

Design and Technology: Resistant Materials

General Certificate of Secondary Education **J306**

General Certificate of Secondary Education (Short Course) **J046**

Examiners' Reports

January 2011

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Reports should be read in conjunction with the published question papers and mark schemes for the Examination.

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Chief Examiner's Report

This report provides an overview of the work seen in the written examination Units 2 and 4 and the Controlled Assessment Units 1 and 3, for candidates who took the examination during this series. It precedes a more detailed report to centres from each subject area within the Innovator Suite and highlights general issues that have occurred across the suite of specifications.

This report has been prepared by the Chief Examiner, Assistant Chief Examiners, Principal Examiners and Principal Moderators and covers all specifications within the Innovator Suite. It should be read in conjunction with the examination papers, the mark schemes, and the marking criteria for assessment given in the specification booklets.

This is the first examination series in the second year for the new Innovator Suite.

A reminder: An important point for teachers to note about the Terminal Rule in relation to this suite of specifications and re-sits:

The terminal rule is a Ofqual requirement. Candidates must be entered for at least two units out of the four (full course) at the time that they certificate. ie the end of the course.

Please be aware that the Ofqual rule states that marks scored for terminal units will be the marks used in the calculation of candidate grades. Therefore, if one of the candidate's terminal units is a re-sit and the mark is poorer than the original mark, the poorer mark will be used to calculate the final grade for that candidate.

Obviously, the terminal unit marks are then added to the highest marks scored in the other units making up the certificate.

Centres are reminded that it is also a requirement of Ofqual that candidates are now credited for their accurate use of spelling, punctuation and grammar across all four units.

It is pleasing to see that centres and candidates have continued to respond well to the new style of examination approach. Centres are to be commended for this.

Written Examination – Units 2 and 4

Unit 2 – For this examination series of the GCSE Innovator suite entries were seen from all six subject specialisms:

A512 Electronics and Systems Control
A522 Food Technology
A532 Graphics
A542 Industrial Technology
A562 Resistant Materials
A572 Textile Technology

Entries were significantly increased this session giving a more realistic idea of candidate performance. The overall performance and range of results for Unit 2 has improved. Performance however, within subject specialisms is still varied.

Many of the candidates demonstrated a general awareness of the main points and issues linked to sustainable design and the 6Rs.

Unit 2 – Section A Most candidates across the suite attempted to answer all questions, with few candidates giving no response (NR) answers. It was noticeable that, at times, candidates had not read the instructions correctly and centres would benefit from explaining the correct examination requirements to the candidates. Candidates need to be encouraged to give an answer for the multiple choice style questions even if they are uncertain that they are correct. There was less duplication of circling answers seen during this examination session.

Unit 2 – Section B A greater mixture of responses was seen and teachers need to ensure they read the subject specific reports for further detailed feedback on specific issues and individual question performance.

In general, candidates lacked the specific knowledge and understanding required to answer some questions in depth. Many candidates did manage to use subject specific 'terms' in their answers, but at times these lacked sufficient depth and tended to be generally weak.

Candidates need to be made aware of the importance of the wording of each question and they need to understand the difference between terms like 'name', 'discuss' and 'explain'. Many candidates did not score marks on the explain questions, because they gave a list of unrelated points instead of developing one of these.

Important: Candidates need to be careful that they do not repeat the question in their answer or write the same answer for several questions. Such answers included:

- 'Environmentally friendly' and 'better for the environment' or 'damages the environment'.
- To 'recycle' and 'recycling' is good for the environment.

The questions marked with an asterisk * provided candidates with an opportunity to give a detailed written answer combining good subject knowledge with an ability to produce a structured response. Few candidates were able to do this really well, but most candidates did score two or more marks from the six available for this question.

Hand writing at times was difficult to decipher and candidates need to be prepared to make an effort with their hand writing, particularly on the banded mark question * and questions requiring a detailed explanation or discussion of points.

Centres are reminded that candidates are marked on spelling, punctuation and grammar on the banded mark scheme question. It is also important to note that candidates need to ensure that they write legibly and within the areas set out on the papers.

Unit 4 – For this examination series of the Innovator suite entries were seen from the following subject specialisms:

A514 Electronics and Systems Control
A524 Food Technology
A534 Graphics
A544 Industrial Technology
A564 Resistant Materials
A574 Textile Technology

The overall performance of candidates varied considerably across the suite of subjects for Unit 4. However, it was encouraging to find that many candidates did demonstrate a good understanding of the technical aspects of designing and making in most of the specification areas this series compared to last year.

Areas of Unit 4 which Principal Examiners highlighted as being of particular concern are:

- **reading questions carefully** – the majority of candidates attempted all the questions this series. It is important that candidates do read the questions carefully to determine exactly what is required. It can be helpful for candidates to highlight what they consider to be the 'key' words or instructions before completing their answer.
- **clear and accurate answers** – in questions that require candidates to produce sketches and notes, it is essential that answers are made as clear and technically accurate as possible. Marks may be compromised through illegible handwriting and poor quality sketches.

It is apparent this series that candidates need to be practiced in examination technique; reading the questions carefully, responding to the instructions given in the questions and having an awareness of the full range of question formats.

Centres are to be reminded that questions marked with an asterisk* provide candidates with the opportunity to give detailed written answers combining good subject knowledge with an ability to produce structured, coherent responses and accurate spelling. A list of bullet points does not represent an adequate answer. Practice of this type of question which carries [6] marks is strongly recommended. There are two of these type of questions within Unit 4.

