1. PTFE, Polypropylene, Kevlar and Polyamide (Nylon) have specific properties. Select two of these materials and describe the specific properties that make them suitable for use in named products. 2 x [4]**

This was one of the more popular questions and was generally answered very well. Candidates could describe the specific properties of named products in their responses. Most candidates described two of the materials, although there were a lot of candidates who selected all four materials instead of two. The weaker answers focused on the use of the materials and did not describe the specific properties that make them suitable for the products they had chosen. There were some very good responses to this question, which allowed some candidates to illustrate their in-depth knowledge and understanding of materials. Weaker responses were just very descriptive but did not provide any valid points for their selection and also did not link any examples of products to their answers.

- 2. Explain the difference between Quality Control (QC) and Quality Assurance (QA) when used within the Total Quality Manufacturing Principle (TQM). [8]**

This was one of the more popular questions and was generally answered very well. The majority of candidates understood the terms Quality Control (QC) and Quality Assurance (QA). The stronger candidates were able to explain the difference between the two but the weaker responses just focused on defining the terms and give examples of different scales of production. Very few candidates included any reference to the Total Quality Manufacturing Principle (TQM).

- 3. Specific stages of production are used within industrial and commercial practices. Name and explain any two stages of production. 2 x [4]**

This was a popular question of the exam paper. A lot of candidates misread this question and answered the question in terms of types of production instead of the stages of production. A lot of candidates who did understand the question did not provide detail in their explanation of their chosen stages of the production process. In contrast to this there were some very good responses displayed in depth knowledge and understanding of what the question was asking. The question was looking for explanations around sourcing raw materials, converting the raw materials into suitable forms for use, transporting materials to the production line, shaping forming and production of parts, assembly, finish, packaging and transportation for sale. Candidates had to name and explain any two of these. A lot of responses described scales of production and not the stages as asked for in the question.

**4. Concurrent engineering is a process used in the manufacture of products.**

**(a) Explain what you understand by the term concurrent engineering. [4]**

**(b) State two advantages of concurrent engineering to the designer. 2 x [2]**

This was a very popular question and most candidates did understand and could explain the term concurrent engineering. The term was very often put into context using examples. Generally the first part of the question was answered well but the advantages of concurrent engineering were often very vague and required further explanation. The stronger answers provided detailed answers whilst the weaker responses just described the term but did not relate this to any advantages to the designer. Simultaneous work in all design areas therefore speeding up the design process and getting the product to market quicker were the key points to explain further here.

**5. Planned obsolescence is a feature of some everyday products.**

**For a named product:**

**(a) Describe two benefits of planned obsolescence to the consumer. 2 x [2]**

**(b) Describe two benefits of planned obsolescence to the manufacturer. 2 x [2]**

This was a very popular question. The majority of candidates were able to explain what planned obsolescence is, but the description of benefits to the consumer and manufacturer were not always provided in the weaker responses. The best responses provided an explanation of the term and gave clear benefits to both consumer and manufacturer and a lot of candidates used examples of products to illustrate their answers. This approach allowed them to gain very good scores with this question.

**6. Anthropometric data is used in the design of products.**

**Explain in detail how designers have successfully used anthropometric data in two different named products. 2 x [4]**

This was not a very popular question. A lot of candidates could explain anthropometric data and could relate its application to two named products. The best responses provided detail and linked their explanations to anthropometric data. They also showed a clear understanding of the term as they also made reference to ergonomic factors and could distinguish between the two. The weaker responses provided answers that were about ergonomics rather than anthropometrics. The weaker responses also did not use any named products to explain their answers.

7. **Density, electrical resistance and thermal conductivity are terms are used to describe the physical properties of materials:**

**(a) Explain the meaning of any two of these terms. 2 × [2]**

**(b) Explain how these properties benefit two named products. 2 × [2]**

A variable response in terms of the whole of the question. This was not a very popular question but there were some very good responses from candidates who chose to answer this question. They explained the meaning of two of the terms and linked their detailed explanations to examples of named products. The weaker response provided explanations of the terms, and in some cases all of the terms instead of two. The properties and benefits were often omitted from their answers and did not include any reference to named products.

8. **(a) Describe the difference between primary and secondary design specification criteria. [4]**

**(b) Give two primary and two secondary specification criteria, explaining how they are important to a named product. 2 × [2]**

This was surprisingly the least popular question within section A. A lot of candidates again did not read the question properly and their responses focused on primary and secondary research rather than the specification criteria. The stronger responses from candidates described primary and secondary specification criteria and the differences between the two were often illustrated with named products. Some of the weaker responses focused on the explanations but not the differences and the named products were not included which resulted in these candidates losing marks here.

