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Examiners' Report
June 2013

GCE Design and Technology
Product Design 6GR03 01

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Introduction

The examined unit covers knowledge and understanding of a range of modern design and manufacturing practices and contemporary design issues. This includes a good working knowledge of the use of ICT and systems and control technology in the design and manufacture of products. Additionally candidates need to be aware of important contributions of designers from the past which may provide the inspiration for future designs and that sustainable product design is a key feature of modern design practices.

More able candidates performed well across the paper demonstrating detailed knowledge and understanding of key concepts and content. They were able to:

- draw upon detailed knowledge of the specification content
- read the questions carefully and focus upon the specific scenario
- understand the design movements and philosophies
- understand and differentiated between the different elements and features of manufacturing systems
- understand sustainability issues.

Less able candidates:

- replied on generic knowledge of key areas of the specification rather than focusing on the specifics of the specification content
- did not apply their knowledge to the question scenario and wrote generic essays about the issues or methods being examined
- responded with knowledge and understanding of other systems, for example in question 2 (c) many candidates wrote about blue/green screen technologies rather than how motion capture is used to create digital special effects.

Candidates need to ensure they have covered all areas of the specification and understand how to differentiate between the key technologies within each section. They also need to read questions carefully and know how to apply their knowledge to different scenarios so that they are more able to focus on the specific assessment requirements of a question.

Overall the paper performed well and in line with previous examination series providing appropriate content and rigour across the ability range.

Question 1 (a)

The focus of this question is on recycling and is not about reducing, re-using or recovering. Many candidates performed very well on this question, identifying key points such as: using as few different materials as possible; making components easy to separate, labelling and marking materials/polymers for correct sorting; using recycled materials; avoiding surface treatments etc.

Some candidates however didn't focus on 'designing with recycling in mind' and produced a generic response covering waste reduction.

Answer ALL the questions. Write your answers in the spaces provided.

1 Sustainability is a major feature of modern packaging design and manufacture.

(a) State **four** ways in which packaging is designed with recycling in mind.

(4)

1 Materials used need to be easy to seporate for them to be recycled, and organised.

2 Materials need to be selected carefully such as plastics and card that are recycleable materials.

3 Printing processes and finishing techniques can cause a material such as card to be unrecycleable.

4 including a recycling symbol and easy-to-read code eg for the polymers so consumers know what can be recycled and how to recycle it.

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Examiner Comments

This response was awarded the full four marks. The candidate has clearly identified four key areas to consider when a designer is designing with 'recycling in mind'.

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Examiner Tip

Candidates need to carefully read questions in order to focus upon the key requirements of the question. Here the key word is recycling and many candidates focused on the broader issue of waste reduction.

Question 1 (b)

This was a fairly open question and was answered well by the majority of candidates. They responded with a range of answers covering benefits to the manufacturer, the consumer and to the environment.

Question 1 (c)