Controlled Assessment – Units 1 and 3

Unit 1 – For this examination series of the Innovator suite entries were seen from the following subject specialisms:

A511 Electronics and Systems Control
A521 Food Technology
A531 Graphics
A541 Industrial Technology
A561 Resistant Materials
A571 Textile Technology

Unit 3 – For this examination series of the Innovator suite entries were seen from the following subject specialisms:

A524 Food Technology
A533 Graphics
A563 Resistant Materials
A573 Textile Technology

This examination series has seen portfolios for all subject specialisms being submitted both through postal and repository pathways. Most centres have been prompt in the dispatch of documentation to OCR and moderators, which is to be commended. It is important that centres forward form CCS160 in particular to moderators.

Important Note: Centres must ensure that if candidates are entered through the repository (01), the marks must be downloaded onto the OCR site and the sample uploaded into the OCR repository and **NOT** sent through to the moderator on a disc. This is classed as being a postal (02) moderation.

In general, centres have been successful in applying the marking criteria for both Units 1 and 3. However, it is still noticeable that some candidates were being awarded full marks for work that lacked rigour and depth of analysis. Words highlighted on the marking criteria grids such as 'appropriate', 'fully evaluated', 'detailed' and 'critical', which appear in the top mark band, were not always adhered to.

Centres are reminded to apply the mark scheme on a 'best fit' basis. For each of the marking criteria, one of the descriptors provided in the marking grid that most closely describes the quality of the work being marked, should be selected. Marks should be positive, rewarding achievement rather than penalising failure or omissions.

It was still evident that a significant number of portfolios, particularly for Unit 1, resembled the legacy format. Care must be taken here to ensure that the marking criteria and format of the Innovator suite is not confused with the legacy approach.

It is important that centres encourage candidates to organise the portfolio according to the different marking criteria strands as it enables the candidates to produce work that clearly shows an understanding of the controlled assessment requirements. Portfolios should be clearly labelled with the Candidate and Centre name and number, with the unit code and title also evident. (*Specification – 5.3.5 Presentation of work*) This is particularly important when the Centre submits work via the OCR Repository, where individual files are used to store portfolio work. Centres need to ensure that candidates clearly label each file using the marking criteria section headings; this facilitates a more effective completion of the moderation process.

Centres are also reminded to ensure that the OCR cover sheet is evident on each portfolio of work, **outlining the theme and the starting point** chosen by the candidate.

Many candidates included a bibliography or referenced their research sources, which was pleasing to see. It is good practice to ensure that candidates acknowledge sources of information used for the development of their portfolio work.

There was still some evidence this series of strong teacher guidance influencing candidate portfolios. Where this was evident it greatly hampered the candidate's ability to show flair and creativity, and therefore achieve the higher marks. Centres should avoid over-reliance on writing frames for candidates work.

Centres are to be reminded that the '*controlled assessment task must NOT be used as practice material and then as the actual live assessment material. Centres should devise their own practice material using the OCR specimen controlled assessment task as guidance.*' *Specification – Section 5.2.2 Using Controlled Assessment Tasks.*

It was noticeable that where candidates had scored the high marks, they had used specialist terms appropriately and correctly and had presented their portfolio using a structured format.

Centres are to be commended on the amount of work produced for the portfolios in Units 1 and 3, which has been realistic in terms of the amount produced and the time allocated to each unit – 20 hours.

Unit 1 – specific areas of importance

Centres are to be reminded that some Themes for Unit 1 are based around environmental awareness and sustainable resources/processes. Therefore, it is considered good practice for teachers to encourage candidates to consider Eco-design and sustainability when making decisions and combining skills with knowledge and understanding, in order to design and make a prototype product. This knowledge base also acts as a 'spring board' to active learning for Unit 2.

It was evident through the portfolio that candidates struggled with the critical evaluation section of the marking criteria. Unit 1 requires that the candidate evaluates the processes and subsequent modifications involved, in the designing and making of the final prototype ONLY. Too many references were made to the performance of the prototype against the specification, which meant that candidates' marks were compromised. (Not applicable to Food Technology)

Unit 3 – specific areas of importance

Due to the low number of entries for this unit specific guidance is limited. However, centres need to ensure that candidates complete a quality product for Unit 3. The weighting of marks available for the making section therefore, must be reflected in the time available for the candidates to complete a quality product.

A561 Introduction To Designing and Making

Introduction

Entries for this unit again remain positive and it is encouraging to see that quite a number of centres have seen the advantages offered by this specification in having the alternative of two assessment periods to enter the work of their candidates.

The majority of centres also have a clear understanding of the regulations relating to “controlled assessment” however there is still evidence that some of the work presented for moderation did not comply with the levels of control stated for this unit of work in the specification.

Disappointingly there was again evidence of teacher guidance and the use of writing frames which created a very formulaic approach to the work in these centres and as a result it stopped the candidates from showing the individuality which is expected in this unit. Our advice would be to take great care when making the distinction between guidance and prescription during these periods and centres should be aware of the guidance offered in the document, “**Guide to controlled assessment in Design Technology**” which can be downloaded from the OCR website for Design Technology Resistant Materials.

Centres are also reminded that one of the main requirements of this unit is to design and make a prototype product primarily constructed using “Resistant Materials”. In this way it was never intended to be a continuation of the projects previously produced for the legacy specification but an opportunity for the candidates to show some creativity in their work *which necessitates* a different approach to teaching the candidates for it to be successful.