## SECTION B

9. **“ Manufacturing is more than just putting parts together. It is coming up with ideas, testing principles and perfecting the engineering, as well as final assembly. ” James Dyson**

**Discuss this statement in relation to any specific named product. [30]**

This was the most popular question in this section where a good number of candidates scored well. Candidates could clearly discuss the statement and related it to a specific named product or products. This was very often Dyson's products. The best responses provided detailed responses to all parts of the statement and these candidates provided clear evidence of planning their answers, which resulted in well-structured responses. The better responses gave information about modeling and testing and its importance in developing the idea to make it as perfect as possible. Some included explanations about physical models and also the use of CAD modeling to speed up the design and manufacturing process. The best responses also related personal opinions backed up with reasoning and factual information to

justify their thoughts and provide discussion in their answers. This was quite a difficult skill but was very often well executed. The weaker responses just provided information about Dyson and his products but lacked any real discussion relating to specific products. Quite a few candidates scored marks in the highest mark ramp for this question. Those within the higher mark ramps wrote essays that were well planned, showed structure and also were able to show their in-depth knowledge within this question.

**10. When designing products, designers consider the implications of materials selection and product disposal.**

**Discuss the importance of these areas in relation to product design. [30]**

This was the least popular question in this section. The best responses were well planned and focused on discussing the validity of the question using a range of products. The better responses also had extended writing and used key technical terms and vocabulary carefully executed using grammar and punctuation. These candidates scored well. The weaker candidates provided much shorter responses that clearly lacked planning and missed a lot of key points relating to the question. A good number of students interpreted this in their own way and made their response illustrate their own opinions and beliefs. There were some excellent responses to this essay question and this was where planning was evident prior to the candidate's answer giving it structure and the use of technical vocabulary enabled candidates to access the higher levels of 3 and 4. Weaker response focused on describing how materials are selected and disposed of but their responses lacked explanation and did not relate this to product design as the question asks. The best responses focused on all three parts of the essay question rather than the weaker responses that focused on only one or two of the product design, the implications of material selection and the eventual disposal of the product and issues relating to the environment.

**11. Designing and making products recyclable, repairable and with a longer life expectancy are essential to minimise environmental impact.**

**Discuss this statement in relation to the future of designed products.**

**[30]**

This question was the second most popular question in this section. Generally, products such as mobile phones, iPhone and iPad were used in responses. The question focuses upon designing and making products recyclable, repairable and also extending product life in order to minimize environmental impact. The best responses broke the question down into sections and related everyday products to each. Also the better responses explained the benefits of recycling products and designing a product so that it can be repaired easily rather than just being thrown away. This is a four-part essay and all parts should be included in the response. Weaker responses only focused on one or two parts of the question and did not really discuss the statement making their responses more descriptive and quite short. The better responses showed a clear understanding of the question. The statement was generally discussed well within their answers. A lot of candidates were aware of recycling and materials selection in terms of sustainability and environmental impact and could clearly link these to named products. There were some excellent responses to this essay question and this was where planning was evident prior to the candidate's answer giving it structure and the use of technical vocabulary enabled candidates to access the higher levels of 3 and 4.

**DESIGN AND TECHNOLOGY**  
**General Certificate of Education (Legacy)**  
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**Advanced Subsidiary/Advanced**  
**DT1 – FOOD TECHNOLOGY**

With this being the legacy paper for Food Technology the year's cohort was small. Many candidates answered the questions well using good grammar, spelling and punctuation and were able to give both relevant and appropriate answers to their selected questions in both Section A and Section B. However, some candidates were entered for the examination that appeared not to have adequate subject knowledge to enable them to be successful; some displayed a very basic knowledge and understanding. It is evident that many candidates are inexperienced in answering the extended essay questions and should be made aware of the importance of a focused response. Candidates should be encouraged to practice examination questions under timed conditions and should be taught to refer to the mark allocation for each question. The majority of candidates this year answered the required quota of questions. Centres should advise candidates to read the front of the examination paper and to record question number to their answer booklet in the order that they are attempted on the front of the answer paper.

1. **Outline** the difference between Quality Control and Quality Assurance when used as Total Quality Manufacturing principles in the food industry. [8]

Few candidates chose to answer this question. Some of the candidates who chose to answer it were confused between QC and QA. Centres should encourage candidates to link their coursework tasks to the examination paper which enable them to transfer knowledge gained during practical work.

2. Specific stages of production are used within the food industry. These include sourcing of materials, the buying cycle, forward ordering, storage, processing, assembly, finishing, packaging/labelling and transportation.

**Explain** two of these stages giving specific food related examples. 2 × [4]

The candidates who answered this question were able to explain some of the required points such as sourcing materials, storage of materials and products. Few considered processing or packaging.

3. (a) State the difference between primary and secondary design specification criteria. [2]  
(b) Write **three** primary specification criteria relevant to a named food product. 3 × [2]

Many candidates who answered this question were confused between primary and secondary design specification criteria. One teaching strategy that centres could adopt is to ensure that candidates are able to link coursework processes to the examination paper; all candidates will have completed primary and secondary research during the coursework process; ensuring that they really understand each would enable them to access such questions on the examination paper.