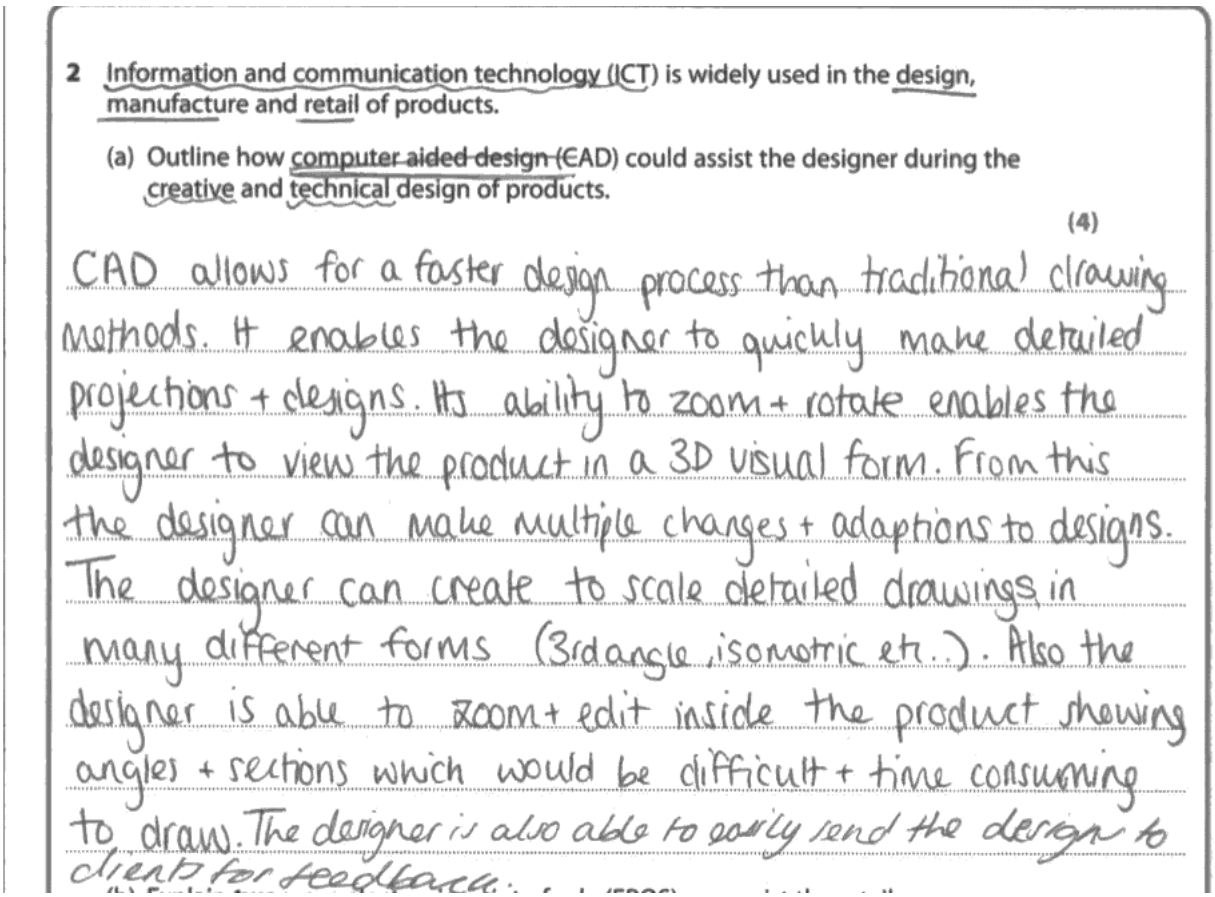
Here candidates were required to explain two advantages and one disadvantage of using the biodegradable polymer, Biopol for the manufacture of the reusable liquid detergent bottle. Many candidates made the mistake of simply saying that Biopol is biodegradable which is a repeat of the question and a more appropriate response would have been 'fully degrades in suitable conditions, eg in sealed landfills where no oxygen is present/micro-organisms are present thus reducing time in landfill/minimising the environmental impact of landfill'.

The question was answered well by candidates achieving the higher grades, who clearly had a sound knowledge of the properties of Biopol and were able to apply their knowledge to the context of the question responding with a broad range of appropriate answers covering the breadth of the mark scheme.

Question 2 (a)

This question was answered very well by the majority of candidates across the full grade range. Candidates are now clearly widely experienced in the use of computer aided design (CAD) and realise how it can assist the designer during the creative and technical design of products. Most candidates recognised the use of 3D modelling, textures/rendering, manipulation tools and automatic editing changes across different views. Some candidates considered simulations and testing, which showed a deeper understanding of design software.

The one area where a relatively small proportion of candidates provided an inappropriate response was when they considered the manufacturing benefits of CAD linking with computer aided manufacturing (CAM), for example the creation of tool paths on computer numerically controlled (CNC) machines. An appropriate response relating to the use of CAM would be linking to rapid prototyping as part of design development, feedback to clients or testing of designs.



2 Information and communication technology (ICT) is widely used in the design, manufacture and retail of products.

(a) Outline how computer aided design (CAD) could assist the designer during the creative and technical design of products.

