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Edexcel

Examiners' Report  
Principal Examiner Feedback

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Pearson Edexcel GCE  
In Design and Technology: Product Design  
(9DT0/01)

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## Introduction

This is the second live sitting of the new A Level in Design and Technology (Product Design), which typically has an externally assessed exam (9DT0\_01) reflecting 50% of the qualification assessment (under normal circumstances\*). The other 50% being typically assessed by a non-examined 'Design and Make' project/portfolio. This represents a significant change from the 40% examination weighting in the legacy specification. This increase in weighting is also reflected in the 'theory' content of the specification as well as the increase in the examination time from 1.5 hours to 2.5 hours.

\*In the October 2020 however, the examination constituted 100% of the weighting for the qualification at awarding, with the non-examined project being removed from assessment (for one series only).

The paper includes several types of questions which include; short, medium and long open response questions, calculations and drawings. This provides increased rigour over the legacy specification examinations as candidates need a wider skill set in order to access the different types of question.

The long response essay questions together with the drawing question are assessed by use of a levels-based mark scheme. This type of mark scheme will reward more able candidates who can now go into greater depth and be awarded for knowledge and deep understanding and will limit the marks of less able candidates, who often provide bulleted lists of recall without effective discursive elements or evaluative comments.

Feedback on individual questions

### Question 1(a)

This question required candidates to consider the characteristics of polyester fabric that would make it a suitable material for the canopy.

The question worked well as an introduction to the paper to ease candidates into the assessment, with candidates only being required to give rather than explain a characteristic. The question worked well, with the majority of candidates gaining at least one of the two available marks. The most common mistake was to provide the answer strong or high strength, as this is not sufficiently specific. Whilst the material would have good tensile strength, it would be weak in compression and compressive strength is not a necessary characteristic for the given scenario.

### Question 1(b)

This question required candidates to explain the properties of nylon that makes it an appropriate material for the cords that are used to anchor the canopy.

The question ramped up the demand from the previous question by requiring the candidates to explain appropriate properties (introduce appropriate properties and then provide linked reasons why the property makes the material suitable for its intended use). The majority of candidates gained at least 2 of the available four marks. Common mistakes included a lack of specificity on strength characteristics and considering properties that were not relevant to the context (such as thermal properties).

### Question 1(c)

This question required candidates to explain one advantage of using aluminium tube rather than solid oak poles for the support legs. This was a three mark explain question so candidates had to give an advantage and two linked reasons explaining why this was an advantage.

Whilst, in theory being a difficult explain command, as two linked explanations were required, this was nevertheless answered very well with the majority of candidates achieving the full three marks. The most common mistake was to provide multiple advantages rather than **explaining** one advantage.

### Question 2(a)

This question required candidates to state two properties of foil-lined board that makes it a suitable material for a drinks carton (shown in figure 2 on the paper). Responses relating to strength were excluded by reference in the question stem. Whilst being only a short open response question, candidates needed to consider both the properties of the material and use of the product in order to decide which properties were relevant to the suitability of the material.

The question was answered reasonably well with the majority of candidates gaining at least one of the two marks. A common mistake was to provide a response relating to strength which was already referred to in the question stem.

### Question 2(b)

The formula for calculating the volume of a frustum which is the shape of the drink carton shown in figure 3 of the question. Candidates were given the volume of the carton, together with the diameter of the base and the top of the carton, and were required to calculate the height of the carton.

In order to answer this question candidates needed to rearrange the formula to make the height (h) the subject, and then substitute provided values into the formula in order to complete the calculation.

This question was answered very well with almost three quarters of candidates being awarded the full five marks. Candidates who made mistakes tended to enter values into the formula before rearranging the formula (which led to some confusion). Candidates also need to use the answer space where one is provided, as in mathematics questions full marks are awarded irrespective of working out. Also candidates should show their working out because if the final answer is incorrect some credit can still be given for parts of the calculations and/or methods that are correct.

### Question 3(a)

This question looked at smart and modern materials and required candidates to explain one way that thermo-chromic materials could improve the safety of consumer products.

