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Examiners' Report

June 2011

GCSE Design & Technology Resistant
Materials 5RM02 01

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Introduction

This is the second paper to be sat for the new specification. The specification does allow for the paper to be sat at the end of year 10 but not many centres took up the opportunity to be able to do so last year and as such this was the first time that a substantial number of candidates sat the paper.

As a single tier paper it needs to be able to offer all candidates sitting it the opportunity to access questions. Some elements have been adapted from the legacy specification and new aspects such as the multiple choice questions have been introduced at the very start of the paper.

Question 11 (a) (i)

Candidates do not need to launch into too much detail describing what the tool is used for. 'Cutting a screw thread' was sufficient and was correctly scored by a good number of candidates.

Tool/Component	Name	Use
	Die	produce threads in a screw etc. (1)
		cutting metal



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Examiner Comments

A good number of candidates scored well on this part as they correctly identified that the die is used for cutting or making a screw thread.



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Examiner Tip

A short statement here is all that is needed; candidates do not need to give a long detailed description.

Question 11 (a) (ii)

There was much confusion over the use of the hacksaw with very many candidates giving its use 'for cutting wood'. That said a very good number were able to correctly identify its use for 'cutting metal or plastics'.

Question 11 (a) (iii)


This question was well done by a very good number of candidates who were correctly able to identify the component as a 'knock down fitting' or 'joint block'.

Question 11 (a) (iv)

The micrometer was not identified by too many candidates. Many confused it with some sort of gauge.

Question 11 (b) (i)

The command words such as 'give' in this case is key to this type of question and in relation to the properties of mild steel making suitable for use for the frame of the garden bench were either clearly known or guessed. When answers were guessed they often 'it rusts' or 'it is cheap'.



(i) Give **two** properties of mild steel that make it suitable for the frame. (2)

1 Tough

2 Malleable

(ii) Give **two** reasons for applying a surface finish to the mild steel frame.



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Examiner Comments

All that is required here are two basic statements and that is what this candidate has provided.

Question 11 (b) (ii)

A very good number of candidates scored well on this part question. They clearly understand why a surface finish needs to be applied to a material, in this case, mild steel. A short statement was all that was required here and the example clearly shows that.

(ii) Give **two** reasons for applying a surface finish to the mild steel frame.

(2)

1. So that it doesn't rust from getting wet.
2. So it looks more pleasing to the eye.



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Examiner Comments

This candidate has provided two short basic statements about the reasons for applying a surface finish to score full marks.

Question 11 (b) (iii)

Most candidates were able to score at least 1 mark here with the most common finish given being 'paint'. A very good number of other responses were seen where candidates clearly had a good understanding of a range of surface finishes that could be applied to the mild steel frame.

Question 11 (b) (iv)

This type of question which requires candidates to 'explain' is not always done well. This type of question requires a point to be made and then to be further developed to give a consequence as can be seen in the first response in the example shown. The second response is not fully developed and therefore will not score a second mark. Generic terms such as 'strong' are also to be avoided. Strength needs to be better defined such as tensile or compressive strength for example.

(iv) The frame could be manufactured from aluminium.

Explain **two** advantages of making the frame from mild steel rather than aluminium.

(4)

1 mild steel is tougher than aluminium
so it won't get damaged as easily.

2 mild steel is stronger than aluminium so
the frame could take more weight



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Examiner Comments

This type of question which uses the command word of 'Explain' requires candidates to make a point and then to develop and justify it.



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Examiner Tip

Responses such as 'strong' should be avoided unless it is qualified such as tensile or compressive strength.

Question 11 (b) (v)

Two effects needed to be described here and again this type of question is not always well done by the majority of candidates. A point needs to be made and then developed or a consequence given. The example shown makes two good points but in each case they are not fully developed and therefore only score 1 mark for each of the two responses.

(v) Describe **two** effects on the environment of being able to recycle mild steel.