Administration

Encouragingly centres again used the full range of options available in this specification to produce candidates work and portfolios were presented for moderation as “traditional” paper folders, e-portfolios or through the repository.

Where there were difficulties in administration they were focused upon the fact that some centres did not supply individual Controlled Assessment Cover Sheets for every candidate or a CSF form with the sample of work that had been requested. It is worth noting that in order to complete the moderation process moderators require this information both to check on the standard of marking and to provide the feedback required to centres on how their candidates performed.

Centres are reminded that there is a full range of documentation, including downloadable forms and other subject specific support materials on OCR’s website: www.ocr.org.uk.

It is also worth noting that the assessment statements are now used as “best fit” descriptors when they are applied to the candidates work and marking should be positive. In order to support this there are no longer separate marks given for any of the individual elements of the assessment objective, only an overall numerical value taking into account the quality of all the work produced by the candidate against the related criteria. This is a fundamental difference between the marking in the legacy specification and this unit. Centres are therefore advised to look at the three main levels of response – Basic ability column, demonstrate ability column and works competently column as a first indication to use when assessing candidates work.

Performance of Candidates

The more successful candidates work tended to reflect the assessment strands written in the specification and they provided evidence across all of these areas to support the marks awarded by the centre. Again some of the more common issues which affected candidate's achievement included –

- A “range” of existing products being shown in the creativity section of the portfolio without the candidates concluding what trends or design features they had identified from their analysis. Presenting examples of these products with just a basic description taken in many cases from a commercial catalogue is not what is required in this assessment strand.
- Candidates not editing research information and providing summary conclusions as to what they had learned from producing these materials.
- Limited evidence of modelling techniques being employed to support the development of the design ideas.
- The lack of a written commentary to support the marks awarded on how they overcame technical problems in the making.
- Limited photographic evidence in the record they needed to produce of the key stages in making the prototype.
- The evaluation being focused upon the product rather than the process of designing the prototype.

Creativity

There has been encouraging evidence in this cohort of entry that some centres have prepared their candidates well for this assessment strand. The work has *been well* presented and there has been clear evidence that the candidates have edited this information to show how they have identified trends or design features from their research work. In this way they have been able to state what they have learned from this process rather than just seemingly “going through the motions” to address the requirements of the assessment criteria.

Centres are again advised to prepare candidates prior to starting the controlled assessment on how to present the work required for the creativity section of this unit. We are not expecting work that is not relevant, informative or focused upon the theme selected by the candidates. In this way research work such as a questionnaire produced to find out the user needs can still be completed but within the “controlled” environment, it is the results or conclusions only that we would expect to see in the portfolio.

Successful candidates clearly showed how they had selected their own problem area from the list of controlled assessment themes stated in the specification. They carried out a thorough analysis of one existing product and then by editing information from other similar research they were able to identify what were good design features and explained the significance of any trends in these existing products. By using notes, sketches and photographs they were also able to give examples of intended users and their likely needs when using the product. From this candidates were then able to analyse the information that they had gathered before using this to generate a concise Design Brief that clearly identified the product and users.

Designing

The better candidates in this assessment strand were able to start the work by analysing their design brief and the conclusions that they made from their previous research before producing a detailed specification for their own prototype product.

However, there has been a great variation in both the quality and content of the design specifications seen in the portfolios with a lot of very generic or vague statements being given that could apply to any product rather than specifically to the design that candidates wish to produce. Our advice would be to produce this list of specifications as a series of bullet points that are relevant to the product being produced and which reflect the information presented in the creativity section of the portfolio.

Candidates used freehand sketching to illustrate their initial design ideas with basic annotation, which sometimes provided little in terms of detail or explanation. In some cases the quality of the work produced was a delight to see and moderators were very encouraged by the standards of work produced by some centres. However, some of the portfolios presented for moderation were very poorly produced and because of the quality of detail contained within them it proved difficult to follow the candidates design thinking in developing the prototype required.

Modelling was also used by a number of candidates to show how the product *is developed* from their earlier designs and to make informed decisions about materials and construction techniques. However, some candidates seem to ignore this requirement completely or the standard of the work that was produced was of such a low quality it could not, in all honesty, have supported this process and yet high marks were awarded. Centres are reminded that modelling is a necessary requirement of this unit and it is essential that candidates include evidence of modelling work in order to gain full credit for their design work in this assessment strand.

Successful candidates having analysed their brief and the conclusions that they had reached from the research were then able to produce a clearly structured design specification which related to the product that they intended to design. Design ideas were presented using a range of graphic techniques, including the use of CAD, which were supported by detailed annotation. Modelling helped them to develop the final solution where they were then able to give details of sizes, possible materials, likely construction methods and processes. Reference to the specifications then helped them to give reasons for the choice of the prototype product that they intended to make.

Making

Could centres please note that the focus of this unit remains as an introduction to designing and making and as such candidates should be developing a prototype product which enables the candidates through the assessment scheme to show some creativity in their work? It therefore remains a concern *at the* variety of products being produced by candidates in some centres as due to their size and complexity they seem to imply that the details given in the specification are not being clearly understood. These centres still appear to view the controlled assessment units in the Innovator suite as being two similar units of work. It is worth stating again that this has never been the intention of the examination board with the introduction to the unitised approach to assessment in this specification.

Candidates were able to complete a “prototype” product within the allocated time for this unit; however, the use of CAM to produce the final product was evident in some of the candidates work submitted for moderation and centres are reminded that the assessment scheme indicates that a variety of processes should be used in the construction if this method is employed for manufacture.