(4)

CAD allows for a faster design process than traditional drawing methods. It enables the designer to quickly make detailed projections + designs. Its ability to zoom + rotate enables the designer to view the product in a 3D visual form. From this the designer can make multiple changes + adaptions to designs. The designer can create to scale detailed drawings in many different forms (3rd angle, isometric etc.). Also the designer is able to zoom + edit inside the product showing angles + sections which would be difficult + time consuming to draw. The designer is also able to easily send the design to clients for feedback

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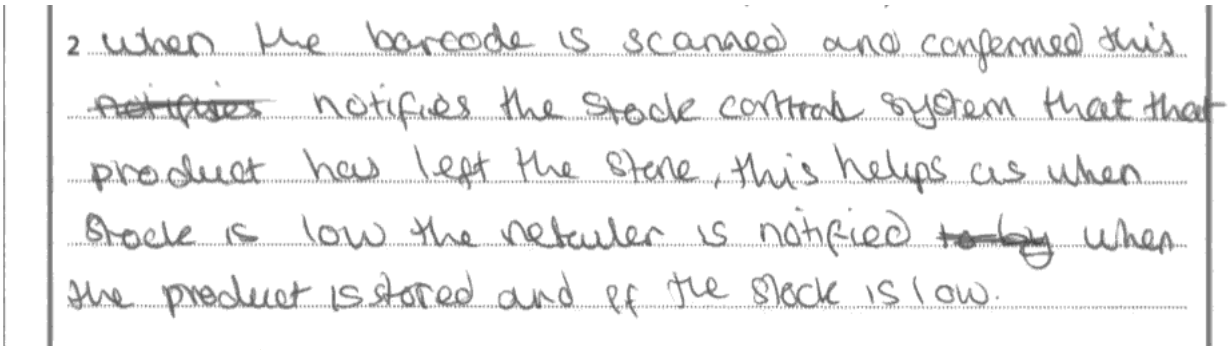
Examiner Comments

This shows a typical candidate response that was awarded 4 marks for a range of items covered by the mark scheme, including:

- Speeds up the design process
- Allows manipulation of drawings / views / angles / scales
- Allows 3D simulations / virtual modelling / visualisations
- Allows editing and modification
- Allows design files to be sent to consultants or clients via email for feedback

Question 2 (b)

Candidates either performed very well on this question and were fully aware of the features and uses of electronic point of sale (EPOS) systems or they guessed that it was some kind of electronic point of sale marketing display and didn't provide any response worthy of credit.


2 when the barcode is scanned and conferned this ~~notifies~~ notifies the Stock control system that that product has left the store, this helps us when Stock is low the retailer is notified ~~today~~ when the product is stored and if the Stock is low.

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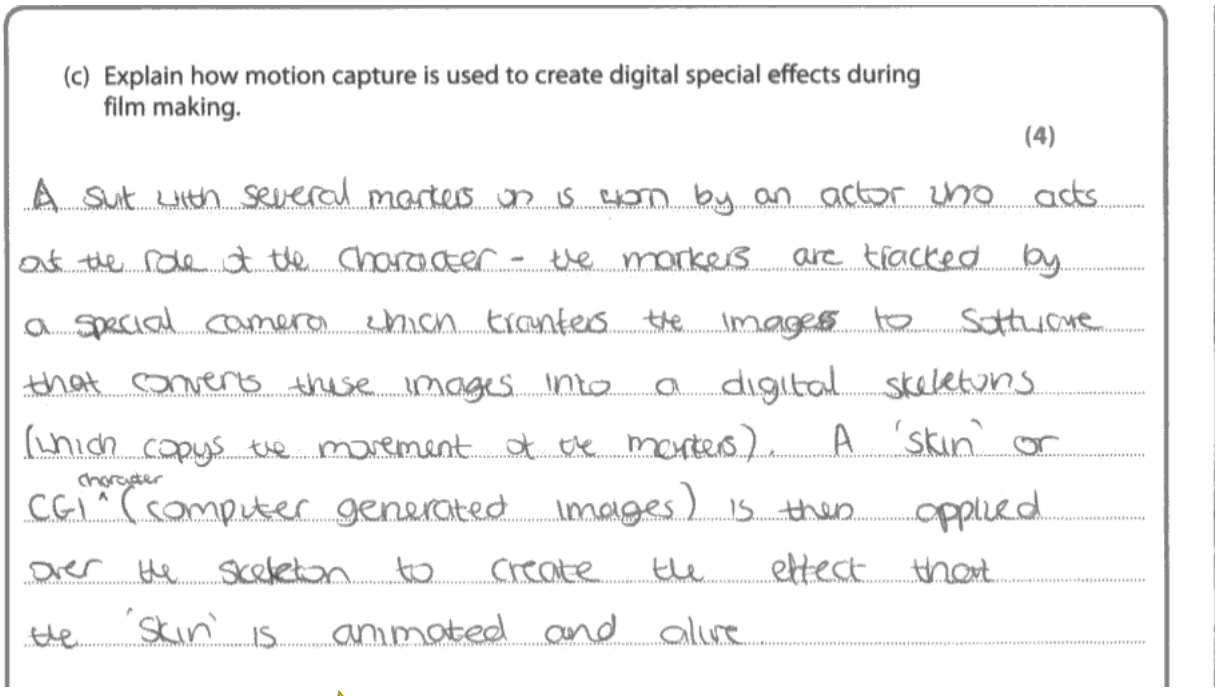
Examiner Comments