(4)

1 There will be less waste going to landfill.

2 less natural resources need to be dug up from the ground to make new mild steel



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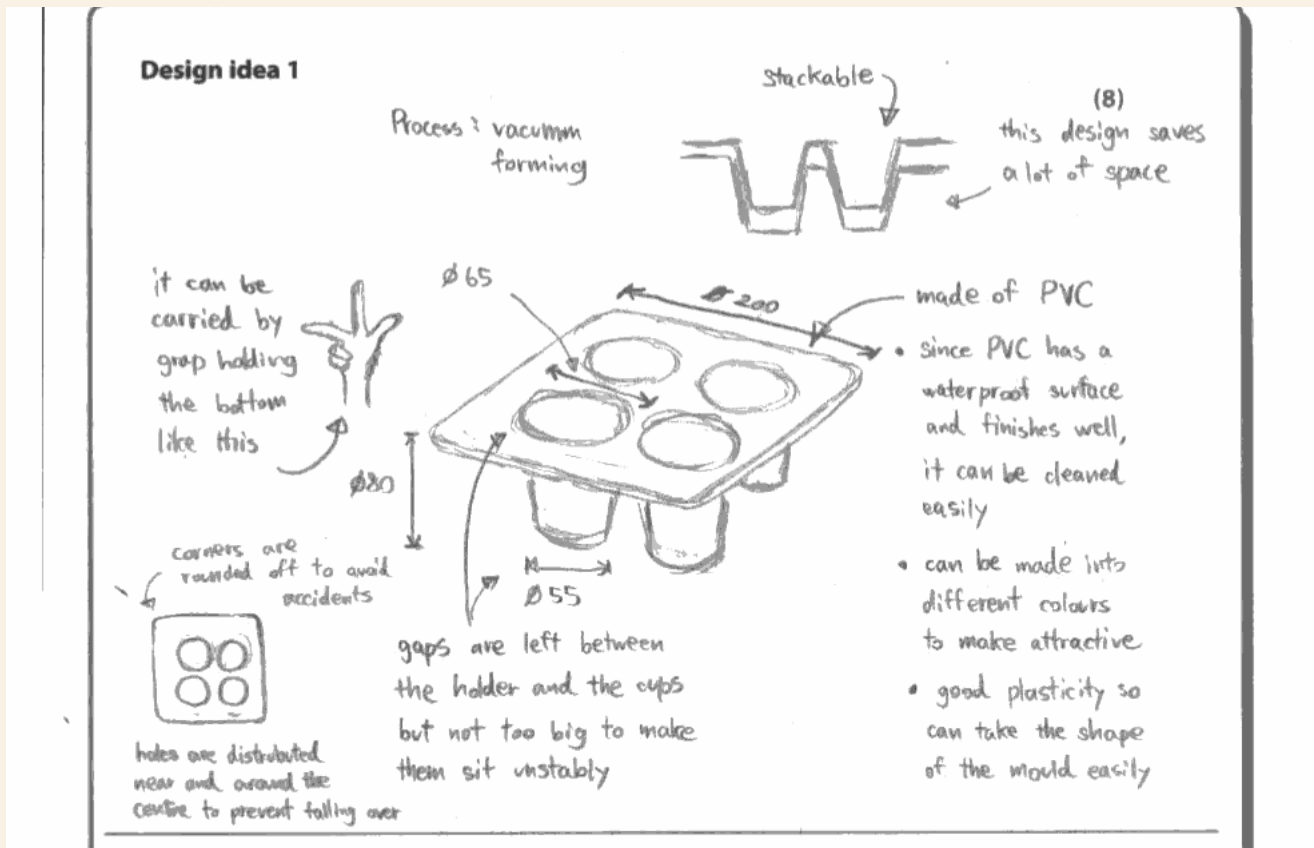
Examiner Comments

Two separate good points are made but they are not fully developed and so are only awarded 1 mark for each of the two separate responses. The second response for example could have gone on to say 'therefore natural resources will last longer'