4. Food Materials are subjected to heat treatment in order to create desirable sensory characteristics in the end product

**Describe** what happens in two of the following processes: 2x [4]

(a) Caramelisation

(b) Coagulation

(c) Gelatinisation

This was a popular question; the majority of candidates described what happens in the processes of coagulation and gelatinization. Most candidates were able to access marks for each process.

5. (a) **Define** the term *Just in Time(JIT)* when used in food manufacturing [2]

(c) **Discuss** three benefits of JIT to the food manufacturer 3 x 2]

Several of the candidates who answered this question were confused between other production methods. (Some candidates explained the benefits of mass or continuous flow production and consequently were unable to secure marks). Centres should encourage candidates to refer to the stem of the question and to interpret clearly the key words eg JIT, discuss, benefits. Centres are advised to ensure that production methods are covered in detail during revision time.

6. (a) **Outline** the main functions of protein within the diet [2]

(b) **Explain** the differences between high and low biological protein. 3x[2]

Few candidates who answered this question were able to give detailed responses, confusion between HBV and LBV was evident in many answers. Studying nutrition is an essential part of the specification and centre are advised to ensure candidates are fully prepared.

7. **Discuss** how the design of some new food products is influenced by current dietary guidelines. [8]

This was a popular question, however many candidates who answered this question showed a lack of awareness of basic details e.g. few discussed the Eatwell Guide. Centres are advised to ensure that this is covered in detail and that they discuss with candidates the changes and reasoning behind developing Eatwell Plate into the Eatwell Guide. The FSA have excellent resources available that will assist teachers in delivering this material.

8. During food manufacturing, different processes and procedures are undertaken to ensure that the products arrive in the supermarkets in the required condition.

**Outline** the safety factors to be considered when producing food products containing meat or fish for supermarkets. [8]

This was a popular question; with many candidates achieving good marks. The majority of candidates described the processes and procedures required to ensure that products arrive at the supermarkets on time. It was particularly pleasing to see that the candidates focused on meat or fish products.

### Section B

Most candidates attempted to answer one of the essay questions. Several candidates produced good answers showing sound depth knowledge. Some candidates however seemed to struggle with the demands of answering the essay question, indicating that they had not been provided with opportunities to complete practice questions prior to the examination. Very few candidates had planned their essay and many were of inappropriate length.

9. Social, moral and ethical issues all affect the food that we eat. Discuss this statement. [30]

This was the most popular question in section B. Most candidates who answered this question covered a range of points that affect the food that we eat. Some candidates were confused or omitted to write in detail about ethical issues. Encouraging candidates to read articles from magazines and food related journals would be a teaching strategy that could be used to assist in delivering work linked to social, moral and ethical nutrition.

10. Bread products can be produced by combining a number of food materials.

**Analyse** how each of the following influences the finished bread product;

- Selection of bread flour
  - Introduction of new shapes and flavours
  - Use of raising agents
  - Bread making processes
- [30]

Few candidates answered this question. Candidates should explain how the points listed influence bread products. They could also discuss faults in bread making and explain why / how they occur.

11. Food processing is a key part of producing products that are consistently safe to eat and of a high quality.

Discuss the reasons why food is processed and outline the differences between primary and secondary processing. [30]

Some of the candidates who answered this question were unsure of the differences between primary and secondary processing. Centre's are advised to study the mark scheme and use this question within their revision programme for future cohorts. They should consider for example how food processing alters appearance, texture, nutritive values and digestibility of foods. Candidates should then proceed to explain primary and secondary processing of different food materials.

**DESIGN AND TECHNOLOGY**  
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**DT1 – Systems and Control Technology**

Please refer to Product Design report, no candidates or very few attempted the Systems and Control style questions.

**DESIGN AND TECHNOLOGY**  
**General Certificate of Education (Legacy)**  
**Summer 2018**  
**Advanced Subsidiary/Advanced**  
**DT2 - Design & Make Task**  
**Product Design and Systems & Control**

**General Comments**

A small number of candidates were entered for the *DT2 Design and Make* element this year. With the new specification now running this report highlights some aspects of the legacy work seen this year and the comments are aimed both to report on the work seen and as a tool for preparing and guiding centres within the new specification.

As in previous years we would like to congratulate centres both for the administrative aspects involved in internal standardisation and in the standard and quality of project work.

The future choice of projects will need to be carefully considered in relation to the new specification whereas; in the past some candidates undertook projects which were inappropriate at AS level. Work which provides more opportunity for effective teaching of new skills and techniques and build upon a centres strengths and facilities are an effective way forward, in which candidates are able to demonstrate high level designing and making skills and standards of accuracy, thus securing high-level marks.