The use of screen shots or CAD drawings to show “ownership” of this process, as mentioned in the previous report, was felt to be far more evident in this cohort of entry.

The majority of candidates had planned the stages of making their product to some degree or other before starting to make the prototype. Centres are reminded that the assessment of this work should be taken into account when deciding upon the overall mark to award for the making process as candidates cannot be awarded the highest marks if this work is not evident in the portfolio.

The work presented to record the key stages of making was in many cases limited and was usually just a few written notes. Photographic evidence is also required to support this process and where this was evident and detailed many of the candidates were able to achieve full marks for this assessment.

Centres are also awarding marks for how the candidates overcame any technical difficulties without there being any formal evidence recorded by the candidate. This resulted in a number of adjustments having to be recommended during the moderation process and our advice in this instance would be to highlight this information in the record of the key stages mentioned above.

Successful candidates made appropriate choices of materials, tools and equipment and worked skilfully and safely to produce a high quality prototype product suitable for the intended user. They showed evidence of having used a variety of making processes in producing the product and where CAM had been used as one of these techniques they provided supporting evidence in the form of screen shots which indicated understanding and ownership of the manufacturing system. Planning the stages of manufacture had clearly been produced before they started the practical work and they were then able to demonstrate their ability to solve any technical problems in the record they made of the key stages in creating the prototype through comprehensive notes and visual evidence.

Evaluation

Although there was evidence that a lot more centres have now focused their work to reflect the specification requirements for this assessment strand it is still disappointing to see candidates who have based their evaluation on their prototype product and how it functioned rather than modifications to improve the designing and making process. It is worth noting that with grade boundaries previously amounting to fewer marks than those that can be awarded for the evaluation process it may have a significant affect on the candidate's achievement if an adjustment is recommended by the moderator due to a lack of understanding from the centre.

Centres are therefore again reminded the Specification for Unit A561 clearly states that the evaluation should be of the complete designing and making process and not how well the final product functions. Furthermore that any modifications proposed by the candidate should be of ways to improve the designing and making process that the candidate has produced in completing this unit of work only.

Successful candidates critically evaluated the processes involved in designing and making the prototype in this unit of work as opposed to the product itself (as in unit A 563). With reference to their initial planning, and the record they produced of the stages in making their prototype product, they were then able to reflect and suggest modifications to improve the design, modelling and prototyping processes using specialist terms with a clear emphasis on the correct use of spelling, punctuation and grammar.

A562 Sustainable design

General Comments:

Generally, the paper was suitably challenging for all candidates, with most being able to attempt the majority of the questions.

Section A. The questions in this section are a combination of multiple choice, one-line and true/false statements which on the whole, were answered well by most candidates.

Candidates must take greater care when circling their answers in Section A. They should not circle more than one answer and completely clear incorrect circles to eradicate confusion in marking.

Section B. These questions provided many opportunities for candidates to gain marks. There were no questions that were not attempted with some candidates managing to achieve full marks.

The * question (which rewards candidates for the quality of their written communication) was marked using a banded mark scheme. Few candidates were able to do this really well, but most candidates did score two or more marks from the six available.

Comments on Specific Questions

Section A

Question 1

This question was well answered with almost all candidates achieving one mark. **Solar** power is the correct answer.

Question 2

This question was fairly well answered with a majority of candidates achieving one mark.

Disposal of the product is the only correct answer.

Question 3

The majority of candidates found this question challenging. **People** are the subject of anthropometric measurements.

Question 4

This question was reasonably well answered by candidates. **Pine** is the correct answer.

Question 5

Very few candidates gained the mark available for this question. **Mild steel** is the correct answer.

Question 6

A large number of candidates recognised that aluminum was the required material. Most then linked these concepts, but failed to recognize that the symbol would normally be found on containers for the disposal of empty cans. **Recyclable aluminum** is the correct answer for the full one mark.

Question 7

Many candidates answered this question correctly. "Planting trees" did not gain the mark. **Re-planting trees after cutting them down**, or acceptable close alternatives, is worth one mark.

Question 8

Most candidates gave no response for this question. However, where this was attempted, most answers were correct. **Control of Substances Hazardous to Health** is the acceptable answer.

Question 9

Many candidates did not recognise that the term implies a *measurement* of man's effect upon the environment, not simply the effect alone.

The measurement of our effect upon the environment or other references including statements such as "The amount of ..." or "A calculation of ..." achieved the mark.

Question 10

Few candidates were able to answer this question correctly. **Smart Materials** is the expected response, but a very few candidates proffered specific smart materials such as "thermochromic".

Question 11

Most candidates did not understand the meaning of primary, secondary and tertiary recycling. The question was worded to test the candidates' understanding, and it is **False**.

Question 12

A large number of candidates were able to answer this question correctly. This statement is **True**.

Question 13

Most candidates recognised that this statement was **False**.

Question 14

This question expected the candidate to recognise that the issues relate to day-to-day relationships between neighbouring communities, irrespective of race, religion or skin colour. The statement is **True**.

Question 15

The majority of candidates recognised that this statement was **True**.

Section B

Question 16

- (a) Many candidates repeated the question, using “analysis” or “analyse” as part of the answer, which was not required. Most candidates clearly understood the concept of product analysis. No credit was given to answers that were based upon evaluation, testing or researching. Acceptable answers included:
Looking at .../examining/taking apart/checking areas such as materials, features, shape, form, function (see how it works), aesthetics, sizes, texture, components, ergonomics, purpose, manufacturing methods, safety, ease of use, good/bad points, possible improvements.