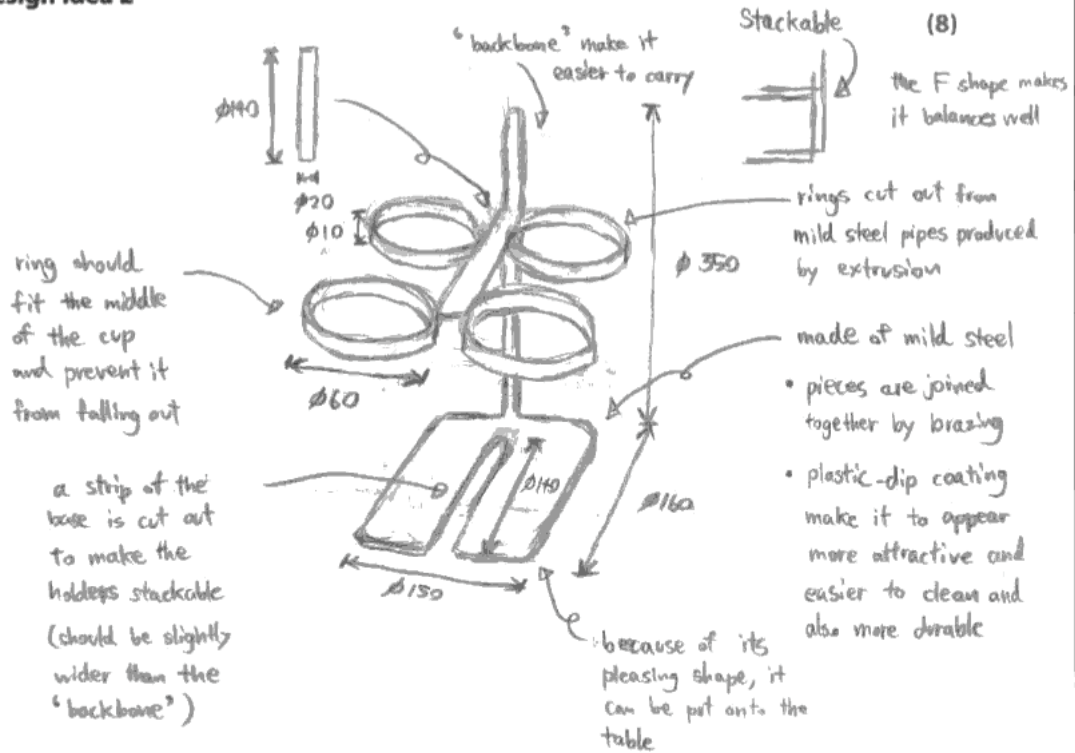
Question 12

This question is a very familiar question from the legacy specification but the evaluation section has been removed. Candidates for the most did quite well on this question but they do need to be aware that the second design solution needs to be different from the first in that it should not be a variation on a theme. Different materials and processes should also be used and therefore if they give vacuum formed acrylic for both responses they will not get the marks for material and process in the second solution.

Candidates should try to present two clearly laid out design ideas that are different from one another. The example shown is excellent in this respect.



Design idea 2



(Total for Question 12 = 16 marks)



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Examiner Comments

The candidate has used annotation well here to convey information about the solution.



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Examiner Tip

Drawings should be gone over to make the line density and quality that little bit darker. Some candidates have labelled up their work to show where each of the eight separate points were made and resolved.

Question 13 (a)

Basic factual knowledge and recall is tested here. Two properties of ABS were required as so a short word or statement will suffice as can be seen by the selected clip.

(a) Give **two** properties of ABS which make it suitable for the handle. (2)

1 it has high impact strength

2 it is resistant to scratches



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Examiner Comments

Two short statements are given by the candidate, both scoring full marks.



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Examiner Tip

Make sure you are familiar with the properties for all the named materials in the specification.

Question 13 (b)

On the whole a poorly completed part question with many responses relating to the mould be squeezed and the ability of ABS being able to withstand heat.

(b) The trigger of the workshop cramp is manufactured in ABS.