This shows a typical candidate response explaining how when the barcode is scanned a link to the stock control system helps the retailer to monitor stock levels. The candidate was awarded 2 marks for this part of the question.

Question 2 (c)

This question produced some very good responses, with high marks awarded where candidates recognised the use of a motion capture suit, with markers at key points, worn by an actor acting out a series of movements. The computer software can then track the movement and produce a computerised skeleton or wireframe to which a computer generated character can be applied. This would then move with more realism than keystroke generated animation.

A number of candidates provided a generic response about special effects mainly focusing on blue/green screen technology and did not consider motion capture, therefore did not receive any credit.



(c) Explain how motion capture is used to create digital special effects during film making.

(4)

A suit with several markers on is worn by an actor who acts out the role of the character - the markers are tracked by a special camera which transfers the images to software that converts these images into a digital skeletons (which copys the movement of the markers). A 'skin' or CGI (character computer generated images) is then applied over the skeleton to create the effect that the 'skin' is animated and alive

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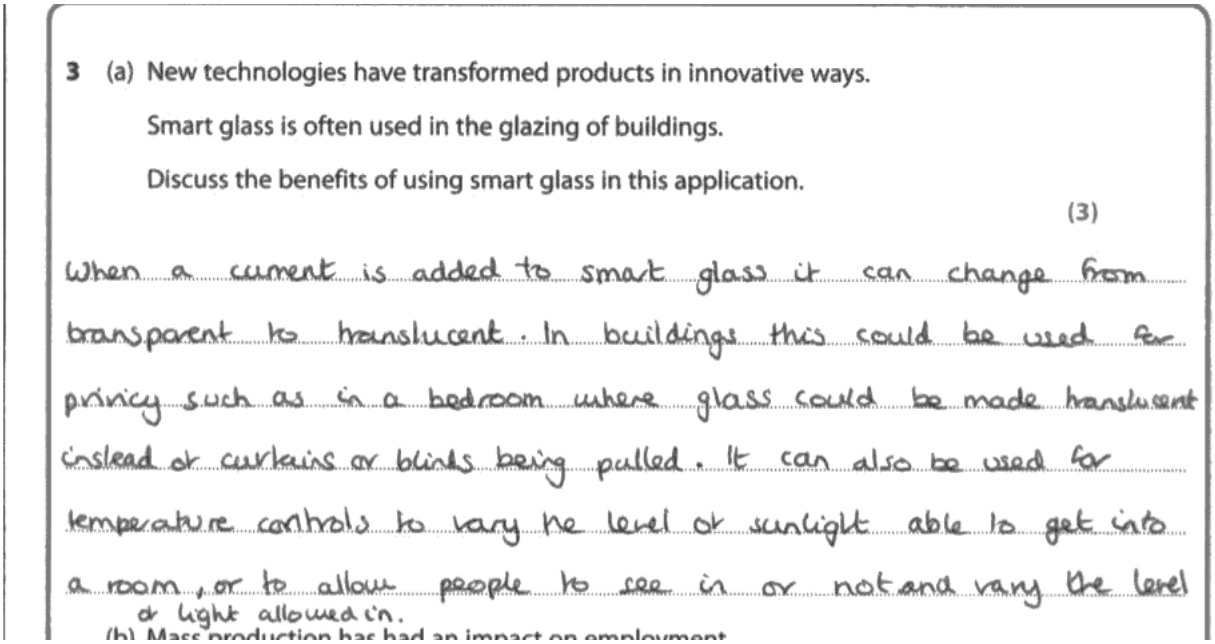
Examiner Comments

This shows a typical candidate response that was awarded a total of 4 marks.

Question 3 (a)

This question was answered inconsistently. Many candidates were aware of the properties of smart glass and how it is controlled but others guessed that it was photochromic glass that reacts to sunlight and is commonly used as a reactive lens in glasses.