Candidates performed well on this question with the majority of candidates gaining both of the available marks and demonstrating good knowledge and understanding of this material. A common mistake was to respond with an answer relating to another smart material such as photo-chromic materials.

### Question 3(b)

This question looked at the benefits of using shape memory alloys for spectacle frames. Candidates were required to provide two extended explanations each worth three marks.

Candidates demonstrated good knowledge and understanding of shape memory alloys and were able to link this to the context of the question with the majority of the candidates gaining at least half of the available marks.

### Question 4(a)

This question looked at the methods that could be used, during the manufacturing process, to attach a steel wing panel of a car to the steel supporting structure. Candidates were required to name three methods.

Most candidates were able to come up with two appropriate methods and the modal score was the maximum three marks. A few candidates dropped marks by naming multiple different welding techniques rather than three different fixing methods.

### Question 4(b)

This question is about the process used to form a front wing panel of a car. Most candidates realised that the process is press forming although many didn't know the exact details of the process. Although not a high scoring question, candidates found it easier to access marks describing press forming on the 2020 paper compared with flexography on the 2019 paper. This may relate to the background and experience of the candidates if their earlier Design Technology experience had focused on Resistant Materials rather than Graphic Products. A common mistake was to refer to laser cutting and heat processes.

### Question 4(c)

This question required candidates to describe, using annotated sketches, the process of case hardening a one-off product in a school workshop. Whilst candidates demonstrated some knowledge of heat treatments and had knowledge of hardening processes by heating and cooling, very few demonstrated specific knowledge of case hardening and the use of added carbon.

### Question 4(d)(i), (ii) and (ii)

This was a mathematics question where candidates were provided with a table of test results for a batch of steel with the failure load and number of failures for each load. Candidates were required to calculate the modal failure load, the median failure load and the mean failure load of the steel in the batch of provided results.

In line with other mathematics questions candidates performed well with the majority of candidates gaining at least 5 of the 7 available marks with a modal score of 7 across the three parts of the question.

#### Question 5(a)

This question required candidates to give two disadvantages of quality control systems. The main disadvantage, the high cost of set up, was excluded via the question stem. This question reverses the approach of looking at advantages of such systems and required candidates to consider the drawbacks of a system that, in the main, provides benefits to manufacturers and consumers.

Candidates performed well on this question with the majority of candidates gaining the full two marks.

#### Question 5(b)

This question required candidates to evaluate the effects of built-in obsolescence on manufacturer, which again was a move away from the expected focus of the impact on manufacturers.

Candidates did less well on this question with a modal mark of 4 and the majority of candidates achieving 3 or fewer marks. Candidates appeared to have a narrow band of knowledge that focused on reduced consumer demand for the manufacturer's products, as consumers moved to other manufacturers, following disappointment over the longevity of the items under consideration. Very few were able to provide other considerations outlined in the indicative content such as the cost implications of research and development or the impact of changes on production lines.

#### Question 6(a)

In this question candidates were required to give two disadvantages of patenting designs. Candidates did well on this question with the majority of candidates gaining the full two marks. Candidates utilised a broad range of points from the mark scheme, although costs incurred when patenting designs was the most common response.

#### Question 6(b)

This question required candidates to explain two ways Six Sigma can improve manufacturing processes.

Six Sigma is a new topic area on the 9DT0\_01 specification and is also a new topic to teachers delivering the qualification and is not in any of the established A Level text books. Candidates therefore struggled with this question as it will not have been included as part of any prior learning, with resources therefore scarce for independent learning (as will likely have been the case under the circumstances this year).

Candidates did however pick up a few marks through their generic responses, which often identified aspects relating to process time and product quality.

#### Question 6(c)

This question required candidates to discuss how consumer rights legislation provides protection to consumers who receive faulty goods.

Candidates were generally able to come up with a basic response relating to refunds or exchanges but very few candidates had a thorough understanding of the finer points of the legislation. Typically candidates achieved a mark of two or three of the available six marks.

#### Question 6(d)

This question required candidates to give two ways that a product can be sustainably disposed of at the end of its useful life.