- (b) Disassembly does not normally involve weighing or measuring, nor does it usually assist with improving the appearance of a product or aiding its assembly: Many candidates used these as part of their answer, and lost marks because of this. Most candidates answered this question, but few were able to gain full marks.

Acceptable responses included: how the mechanism works; materials components are made from; method of construction/manufacture used for each component; the components used; fixings used; finish used; ease of disassembly; quality of manufacture.

- (c) Many candidates made assumptions about the construction of the can crusher, and proposed that it was made from recycled or recyclable or reusable materials, none of which was stated in the stem of the question. These or similar statements gained no marks. Similarly, many discussed the reduction in landfill volume taken up by crushed cans, missing the point of the machine which is to aid recycling, not disposal. Very few candidates scored maximum marks. Acceptable responses included: product encourages people to recycle cans; product crushes cans so they take up less space when stored or transported for recycling; product does not require an energy source/no emissions.
- (d) The majority of candidates attempted an answer to this question, but wasted time by redrawing the whole can crusher. This was unnecessary, sketches showing a fixing to the crusher would have been sufficient. Some candidates failed to gain marks due to the poor quality of sketching or because they did not use notes **and** sketches. Centres must spend time in ensuring that students can extract the relevant points from a question and put the details down in note and sketch form as quickly and accurately as possible. Notes cannot just be labels; they must provide information that cannot be obtained from the drawing alone. A good proportion of candidates scored full marks on this question however. Acceptable responses to this question were: base extended; an attachment to base or back plate; fixing to a wall/work surface; addition of a second supporting handle that improves stability.
- (e) The key word in this question is “sold”. The crusher has to be **marketed** as environmentally friendly (without referencing cost), not simply seen to be eco-friendly. The majority of candidates answered this question well. Acceptable responses included: could be made from recyclable/sustainable materials; easy to disassemble for recycling or disposal (including biodegrading); use of materials/packaging kept to a minimum; easy to repair; no energy required for operation; use of environmentally friendly finishes; sourcing of materials; choice of materials; keeping the energy needed for manufacture to a minimum; information on the packaging stating that the product can be recycled.

Question 17

- (a) Most candidates were able to identify two user groups, but were often unable to qualify their choices with good reasons or cause/effect rationale. Some candidates did not read the first part of the question and responded to the unsuitability of the design environmentally. Marks were evenly spread across the ability range for this question.
- (b) The majority of candidates were able to identify suitable fastening materials. Generic terms (metal, plastic) were not rewarded, nor were iron or copper. Appropriate responses were: Aluminium, Brass, Stainless steel, Nylon.
- (c) This question was not well answered with very few candidates receiving the full two marks available. Some candidates could identify the fact that the product could be recycled, but very few could reasonably discuss that the number and letter enable the product to be identified so that it may be separated and recycled with chemically similar items. Centres need to ensure that students can differentiate between recyclability, recycling and recycled. An acceptable response is: Shows that the product can be recycled; enables the type of material the product is made from to be identified for recycling.
- (d)* This question allows the candidates to show the quality of their written communication skills. Few, however, took the opportunity to provide a convincing argument for the recycled plastic table, preferring to discuss wood in depth. The majority of candidates provided a bullet point approach which compromised the top marks. Centres must ensure that students can distinguish between questions that begin "State ...", "Explain ..." and "Discuss ...". Poor spelling, grammar or punctuation also impacted on the marks achieved by some candidates. Suitable responses referred to: The table will require no maintenance; the table will be easy to clean and be more hygienic to eat from; the table will be more comfortable due to rounded edges and no splinters etc; table is made from recycled plastic so no new resources used; can be recycled again at the end of its useful life; could be lighter so easier to move than solid wood; self coloured.

Question 18

- (a) Few candidates obtained the full range of marks for this question, many candidates missed the fact that the focus was on the manufacture of products, not about recycling, solutions to problems, etc. Any combination of cause/effect could be accepted if logical. For example; Pollution, ie in the form of carbon dioxide are forming a thicker layer over the earth and preventing infrared radiation escaping leading to global warming. Factories use a large amount of energy – production of energy uses unsustainable resources or causes pollution.
- (b) This question was not well answered with candidates giving vague responses. Few candidates were able to discuss the reasons why designers would not design CFCs into their products. Acceptable responses included: CFC's cause damage to the ozone layer; the designer may think it is immoral to use them because of damage to the environment; mention of specific health issues such as sunburn; allows more UV light through which impacts on marine life; customers may not want CFC products; problems with recycling CFC products.
- (c) Candidates performed reasonably well on this question. However, careful reading of the question would have allowed many more candidates to achieve the higher mark. The question relates to transportation of goods *to the consumer*. Many answers referred to a reduction of routes, cutting down on numbers of lorries on the road, using bigger/smaller vehicles, electrically powered vehicles and similar impractical "solutions". Requiring consumers to travel further to pick up goods from a central depot was also proposed, thus increasing the traffic on the roads rather than reducing it. Acceptable responses included:

Making products stackable so more can be transported in a given space. Making products self assembly/flat pack so more can be transported in a given space. Manufacturing closer to where the product is retailed so less distance is travelled/less energy used. Reduce the size/weight of the packaging used so that more products can be moved at the same time.