Describe **two** reasons why injection moulding is a suitable process to manufacture the trigger.

(4)

- 1 injection moulding allows many identical triggers to be produced to the exactly the same dimensions, because the mould is reused over and over, and so the process is cheaper as there is no need for any extra surface finishing (except for the sprue pins being removed)
- 2 injection moulding also allows the triggers to be produced in ^{a short} ~~in~~ amount of time because the process is highly automated and can run for 24 hours a day, which means the consumer can purchase multiple products which will be received quickly.



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Examiner Comments

A fully described first response scores the full two marks allocated. The use of the word 'because' has helped as a trigger for the candidate has been able to go on to justify the point being made.

Question 13 (c) (i)

Many candidate responses repeated the main part of the question here and as such they would only be able to score one mark at best if they were able to focus on the shape/size of the handle or its relative position to the trigger. Very few candidates picked up on the fact that a squeezing action was required rather than a twisting action would require two hands.

Question 13 (c) (ii)

A generally poorly completed question, with very few candidates being able to focus on the mechanical advantage that might be gained by the long lever/trigger.

Question 13 (d)

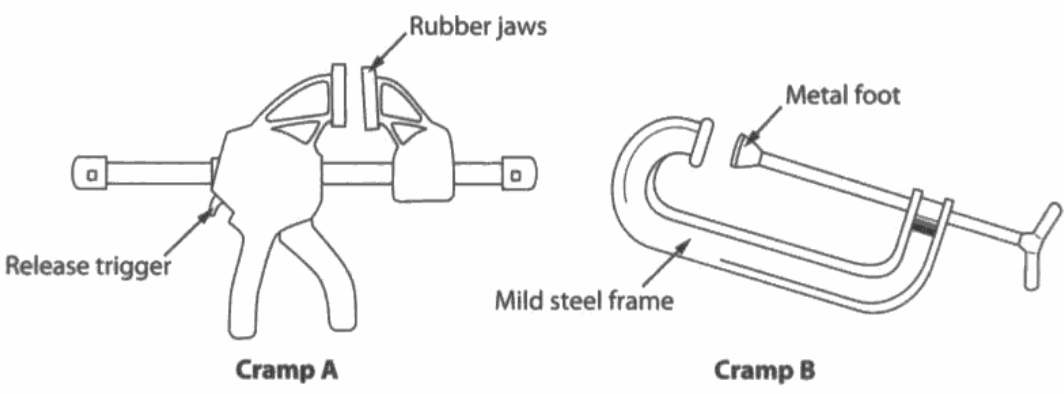
This part question requires the candidates to be able to make some comparisons between the two products shown. It is also one of the parts of the paper that considers the candidates quality of written communication, QWC.

Some candidates did not make the comparisons in relation to the criteria given, in this case 'material requirements' and 'user requirements' and as such could not be awarded any marks.

In some instances candidates simply presented a list of bullet points that were observations as opposed to any evaluative comments and again here they could not be awarded full marks.

Candidates are better advised to concentrate on making three good points that consider both of the specification criteria listed. At this point they must also develop the points made by comparing the two different products shown.

*(d) The drawings below show two different types of workshop cramp.



The image shows two technical drawings of workshop cramps. Cramp A is a hand-operated cramp with a release trigger and rubber jaws. Cramp B is a foot-operated cramp with a mild steel frame and a metal foot.

Cramp A

Cramp B

Evaluate cramp A compared with cramp B in terms of the specification criteria 'material requirements' and 'performance requirements'.

(6)

• Cramp A features rubber jaws whereas cramp B incorporates a metal foot and a mild steel top jaw. In terms of performance, cramp B would allow for a greater clamping force to be applied than cramp A due to these harder materials, yet due to the rubber jaws on cramp A, the first cramp is less likely to damage workpieces - an area which could prove an issue for cramp B.