E-Folios are becoming evident in a number of centres and have proved to be effective but only when supported by a sketchbook - showing rapid idea generation in a free flowing rapid style prior to further development.

Effective research and analysis enabled candidates to more thoroughly understand the task ahead and to subsequently develop sophisticated final specifications which then underpinned the entire project.

Where quality product analysis and research had been undertaken candidates showed a thorough understanding and their final specification effectively addressing the main issues of the design task.

Sketchbook work was well done and contained good evidence of the iterative aspects of candidate' design work. The creative exploration of a range of design ideas is central to this task. Good practice at this level includes both drawing and rapid modeling.

Effective detail design must have all the information needed for the product to be made by a third party and work must include all relevant dimensions and tolerances. Appropriate ICT should be used to present detailed dimensions of the final proposal to gain high marks. Parts drawings are expected if top marks are to be accessed.

Some candidates made contact with professionals and retailers to provide additional objective feedback and we would support this aspect within the new specification. End testing is a crucial aspect to help candidates to be more objective and to formulate effective suggestions for modifications.

The candidates in some centres are producing folios which demonstrate high levels of creativity with very effective use of both hand based graphical work and rapid concept modeling together with highly developed CAD and CAM.

The need for candidate's work to show increasing degrees of creativity and sophistication is one of the challenges of this specification and will be encouraged in the new specification.

Overall the standards are similar to previous years with some good work being produced. Good work will demonstrate high level design and making skills with significant progression from GCSE.

Linear approaches to designing tend to be very limiting and more flexible iterative approaches within the new specification will be more effective. Boosting idea generation by integrating sketching and rapid modeling techniques into early designing can be very effective.

Evaluating thoroughly, and getting the opinions of others, considering commercial potential and manufacturing requirements, testing by using are all valuable approaches.

We would like to thank centres for their commitment to this specification over the years which have seen some exceptional work produced by candidates. We will aim, within the new specification to carry on with this development in providing candidates with a sound foundation for further studies.

**DESIGN AND TECHNOLOGY**  
**General Certificate of Education (Legacy)**  
**Summer 2018**  
**Advanced Subsidiary/Advanced**  
**DT2 – Design and Make Task**  
**Food Technology**

Centres had provided moderators with samples of the final food product as now required for AS; there were a limited number of candidates entered. The majority of projects were displayed in A3 folders and in most instances mark sheets were well-annotated, justifying the allocation of marks clearly which aided moderation.

The quality of presentation of Food Technology coursework was very good in most instances again this year. A range of communication techniques were effectively used, including plenty of ICT for a range of uses, including digital photography, nutritional analysis, research, word processing etc. Many candidates had used a sketch book to keep some of their research, designing and jottings. The amount and quality of sketching varied, but in most cases candidates had utilised techniques and communication methods effectively to put across their ideas, even where they had not used a great deal of sketching.

The amount of detail seen in the product analysis was at least adequate in all cases. It appears that centres are offering structured support to students when completing this section of their folios. It is less common these days to see research done for research's sake. It is mostly the case that research is well-focussed and relevant. Specifications continue to be an area of weakness; still we see specifications which are too basic for this level, with only the main factors needed for the food product considered. This would serve to focus candidates' thinking better as well as facilitating the process of evaluation. In most instances, candidates seemed to have a reasonably good idea of the requirements of their target market and went on to design appropriate food products, but they perhaps need to spend a little more time working out the detail of their design specifications. There are still instances where more measurable criteria could be used.

Quick idea generation is still an area of weakness with some Food Technology candidates. Many individuals are producing only a limited range of possibilities for consideration. On the positive side, trialling was seen as part of the development process and many candidates had gained useful information from this initial practical work and were able to confidently take forward the most successful elements. Candidates were, on the whole, effective in communicating their thoughts and the decision-making processes to the reader. Planning was generally reasonably well done with fairly detailed quality control measures considered by many.

On-going evaluation was generally very good again this year with a range of techniques used, including nutritional analysis, costing, organoleptic testing etc. Testing by the target market, however, was only infrequently seen. It is always desirable, if at all possible, for the target market to be used. Several candidates had obtained useful comments on their final outcomes from an expert of some kind, in some instances an individual from the food industry.

The standard of practical work was generally good with most making dishes of the appropriate level of challenge. Food materials were well used in most cases, though innovation was not often seen. Most food products were well made and in some cases a very high level of accuracy was achieved with resulting foods being of a marketable standard. Photographic evidence was good in most instances, giving the moderator a clear indication of the standard of practical work achieved.

**DESIGN AND TECHNOLOGY**  
**General Certificate of Education**  
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**Advanced Subsidiary/Advanced**  
**DT3 – Product Design**

**General Points**

This paper was well received by candidates demonstrating a wide range in terms of quality of responses across all the set questions, resulting in a spread of marks. Candidate performance was consistent with previous years with many candidates scoring very well.