- (d) This question was not well answered. Acceptable responses included: Compensating for/offsetting the negative effects on the environment of their activities by promoting and/or investing in energy sources which emit less carbon dioxide. Carbon offsetting was often confused with carbon reduction. Candidates need to know the particular differences of each procedure and the issues involved.
- (e) Most answers seen related to a reduction of carbon footprint, or discussed waste energy. References to companies using renewable energy sources, producing polluting gasses, reducing transport and carrying out reforestation were all common responses. The emphasis must be upon **investing in, donating to or contributing to** the work of others, such as development of new/renewable sources of energy or methods of reducing CO₂ in the atmosphere. Acceptable responses included: Contributing to the development of renewable energy sources so less energy from non renewable resources are used in the long term; Investing in reforestation so trees soak up carbon dioxide.

A563 Making Quality Products

Introduction

This series has seen the second entry of students for this unit in the new Innovator specification and the number of candidates entered continues to rise in proportion to those for Unit A561. Many centres are therefore viewing this as the second controlled assessment project even though they can be taken in any order to suit the requirements of the centre.

Centres also this time used the full range of options to present candidates work and portfolios were sent for moderation in paper, repository or e-portfolio formats. It is worth noting however that although the work produced by each individual candidate is expected to be in the same format throughout centres may wish to use more than one method overall.

On a positive note it is good to report that there were no major issues with regards to controlled assessment reported for this unit and that the overall standard of work seen by the moderators was felt to be of a good standard. It was therefore encouraging to note the centres who have applied the information that was provided during OCR training for this specification or who have acted upon the previous examiners report produced in June.

Centres are reminded that the focus of this unit should be on the making of a quality product and therefore within the 20hrs of controlled time allocated for this unit. The majority of this period should be used by the candidate to produce the product rather than the portfolio of design work.

Centres are also required to ensure that candidates do not pursue the same 'theme' for their work as submitted or intended for submission in Unit A561.

Administration

It is encouraging to report that all of the assessment material reached the moderators in plenty of time for them to complete the moderation process and centres are commended for their quick responses to the computer generated sample requests.

Many centres supplied separate notes to those on the Controlled Assessment Cover Sheets for each candidate along with a CSF form with the sample of work that had been requested which in all cases helped the moderation process.

Centres are reminded that there is a full range of documentation, including downloadable forms and other subject specific support materials on OCR's website: www.ocr.org.uk.

Performance of Candidates

Generally there was a good response from the centres that had entered candidates for this unit. Far fewer of the folders reflected the content that we had seen previously in the legacy specifications and therefore it was felt that candidate's time was being focused sufficiently upon the production of a quality product. Centres seemed to have the "balance" of the work more in the right proportion which then reflected the assessment criteria. However, some of the more common issues which affected candidate's achievement included –

- The presentation and annotation of the design ideas was of a more limited quality and this was not reflected in the marks awarded by a few centres.
- Little evidence of suitable modelling techniques being employed that would support the development of the design ideas.

- The lack of formal detail (written notes) to support the marks awarded on how they overcame technical problems in the making.

Designing

The majority of candidates provided a suitable “response” in terms of the content of the work that they presented in this assessment strand having previously identified their own brief from those themes stated in the specification.

Centres are advised to look carefully at the allocation of marks in this section of the portfolio as an indication of the amount of work that should be produced by the candidates. The advice that we would offer would be to show this response in about two sheets of work.

Most of the candidates used freehand sketching to illustrate their initial design ideas with some annotation which varied both in terms of content and quality. In this cohort of entry there was also some evidence in the portfolios of CAD being used to support the development of the final design. Some centres have not understood the need for modelling to be included as part of this process and in some cases high marks had been awarded without there being any real evidence to support this requirement.

As in A561 it is essential that candidates include evidence of modelling work to show how the product has developed from their earlier designs and to make informed decisions about materials and construction techniques in order to gain full credit for their work.

Successful candidates Clearly showed how they had selected their own problem area from the list of controlled assessment themes stated in the specification. They were then able to produce a design brief for their intended product together with some supporting evidence to show what conclusions they had reached from any related research that they had previously conducted. A clearly structured specification resulted from this which was specific to the product that they intended to design. Design ideas were then presented using a range of graphic techniques, including the use of CAD, and were supported by detailed annotation. Modelling helped them to develop the final solution where they were then able to give details of sizes, possible materials, likely construction methods and processes. Reference to the specifications then helped them to give reasons for the choice of the product that they intended to make.

Making

The quality of work seen by moderators in this cohort of entry was generally good across the full range of abilities. Centres are appearing to be more realistic in their expectations due to the obvious time constraints in this unit of work and although there were still some very ambitious projects attempted these were far fewer than in the summer.

Centres are reminded again however that where candidates use CNC techniques to produce the final product they should be used in conjunction with other construction methods as stated in the specification guidance.

The planning that was seen in the portfolios varied considerably in content and detail with a few centres giving very high marks for the quality of the making assessment even though the planning provided by the candidates was felt to be very limited. It is worth noting that although there are no specific marks given for planning in this specification it is a requirement in all three response levels of the assessment criteria that planning is evident to support the production of the product.

Centres attention is also drawn to the requirement that in order to achieve the marks that can be awarded for identifying how the candidates overcame technical problems they must provide evidence of this in their portfolios. Out of all the assessment strands in this unit this was the one indicated by moderators as needing the greater number of adjustments. Our advice would be to ensure that candidates clearly record these issues in the record they make of producing the product.