• Moreover, another area of performance cramp A excels in is ease of use; the cramp can be operated using just one hand due to the main trigger, whereas cramp B is harder to operate with one hand as it ~~requires~~ ^{utilises a} screw-like mechanism. Furthermore, cramp B has to be manually released by this screw-like mechanism, whereas a user friendly, quick release trigger features in cramp A, saving the user time and effort.

• In terms of materials cramp A's ^{handle} is made from ABS, which as a thermoplastic can be easily and accurately shaped when combined with the injection moulding process, but at high temperatures the ABS handle could become deformed and lose its structure. On the other hand, however, the mild steel frame ^{on cramp B} is ^{now} resistant to drops and bumps than that of cramp A, and would probably last longer, yet would be shaped by a more time consuming process such as forging.

Total for Question 13 = 16 marks)



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Examiner Comments

This candidate has made a good number of points that considers both materials requirements and user requirements. For the points made they have also gone on to develop and explore the points. They use technical vocabulary well, demonstrating a detailed understanding of the comparison. D&T terms are also well used throughout.

Question 14 (a)

This type of question relies on basic factual knowledge and recall. A very good number of candidates were able to correctly identify the name of the joint shown.

Question 14 (b)

This question relied on a basic level of factual knowledge and recall in relation to the properties of oak. Hard, tough and durable were by far the most popular responses observed but candidates were not able to fully justify why those properties were appropriate.

Question 14 (c)

Two reasons were required in relation to the use of MDF rather than solid oak. Candidates should avoid the generic use of the word 'stronger' without any further qualification. Many candidates recognised that using MDF would be cheaper but did not go on to develop their response.

(c) A thin layer of oak is glued to a sheet of MDF to make the table top.
Describe **two** reasons why this is used rather than solid oak for the table top. (4)

1. A layer of oak is more sustainable than solid oak, as less deciduous trees are cut down and less ^{of this} material is used.

2. MDF has a much more uniform thickness and density than oak, and so is less likely to warp, cup or bow than oak during seasonal changes in temperature and humidity.



ResultsPlus Examiner Comments

This candidate has given two good reasons which they have been able to go on to fully develop and describe.

Question 14 (d)

Two advantages needed to be described again. In many cases candidates were able to give to reasons but did not go on to fully describe the advantages and subsequently did not gain access to the 4 marks available. Less 'travel required' and 'cheaper' were the most common responses seen.

Question 14 (e)

This part question was another area where the candidates QWC was assessed. On the whole too many candidates did not pick up on the thread that this question was about how to minimise waste during the manufacture, not how to recycle materials or the furniture once it had been used or was broken. Again some candidates simply presented a list of bullet points that considered the advantages and disadvantages of recycling.

* (e) Waste minimisation in the production of wooden furniture is a key issue in today's society.

Discuss the ways in which waste can be minimised in the manufacture of wooden furniture.

(6)

That is one way to minimise the waste, that is a simple shape of a product. The woods before you used to make the product are all boxy shape. If your product have a simple design, that you can make less waste. For example, if you going to make a circle table top, you need to cut the edge to make a circle, which will make lot of wasting piece. But if you going to make a square table top, you can easy to cut out the waste, and that waste bit can also make ~~some~~ ~~some~~ ~~the~~ something else.

And there is another way that ~~we~~ can minimise the waste, that is cut the shape out near the edge of the wood. For example, you are going to cut a circle from a wood board, you can draw the line near the edge of the wood board that you going to use. And when you cut it, the wood board still have some more place for you to make something else. If you cut the circle out from the middle, the wood board will not easy to make something more, and it will become the waste.



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Examiner Comments

This candidate has made some good points which they have been able to go on to develop and discuss as opposed to making a list of bullet points. They have also used technical vocabulary well.

Paper Summary

Centres do need to work with their candidates so that they become more familiar with the style and nature of the paper and in particular candidates need to be better prepared to be able to respond to the describe/explain type questions. Candidates could also be guided to structure their responses to the design question a little better. A better understanding of materials, processes and properties would also enable candidates to be able to access more of the paper in future series.

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