3 (a) New technologies have transformed products in innovative ways.

Smart glass is often used in the glazing of buildings.

Discuss the benefits of using smart glass in this application.

(3)

When a current is added to smart glass it can change from transparent to translucent. In buildings this could be used for privicy such as in a bedroom where glass could be made translucent instead of curtains or blinds being pulled. It can also be used for temperature controls to vary the level of sunlight able to get into a room, or to allow people to see in or not and vary the level of light allowed in.

(b) Mass production has had an impact on employment

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Examiner Comments

This is a typical candidate response that was awarded 3 marks and the discussion included:

- Electrical control of opacity
- Provision of privacy when made opaque
- Elimination of need for blinds or curtains
- Use for temperature control via reduction in solar gain

Question 3 (b)

This was generally answered well across the full ability range with candidates picking up marks covering the full breadth of answers within the mark scheme.

Question 4 (a)

The majority of candidates who read the question carefully, did very well and achieved high marks. The question related to the advantages and disadvantages to the developing country of multinational companies using offshore manufacturing. Some candidates had incorrectly focused on the advantages and disadvantages of offshore manufacturing to the multinational company.

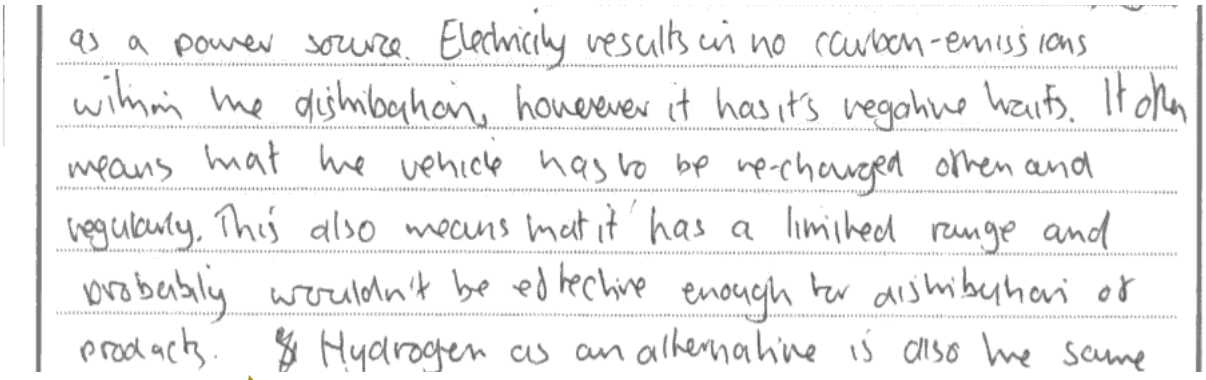
Candidates generally focused on creation of employment, development of infrastructure and improvements to the local economy as advantages and considered environmental issues and potential exploitation as disadvantages.

Question 4 (b)

This question was about the production of energy using wind turbines in the UK. The majority of candidates across the full grade range did very well on this question and were awarded 3 or 4 marks. They demonstrated a clear understanding of wind energy as a renewable energy in the UK. Candidates picked up marks typically by covering objections to the visual aesthetics, noise pollution, production of sustainable energy, high initial costs and reduction in fossil fuel usage/CO2 emissions. More able candidates considered embodied energy, energy payback periods and the infrastructure required to support wind energy.

Question 4 (c)

This was a question that differentiated well and provided challenge. Many candidates could provide a generic essay about alternative fuels but few could focus upon the use of alternative fuels by distribution companies. Many candidates missed the focus of the question and did not even mention the distribution company within their response.



as a power source. Electricity results in no carbon-emissions within the distribution, however it has it's negative hauls. It often means that the vehicle has to be re-charged often and regularly. This also means that it has a limited range and probably wouldn't be effective enough for distribution of products. & Hydrogen as an alternative is also the same

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Examiner Comments

This extract from a candidate's response shows how they have considered the disadvantages of an alternative method of powering the distribution company's transport, by considering the limited range and recharging period of electric vehicles.

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Examiner Tip

Read the question twice and focus on the key requirements of the question.