Many candidates demonstrated very good responses to both section A and section B by their breadth of knowledge, explaining their answers and justifying the reasons for their responses where that was necessary. With the new specification candidates must continue to practice short answer questions and include all the details asked for in the question.

Candidates who have been introduced to a range of different contemporary and historical products during their course clearly demonstrate the required knowledge and understanding and score well throughout the paper. Many candidates continue to demonstrate good awareness of product design and the development of specific products - this again is very important in relation to the new specification.

Within the short answer questions there were many candidates who did identify issues regarding the question but did not follow up with justifications or exemplars where that was necessary.

**SECTION A**

1. (a) Identify how radical improvements have been made to **two** different products and explain how **each** change has contributed to the improvement of the product. 2x[2]

- (b) Identify **two** reasons why a designer may have to incrementally develop an existing product. 2x [2]

Good responses were able to differentiate between radical improvements to products and incremental changes to an existing product. Responses included examples such as touch screen technology for the former and reasons such as extending product life and aesthetic upgrades for the latter.

2. Describe the advantages that rapid prototyping can give a product designer when modelling design ideas. [8]

A popular question where many candidates scored very well by describing advantages such as testing, identification of any design flaws and getting the product to market quickly. A small number of responses did not fully describe the advantages to the product designer including very brief statements only.

3. The materials chosen by designers for the manufacture of products often have a significant impact on sales.

(a) Name and briefly describe **two** specific products that have benefited from the innovative use of materials. [2]

(b) Describe the characteristics of **one** innovative material used in either product. [6]

As stated earlier, candidates who have been introduced to a range of different products during their course demonstrate the required knowledge and understanding and score well in this type of question. Those who did not score well lacked some basic knowledge of materials, their characteristics and properties, and reasons for their use in specific products.

4. Within the process of research, describe how you would analyse an existing product prior to embarking on a design task. [8]

A popular question, in which many candidates were able to describe fully the process of reverse engineering in the analysis of existing products. A significant number of responses also described the process of analysing products through looking at above the line and below the line features of products.

5. Market pull forces have a significant impact on the development of products such as smart phones.

Using a different named product, describe the developments that have taken place as a result of *market pull* forces. [8]

Responses in general did not identify a suitable product which exemplified its development due to market pull. In addition to this the responses did not clearly state how the improvements came as a result of market pull. A small number of responses however did select products which allowed them to describe improvements to materials, forming processes and improvements in function.

## SECTION B

6. (a) Explain what is meant by the term *user interface*. [2]

(b) Name a product and describe **three** design features which demonstrate the effective *interface* between the user and the product. 3x [2]

Candidate responses in general were able to explain their understanding of the term user interface and scored well. The majority of responses were also able to provide descriptions of the effective interface between the user and the product using suitable products as exemplars. However, there were some responses which did not provide the required description required to score well.

7. Outline the reasons why a manufacturer would decide to batch produce a specific product rather than use high volume production. [8]

Responses in general tended to merely describe the features of batch and high volume production – and did not outline the reasons why a manufacturer would batch produce. The candidates who scored well here outlined fully the reasons such as the need for smaller production due to seasonal requirements and the flexibility that batch production offers the manufacturer.

8. (a) Name two different project management systems. 2  
(b) Explain how one of the named project management systems is effectively used by both the designer and manufacturer. 3x[2]

The majority of responses were able to describe systems such as *Gantt charts*, *flow charts* or *critical path analysis charts* to some degree – but the majority did not explain how their chosen system is used by both the designer and manufacturer. Candidates who scored well clearly understood its effectiveness in project management.

9. (a) Name one composite material and one alloy and describe their main properties. 2x[2]  
(b) Describe how the properties of both materials have been used by designers to improve the function of specific products. [4]

Most candidates were able to identify correctly a composite material and an alloy – but many did not fully describe their properties in order to gain further marks. Subsequently their descriptions of how the properties are used to improve the function of specific products were weak with many responses failing to access the marks available.

10. (a) Describe the important features of assembly line production and of production cells. 2 x [2]  
(b) Describe the advantages of production cells to the manufacturer. 2 x [2]

This question was generally well understood in terms of the features of assembly line and cell production. The stronger responses were able to focus on simultaneous production in terms of the advantages of cell production, and also the ability of a manufacturer to monitor the effectiveness of a particular cell.

## SECTION C

A number of candidates this year demonstrated excellent responses to the essay questions, demonstrating maturity and a depth of knowledge and understanding. Candidates who scored well had prepared effectively by producing an essay plan showing structure and clear thinking.

The candidates who fail to achieve a mark above Level 2 in their essay responses is mainly a result of not including the rudiments of the question in their responses and insufficient practice at extended writing lacking any order or structure, are brief and do not respond to the specific requirements within the question.