Successful candidates made appropriate choices of materials, tools and equipment and worked skilfully and safely to produce a high quality product suitable for the intended user. They showed evidence of having used a variety of making processes in producing the product. Where CAM had been used as one of these techniques candidates provided supporting evidence in the form of screen shots which indicated understanding and ownership of the manufacturing system. Planning the stages of manufacture had clearly been produced before candidates started the practical work and they were then able to demonstrate their ability to solve any technical problems in the record they made of the key stages in creating the product through comprehensive notes and visual evidence.

Evaluation

The requirement here is to evaluate the function of the product as opposed to the design processes as in A561. It was encouraging to note that there were far fewer recommendations to adjust centre marks.

Candidates based their evaluation on the product they had produced and how it functioned having previously conducted a series of tests to see how it performed in use. They were then able to compare the product to the design specifications and suggest modifications through notes and sketches.

Successful candidates Showed evidence of having tested their completed product in use and compared this to their list of specifications. From this they were then able to suggest improvements to their product using a series of notes and sketches. Throughout this assessment strand they also showed evidence of the correct use of specialist terms and showed accurate use of spelling, punctuation and grammar.

A564 Technical aspects of design and making

General Comments

Candidates' knowledge and understanding of this area of the specification was very poor. While much of the content is similar to that of the legacy GCSE, there are some new areas that candidates need to be familiar with; including die-casting and rapid prototyping.

In particular, their knowledge of basic techniques when working with wood, metal and plastic was very weak.

Candidates need to make their sketches large and clear and provide meaningful written notes that **add** to the information given in their sketches.

Often, illegible handwriting and inaccurate spelling meant that answers were extremely difficult to understand.

Questions marked with an asterisk* provide candidates with the opportunity to give detailed written answers combining good subject knowledge with an ability to produce structured, coherent responses. While there were some good individual points expressed in both questions, candidates failed to gain maximum marks.

In addition, candidates should improve their examination technique by reading the questions carefully and responding to the instructions given in the questions.

Comments on Specific Questions

Section A

Question 1

This question tested candidates' practical knowledge of working with MDF. Generally, the results were poor.

- (a) Most candidates were able to describe the processes for which the named tools and/or equipment would be used. However, the majority of candidates did not know the purpose of a saw tooth bit.

An accurate set of answers is shown below.

- (a) Complete the table below by describing the processes used to produce the heart shape in the MDF front.

Stage	Processes	Tools / items of equipment
1	Draw the heart shape on the MDF and a template	✓ Template
2	Cut a hole in the middle	✓ Saw tooth bit
3	Cut out the heart shape	✓ Coping saw.
4	File the edges until smooth and correct shape	✓ Half-round file

[4]

- (b) Many candidates gave a good reason why paint would provide a better surface finish than clear varnish; the most common answer referring to use of colour or its attractiveness.
- (c) (i) It was disappointing that most candidates did not appear to be familiar with epoxy resin adhesive.

However, the answer below demonstrates a good working knowledge.

Describe how:

- (i) the epoxy resin adhesive would be prepared;

the epoxy resin would be prepared using
 equal parts of glue and catalyst then
 mixing until its white* * - in some cases [2]

- (ii) Many candidates achieved one mark for applying good practice by describing the use of cramps or a vice. For a second mark candidates needed to describe the use of scrap wood to protect the surfaces or the use of a jig to locate the pieces while the adhesive set.

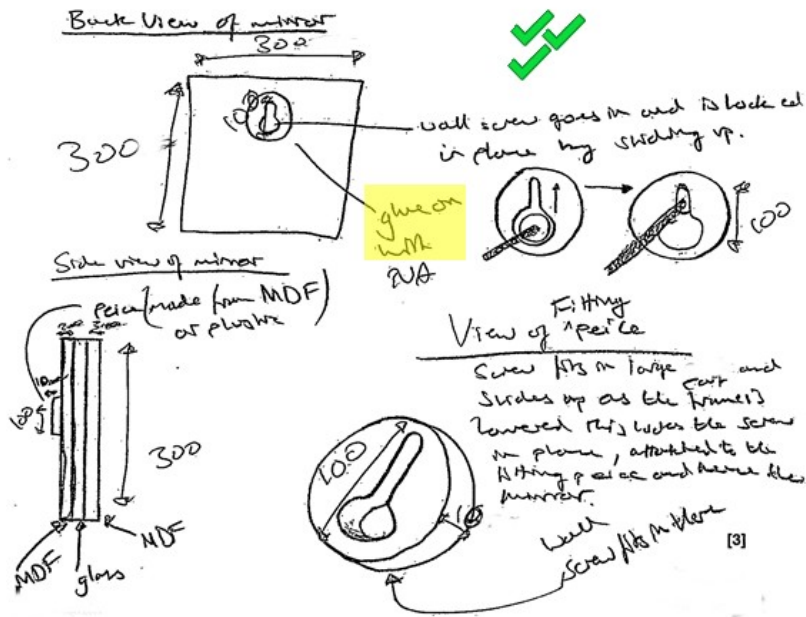
- (ii) the glass mirror and MDF would be held together while the epoxy resin adhesive sets.

This will be done by clamping it together.
 But with in between the clamp and product would
 be scrap wood, the force of clamps could shatter mirror [2]

- (d) Very few candidates were able to provide a totally practical fitting attached to the back of the mirror to enable it to be hung on a wall. There were many simple blocks, plates and brackets drawn that achieved some reward, but the majority of these were then fixed to the back of the MDF mirror by means of screws. Since the MDF was only 3mm thick this method was inappropriate.