Candidates performed well on this question with the majority of candidates achieving the full two marks. Responses typically covered recycling, re-use and repurposing of products.

#### Question 6(e)

This was a mathematics question requiring candidates to plot and extrapolate a graph to estimate the time at which the temperature would have fallen to 12°C.

Candidates performed well on this question with the majority of candidates achieving the full three marks. The most common mistake was to apply a line of best fit rather than joining the plotted points and extending the line to read off the required values.

#### Question 7

This question was the final mathematics question on the paper and required candidates to calculate the weight of a component made from mild steel plate. This required candidates to calculate the area of the component and then apply the mass/m<sup>2</sup> to arrive at the weight of the component.

Once again candidates performed well on a mathematics based question with the modal mark being the maximum mark of 5. Candidates should be reminded to show all stages of their calculations, because marks can still be achieved for correct methods even when errors are made and the final answer is incorrect.

#### Question 8

This question showed a photograph of an office building that was designed and built during the Art Deco period. Candidates were required to discuss how the design of the office building was influenced by Art Deco philosophies.

Candidates struggled with this question, often mixing the features and philosophies of other movements. Many candidates merely described what they could see in the picture without linking the design to the philosophies of the movement. This was a question where candidates were not able to draw upon prior experience and lacked the preparation of earlier A level cohorts. The modal mark was two and the majority of candidates failed to achieve half of the available marks.

### Question 9(a)

This was a question where candidates had to discuss the use of computer-aided testing within quality control systems for a high volume manufacturer. Candidates, in the main, had a reasonable attempt at this question with the majority of candidates scoring more than half marks and a joint modal score of 4 and 6. Candidates were able to demonstrate a range of the indicative content within their responses.

### Question 9(b)

This question required candidates to explain the final three stages of the five stage lean process with the first two stages, being value and value stream, provided as guidance in the question stem.

Candidates particularly struggled with this question, possibly because such specific knowledge and understanding cannot be gleaned from generic Design Technology prior learning and experience. Some candidates made good attempts to gain marks via descriptive Quality Assurance and Quality Control responses, linked to manufacturing systems, reinforcing my belief that this was generally a capable cohort. A few candidates covered the Pull (Kanban) and Perfection (Kaizan) stages and some candidates made reference to JIT but the modal score was zero with the majority of candidates failing to score on this question.

### Question 10

This question required candidates to evaluate the functionality of a polypropylene suitcase for use by holidaymakers with reference to the specification.

Candidates made a good attempt at this question with the majority achieving at least half of the available marks. For this type of question candidates are able to draw upon their generic design knowledge and skills in the investigation of manufactured products and apply common sense to their observations and judgements.

### Summary

There is some evidence that candidates still had a focus on either graphics or resistant materials, as this was evident in the balance of responses seen. Candidates tended to perform better on questions with more resistant materials content, rather than graphic products, which could indicate a GCSE RM background or candidates drawing upon knowledge of the subject gained over the years and experienced in a practical situation. For example; candidates achieved a higher proportion of available marks on 1(c), a question comparing aluminium and oak for a defined purpose, than they did on 1(a) and 1(b) despite 1(c) being a three mark explain question.

Candidates generally performed well on the mathematics questions and this was indicative of a generally capable cohort. Candidates should however remember to show all their working and write their final answer in the space provided.

Candidates did well on the longer essay type questions marked with a levels based mark scheme, but on these type of questions should write in continuous prose rather than use, as did a few candidates, bullet pointed lists, which will limit access to the higher mark levels because they are not making the necessary discursive or evaluative links needed for higher levels of achievement.



Questions requiring new knowledge, rather than more advanced knowledge of earlier learning, provided more challenge than would normally be the case. Also, questions covering topics not previously covered in legacy specifications and not covered by existing A Level text books, such as Six Sigma, proved more difficult for candidates and may indicate difficulties in accessing independent learning resources and materials.

There was therefore some evidence that this is generally a capable cohort who are less well prepared for the examination (by the unique circumstances of 2020) than would normally be the case.