11. *“Design is about making things good (and then better) and right (and fantastic) for the people who use and encounter them.” - Matt Beale*

Discuss the work and style of two contemporary product designers in relation to this quote and describe the impact of the products he/she has designed. [26]

Candidates highlighted the work of contemporary designers and were able to evaluate their impact on the development of products. A number of responses also provided good evaluative comments related to the impact of the named designer and continuously related their responses to the quote. Some responses merely provided a biographical account of designers and were unable therefore to access the higher levels.

12. Explain how the development of a specific named product has been influenced by the use of modern manufacturing processes. [26]

Some good responses which demonstrated candidates' knowledge of modern manufacturing methods – very often relating the process to their own project work such as 3D printing and a range of forming processes.

13. Explain how a thorough specification is used by the designer and manufacturer to ensure that a product meets the needs of the target market. [26]

Responses discussed the use of a good specification as a guide aiming to ensure success in meeting the needs of the target market. The higher level responses discussed its effective use by both the designer and manufacturer – and included the need to meet safety standards.

14. An iconic design classic is a benchmark for other similar products and one that stands up to the test of time, remaining a good design despite the passing of years, decades and even centuries.

Describe how this statement applies to a product that you consider to be 'iconic'. [26]

Some very good responses which used classics such as the Sony Walkman, mini skirt, mini car or London Underground map to exemplify their answers. Responses clearly understood the significance of their chosen products in terms of good design, historical and cultural significance and being benchmarks for other products.

15. The design and manufacture of products can involve the use of ICT in both communication and modelling and in controlling and manufacturing. Evaluate the contribution that ICT makes in the **two** named areas. [26]

The majority of responses evaluated the contribution of ICT in both communication and modelling very well - but many did not fully address the contribution of ICT in controlling and manufacturing, for example in the use of ICT to monitor and control, CAM and CIM systems in terms of efficiency.

**DESIGN AND TECHNOLOGY**  
**General Certificate of Education**  
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**Advanced Subsidiary/Advanced**  
**DT3 – Food Technology**

Centres had provided moderators with samples of the final food product as required and most had survived the freezing and defrosting process well; there were a limited number of candidates entered. The majority of projects were displayed in A3 folders and in most instances mark sheets were well-annotated, justifying the allocation of marks clearly which aided moderation.

The quality of presentation of Food Technology coursework was very good in most instances again this year. A range of communication techniques were effectively used, including plenty of ICT for a range of uses, including digital photography, nutritional analysis, research, word processing etc. Many candidates had used a sketch book to keep some of their research, designing and jottings. The amount and quality of sketching varied, but in most cases candidates had utilised techniques and communication methods effectively to put across their ideas, even where they had not used a great deal of sketching.

Most candidates are carrying a product analysis as the main focus of their research and doing it to a reasonable level of detail. The amount of detail seen in the product analysis was at least adequate in all cases and better in many. It appears that centres are offering structured support to students when completing this section of their folios. In most cases, research was well-focussed and relevant. Some candidates carried out a customer profile, to varying degrees of success: in some instances it seemed to really help them to focus on the requirements of the target market, whilst in other cases it seemed to serve no particularly useful purpose and could have been dispensed with. Centres should consider carefully the amount of time to be invested in individual research activities in relation to the additional marks it might potentially gain.

Specifications continue to be an area of weakness for many; still we see specifications which are too basic for this level, with only the main factors needed for the food product considered. There are still instances where more measurable criteria could be used. This would serve to focus candidates' thinking better as well as facilitating the process of evaluation. In most instances, candidates seemed to have a reasonably good idea of the requirements of their target market and went on to design appropriate food products, but they perhaps need to spend a little more time working out the detail of their design specifications. In virtually all cases, candidates are ordering specifications in some kind of hierarchy, acknowledging that some criteria are certainly more important than others.

At A2 there should be a strong emphasis on generating and developing ideas as there are 30 marks available. Many individuals are producing only a limited range of possibilities for consideration through quick idea generation. On the positive side, plenty of trialling was seen as part of the development process and many candidates had gained useful information from this initial practical work and were able to confidently take forward the most successful elements. Development at A2 is tending to be more thorough than at AS. There was some innovation seen at A2, but this still continues to be fairly limited. Candidates were, on the whole, effective in communicating their thoughts and the decision-making processes to the reader. Planning was generally well done with appropriate quality control measures considered by many.

On-going evaluation was generally very good again this year with a range of techniques used, including nutritional analysis, costing, organoleptic testing etc. Testing by the target market, however, was only infrequently seen. It is always desirable, if at all possible, for the target market to be used. Several candidates had obtained useful comments on their final outcomes from an expert of some kind, in some instances an individual from the food industry.

The standard of practical work was high with most making dishes of the appropriate level of challenge. It was clear that great care had been taken by many to achieve a high level of finish. Food materials were well used in most cases, though lacking innovation in many cases. Photographic evidence was good in most instances, giving the moderator a clear indication of the standard of practical work achieved.