Question 5

The question was about how two designers, Charles Rennie Mackintosh and Philippe Stark where influenced by the design philosophy of their movements. Many candidates did well on this question, but generally had a better knowledge of Charles Rennie Mackintosh and the Art Nouveau movement than they had of Philippe Stark and Post-modernism. Some candidates merely described the photographs and didn't provide any evidence of their knowledge of the designer or their movement.

Discuss how the designers have been influenced by the style and design philosophy of their movements. You may refer to Figure 2 and Figure 3 as a starting point for your answers.

*(a) Charles Rennie Mackintosh interior (Figure 2)

(4)

Art Nouveau was a movement which developed from arts and crafts to focus more on the lines Curves. This interior shows the clear influences of the Nouveau lines style as Mackintosh became famous for his crisp white lines and form over function style. However Mackintosh still encorperated other key aspects of Art Nouveau such as the influence of flora + nature with the curves of pre-raphelite femanine forms. Mackintosh included floral carvings + decorations into his furniture + design.

(b) Philippe Starck interior (Figure 3)

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Examiner Comments

This is a good example of a candidate considering how the style and the design philosophy of Art Nouveau influenced Charles Rennie Mackintosh's designs.

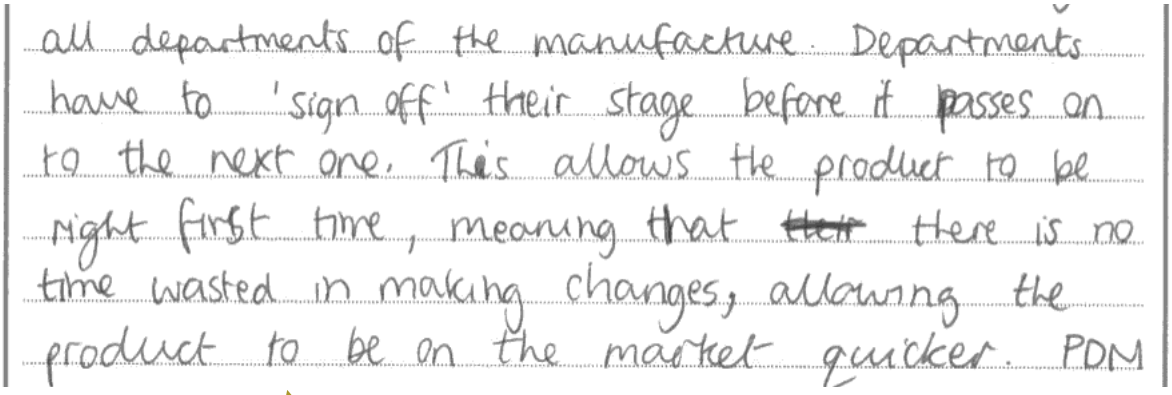
The candidate was awarded the full four marks and covered a range of responses identified within the mark scheme.

Question 6 (a)

Candidates generally scored well on this question, with many recognising the use of open-loop systems as being for simple systems, where a quality control decision is not required. They tended to note that if there was a fault it would not be noticed until the process was completed and because there are no decisions the process is faster.

Question 6 (b)

This question challenged many candidates and differentiates well between the less able and more able candidates. There was limited awareness of product data management (PDM) and the link between design and manufacture. The key discriminator was the recognition that electronic 'sign off' and automatic notifications reduced development time and enabled earlier production of new products.


all departments of the manufacture. Departments have to 'sign off' their stage before it passes on to the next one. This allows the product to be right first time, meaning that ~~their~~ there is no time wasted in making changes, allowing the product to be on the market quicker. PDM

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This extract from a candidate's response shows how the use of 'sign off' procedures eliminates error but would have benefitted from the addition of 'the system then notifies relevant parties that the design is ready for the next stage of the design process'.

Question 6 (c)

This final question differentiated well between more able candidates and less able candidates. Long rambling answers were provided by many candidates writing all they knew about manufacturing systems, just in time and CAD/CAM but they failed to answer the set question or focus on flexible manufacturing systems. Candidates who did pick up high marks made reference to machine/routing flexibility, reduced wastage, expensive to set up, automated storage and retrieval systems and the need for highly qualified technical support.

Paper Summary

Based on their performance on this paper, candidates are offered the following advice:

- Read the question thoroughly so you understand the focus of specific questions
- Avoid the temptation to regurgitate all you know about a generic topic area
- Understand the full breadth and depth of the specification
- Understand of the different elements of modern manufacturing systems

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