General Certificate of Education Design and Technology: Product Design 3D

PROD1

Report on the Examination

2550
June 2014

Version: 1.0

General

The format of the paper was similar to that of recent examinations with all source material printed within the paper. The level of response was varied and questions dealing with polymers were generally more confidently answered than those dealing with metals.

Of the two optional questions in Section B, Question 6 was more popular than Question 7. Candidates who chose Question 6 also tended to score slightly higher marks than those answering Question 7.

Centres are encouraged to make use of the on-line feedback sessions offered for PROD1 where specific questions are reviewed and examination technique is covered in some detail.

Section A

1   The majority of candidates could name a product made from carton board and give appropriate reasons for its use. The most popular products were food packaging such as cereal or confectionery boxes.

2   This question was primarily well answered.

3(a)   Most candidates were able to name a product made from PET. Disposable water bottles and fruit packaging were the most popular.

3(b)   Candidates showed a good understanding of the meaning of the symbol and why is it used, with good references being made to recycling and land fill issues as well as aiding sorting at a recycling centre.

4(a)   The majority of candidates could explain that a composite is a mixture of two or more materials but did not always refer to the enhanced properties.

4(b)   This question appeared to be well answered with CFRP (tennis racquets, fishing rods and Formula 1 car parts), GRP (boat hulls) and MDF (tables, cupboard doors) being the most popular. Candidates who named only one constituent part such as 'carbon fibre' were not credited.

5(a)   This question was answered well by the majority of candidates.

5(b)   Candidates were able to suggest suitable products for either oak or ash, with the majority of responses referring to items of furniture.

5(c)   The better answers made good references such as the aesthetic qualities of the colour and grain being attractive in the modern home and the ability to take specific named finishes such as polyurethane varnish to add resistance to drink spills/hot mugs. Unfortunately many candidates still describe a material as being 'strong', 'durable' and 'cheap' with no further explanation.

Section B

6(a)(i) A significant number of candidates appeared unfamiliar with foam board and many seemed to refer instead to modelling with Styrofoam. Candidates attaining higher marks made good links between the lightweight nature being advantageous when showing a model to a client, the ability to be cut with simple tools such as a craft knife in order to make features such as windows, as well as references to the availability of different sheet size and thicknesses. Credit was not awarded to candidates who gave generic responses such as, 'can be glued', 'easy to cut by hand' or 'cheap'.

6(a)(ii) This question was answered more positively than question 6(a)(i) and better answers made good reference to the malleability/ductility of aluminium allowing it to be deep drawn, non-toxic allowing it to be safe to drink from, corrosion/chemical resistance to not be damaged by acidic content. Candidates did not attain credit for suggesting aluminium was 'strong', 'can be stacked' or for references to keeping the drink fizzy or being able to withstand the pressure from a fizzy drink.

6(b)(i) Most candidates were able to correctly name another product made from aluminium and most answers listed either aeroplane or car body parts.

6(b)(ii) Press forming was by far the most successfully named process.

6(b)(iii) Candidates were largely able to give reasons why the process was suitable for their named product.

7(a)(i) The most popular material was flexi-ply. Some candidates incorrectly named a solid timber such as oak, rather than recognising the oak would need to be thin section such as veneer.

7(a)(ii) This question was out of four marks and should have been very accessible but there were many generic and unjustified responses noted, such as 'cheap', 'strong' and 'easy to cut by CNC'.

7(a)(iii) This question generally produced a low level of response and although some candidates appeared familiar with the steam bending and lamination processes, the manufacture of the metal legs showed significant weakness for many. Again generic statements such as 'can be cut by CNC' were proposed for both the timber seat and the metal legs. Manufacture proposals were often inappropriate and varied from heating the timber over an open flame, to sand casting the legs or using 'CAD/CAM' to produce all the parts.

7(b) Candidates did not generally score well on this question and few were able to state a suitable named finish such as polyurethane varnish. Some higher attaining candidates gave good descriptions of using varying grades of sanding paper, using a brush and applying in the direction of the grain and/or why the specific finish was suitable. Many candidates simply stated 'varnish' or considered applying a 'plastic laminate'.

Section C

8(a)(i)   The majority of candidates were able to suggest a suitable polymer, the most popular were ABS, PP and HDPE.

8(a)(ii)   Generally, candidates were able to give three relevant properties and explained why these were relevant to the product. Most popular responses included the ability to be pigmented for the orange colour to attract children, the polymer's impact resistance if the child dropped it whilst playing and non-toxic/chemical resistance in case the child put the toy in their mouth.

8(a)(iii)   The quality of diagrams was generally better than in previous series where injection moulding has been tested. Although some candidates still produce poor diagrams or suggest a liquid polymer being poured into a mould, the general trend appeared more positive. Top end responses showed clearly labelled diagrams with the mould in the shape of the toy. Reference to correct terminology such as Archimedean screw, hydraulic ram, water cooled split mould and ejector pins were also evident here.

8(a)(iv)   Candidates showed that environmental issues are well understood and almost all made reference to the 3Rs as a basis for their response. There were some excellent references to the use of fillers to help reduce the amount of raw material, using rechargeable, solar powered or integrated batteries and manufacturers offering free product returns at the end of product life.

8(b)   There were a surprising number of candidates who were unfamiliar with smart materials and their uses. Considerable numbers referred to TPE overlays or the LCD screen. Many simply referred to 'glow in the dark', 'fluorescent' and 'heat change' polymers.

8(c)   Although questions on packaging have appeared in previous papers, the responses indicate that many candidates found this question challenging. Most candidates were able to suggest inserting a clear viewing window, a euro slot, bar code and recycling symbol. However, lower level responses tended to propose thick acrylic as a suitable material for the 'window', within a card box that was simply 'cut and folded' into shape. The better responses showed more imagination and were often themed such as a spy or army theme with printed 'spy' scenarios with pictures of people/other children using the toy, as well as links to a product website for other toys in the range. Most of these responses chose laminated card or a recycled/recyclable card for the main box and a polymer such as LDPE for the 'window'. Many of these suggested using off-set lithography to print the designs and some suggested the use of eco inks.

A number also included a vacuum formed insert to hold the toys and showed how the card net would be cut and scored via die cutting or laser cut for higher volume production. The use of a cut out hole to enable the child to try the toy or for the toy to make a sound when the button was pressed was a popular feature with many as was a reduction in product packaging. Some other imaginative concepts showed additional features such as a handle or small 'back pack' straps like a soldier might have, a printed treasure map, secret code words to learn or re-using the packaging to store and display the toys when not in use.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results Statistics](#) page of the AQA Website.

Converting Marks into UMS marks

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UMS conversion calculator www.aqa.org.uk/umsconversion