This is the last AS/A level Design and Technology: Food Technology, could I extend my many thanks to those centres that I have been working with of over the past year's and wish you all the best with your chosen advanced level Food based courses.

**DESIGN AND TECHNOLOGY**  
**General Certificate of Education**  
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**Advanced Subsidiary/Advanced**  
**DT3 – Systems and Control**

Systems and Control Technology remains a small entry at A2 compared to Product Design.

This report focuses on the performance of candidates attempting the questions relating to the Systems and Control knowledge and skills outlined in the syllabus. Additional questions, common with DT3 Product Design, are in the Product Design DT3 report.

- 3. The materials chosen by designers for the manufacture of products often have a significant effect on product function.**
- (a) **Name and describe two specific products that have benefited from the innovative use of materials in their function.** 2 x [1]
- (b) **Describe the characteristics of one innovative material used in either product.** [6]

No attempts for this question. It was anticipated that candidates opting for this question would generate responses that included the identification of components such as piezo crystals, QTC or touch sensitive interface components. However, this question probably provided more challenge than some of the alternative options.

- 4. (a) Describe the process of reverse engineering.** [2]
- (b) Explain the benefits to the designer of reverse engineering prior to developing control systems for products.** [6]

A very popular question that was generally well answered by candidates.

Descriptions of de-constructing or disassembling products from a complete state to identify how products had been constructed were generally very good and gained the 2 marks available.

Part b was less well completed because candidates lost the focus of what benefits would result from this exercise, namely, to see how components, inputs and outputs fitted inside / within products and how the designer / manufacturer had achieved this. Higher achieving candidates linked the activity to enabling clear understanding and knowledge to apply to the project at hand, which gained higher marks.

- 11. (a) Produce a block diagram for a control system that compares one varying environmental condition against a present input to trigger two different outputs depending on the input result.** [3]
- (b) Sketch an electronic circuit diagram for this block diagram, explaining how the circuit functions.** [5]

Around 50% of candidates attempted this question, with most using a programmable microcontroller to compare two inputs and decide on the output. Block diagrams were very well presented and mostly gained the 3 marks available. The sketch of the circuit diagram proved problematic for some, and this affected the final mark awarded for this question. No candidates used the traditional 741 comparator circuit which was quite surprising.

16. ***“Technology made large populations possible: large populations now make technology indispensable.” - Joseph Wood Krutch***

**Discuss the work and style of two contemporary product designers in relation to this quote and describe the impact of the products he/she has designed. 26]**

Again no candidates attempted this question, which was quite surprising given the amount of reliance society has on technology nowadays. There were far more popular essay questions.

15. **The design and manufacture of control systems can involve the use of ICT in communication and modelling and controlling and manufacturing.**

**Evaluate the contribution that ICT makes in each of the two named areas. [26]**

There were some good responses to this question, with popularity reflecting around half of the candidature. Some issues with rubric limited marks here, because only two areas were required. Candidates demonstrated a detailed understanding of the use of ICT at stages during design, development and manufacture, which was very encouraging. The use of examples to illustrate and support responses could be developed and should be encouraged for future essay questions.

## **DESIGN AND TECHNOLOGY**

### **General Certificate of Education**

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### **DT4 – Product Design/System & Control Technology**

#### **Administration and General Points.**

As this specification comes to an end it is again pleasing to note that many of the visiting moderators have again been pleased by the quality seen in a number of centres. Centres continue to demonstrate improvements in aspects of administration, internal standardisation between teachers and across material areas. The preparation for external moderation at centres in general is efficiently undertaken with the work of all candidates effectively displayed in a quiet environment with the supporting administrative documentation.

Centre annotation on the DT4 cover sheets is comprehensive and helpful in the moderation exercise in many centres and with the new specification this will become very important in the moderation process. Moderators have again noted the challenging designing and making experiences undertaken by many candidates on their visits to centres.

The development of 3D printing used in the design and development stages and in the final solutions is a very positive development at centres. In the best examples we are able to access relevant CAD files where the process is used to its full potential. Again in relation to the new specification it is important that centres continue to use development models and include these as part of the moderation process.

#### **Designing**

##### **Analysis, research and developing a design specification**

Innovative and creative thinking early on in the project must be emphasised by teachers and this can be both through the informal use of sketchbooks and formally within the portfolio. Research and design analysis should be as focussed and thorough as possible, and not be seen as an exercise in isolation, considering every possible factor. Design specifications themselves should be more specific to the individual candidate's intended product with clear reference to measurable criteria which would ultimately influence the design solution. Candidates who are able to identify the conclusions of their research and analysis do provide a good foundation to their design work - detailed and relevant specifications also impact later on the quality of summative evaluations.

##### **Generating and developing innovative ideas and proposals**

Specifications are used very effectively by a good number of candidates as a design tool throughout the development of ideas. Reflective activity within sketchbooks and portfolios do score well, with many ideas based on the findings of research and analysis in developing design ideas.

Sketchbook work continues to improve in many centres and this bodes well with the development of the new specification. However in some centres the informal sketchbook type work and the portfolio should be more closely related with early ideas sketched, then partly developed and further refined or formalised within the portfolio.

Solid modelling and other forms of quick modelling continue to feature in more candidates' work. Experimental work and modelling in the designing stage are fundamental to the candidate's insight into possible solutions to the task. Within some candidates work it would be useful to include annotated digital images of early modelling in the sketchbook in order to develop and formalise ideas.

A good number of candidates show high levels of creativity supported with appropriate forms of modelling, which include suggestions for the use of possible materials and manufacturing processes.

### **Detail designing**

Detail designing when done well includes three dimensional or orthographic drawings with detailed dimensions, sections and parts drawings to component level. Candidates who produce a visual diary of the making process can gain some credit here. Candidates should aim for sufficient details for the product to be made by a third party without reference back to the designer.

Final designs in some centres included some basic details such as an exploded drawing and some outline dimensions but parts, materials and component sizes were not included. The work produced by textiles candidates' demonstrated good evidence of pattern development and did not merely rely upon commercially produced patterns. Proposals which are effectively presented to prospective clients (and include manufacturing dimensions and tolerances score very well).

### **Evaluating, reflecting and decision making**

As stated in previous reports we would encourage candidates to work with clients from the outset as this very often provides clear guidance on any decision making and a focus for the development of a product or products. Moderators continue to see many well written objective evaluations against initial specification points which include end testing and comments from clients.

Photographic evidence which is annotated clearly is critical to demonstrate the nature and effectiveness of the end testing. This, together with a well-written summative evaluation report, making clear reference to the specification were evident only in a small number of candidates work.

### **Graphic Communication and key skills**

Good examples of candidates' sketchbooks include early design ideas, development, product dimensions, material needs, calculations, testing and modelling were seen by moderators – all communicated effectively. The detailed engineering drawings are particularly good where CAD software is used to maximise manufacturing detail and three dimensional presentations.

A good number of candidates continue to demonstrate excellent communication skill levels to the standard and variety seen in the past. Good communication often contains clear appropriate presentation of research and analysis, good quality sketching in the sketchbook and portfolio indicating a broad range of techniques, quality modelling and clear detailed designs. Where drawing skills are weak, centres need to devote some time in teaching basic drawing skills.

We are seeing an increase in e-portfolios – and in the best examples are effectively supported by sketchbooks.

## **Making**

### **Planning for making**

Thorough planning for the production of the product is very often presented effectively through candidates' journals of making. These include documenting tasks, progress and alternative ways forward when the need arises (and in some cases highlight training needs for a particular task and targets including quality control and quality assurance included). However, in a number of candidates work there is also ineffective use of Gantt charts with very basic explanations to the blocks of time indicated within the plans.

### **Range and sophistication of making skills**

Again there were a range of well made creative products on display within centres which included a range of challenging making skills. Having a detailed knowledge of the characteristics and properties of the materials they are going to use and understand the equipment that they intend to work with in manufacturing their product or products is essential for candidates.

Innovation does feature in the production of the final solution where candidates have demonstrated knowledge of the characteristics and working properties of the materials they are using – and use CAM where appropriate.

Candidates who do not score well here demonstrate low level making skills with a weak understanding of the materials and equipment used to manufacture their end product.

### **Accuracy, quality and finish of the design solution**

It is pleasing to note within some centres the continued high quality standards seen throughout the present specification. The wide ranging products seen have demonstrated a maturity in design, accuracy of construction and well functioning products. These products were a pleasure for moderators to see which again demonstrated the care, precision and hard work undertaken by candidates and the quality of support given by teachers.

Accuracy, quality and finish through care and attention to detail is essential in scoring well in this section. Architectural models are generally disappointing and candidates who do well produce models to scale, use appropriate materials and of a complexity that clearly demonstrating the appearance and layout of any proposal.

## **Functionality and innovation of the design solution**

The products seen within centres again reflect the individual interest, enthusiasm and commitment of very talented candidates.

Functionality and innovation marks are a reward for the application of new ideas and some of the work seen demonstrated again exciting new innovative end products.

As this specification draws to a close we would like to thank centres for their commitment in producing great innovative and creative work over the years. Giving candidates these unique experiences provides a truly exceptional platform for their post A level studies and experiences.

The value of attending the WJEC Innovation Exhibition and INSET each year is considerable and provides an excellent way for both staff and students to access high quality work and thereby fully appreciate the standard which is required at both AS and A level.

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**General Certificate of Education (Legacy)**  
**Summer 2018**  
**Advanced Subsidiary/Advanced**  
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