The answer below provides a good level of understanding worth the maximum 3 marks.

(d) Use sketches and notes to design a fitting that could be attached to the MDF back so that the mirror could be fixed to a wall.

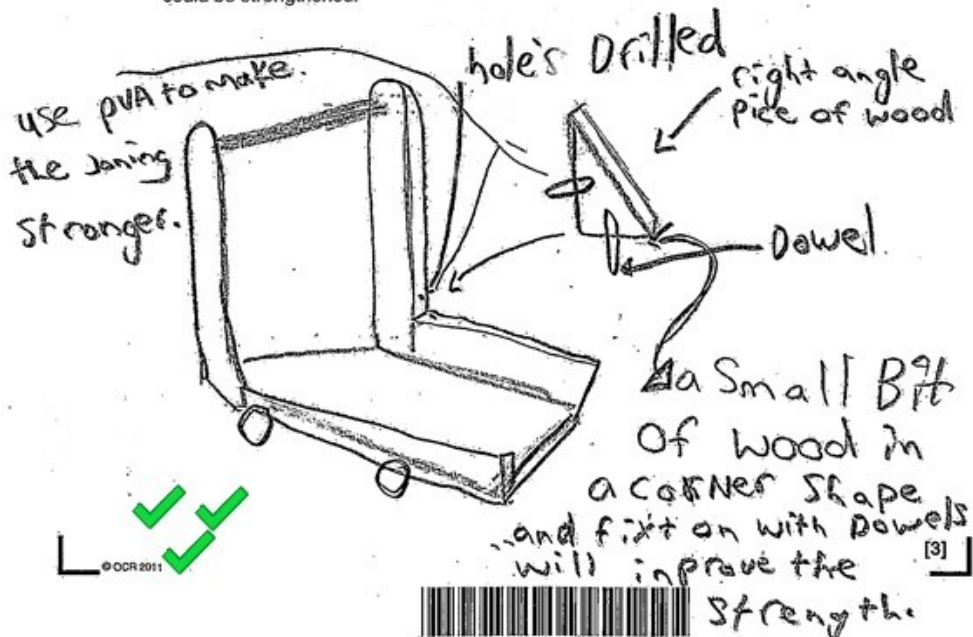


Question 2

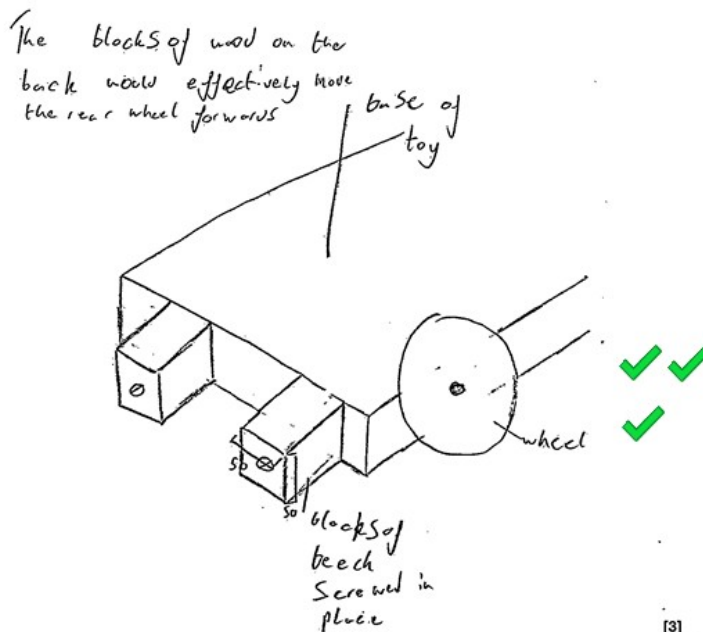
This question tested candidates' practical knowledge of working with solid wood and an understanding of properties of materials. An ability to communicate ideas clearly by means of sketches and notes was essential for success in parts (a) and (b).

- (a) There were some good answers showing clearly how the dowelled joint connecting the side to the upright could be strengthened. The most common methods included the use of a triangular corner piece, an angled metal bracket, or a solid wood brace. For maximum marks candidates needed to provide some details about the size of the material used or how it would be joined.

(a) Use sketches and notes to show how the dowelled joint at A, between the side and upright, could be strengthened.



- (b) Many candidates recognised the need for some form of block or 'stopper' behind the back wheel. For this information candidates were rewarded with one mark. If the size and section of the block or device was shown, then a second mark was awarded. For a maximum three marks candidates needed to show how the device would be fitted to the toy. Those answers that simply added weight to the front of the toy received no marks.



- (c)* This question required candidates to produce answers in a coherent and structured manner with accurate spelling. A list of bullet points does not satisfy this format and candidates cannot achieve a mark higher than Level 1. This question tests the candidates' Quality of Written Communication [4.7 of the specification].

Many candidates appeared to focus on the words: "designing toys for children" rather than the importance of physical and aesthetic properties. This led to many irrelevant answers about the need for safety in toys, including choking hazards and trapped fingers. Some candidates did provide information about the need for durable and robust physical properties and the importance of an attractive appearance, but these were generally not developed fully. The vast majority of responses were awarded Level 1 or 2 only.

- (c*) Explain why it is important to consider the physical and aesthetic properties of materials when designing toys for children.

When designing a toy for children you have to think about if the child will like it at first or not. Then you have to think about how the child will interact with the product. So the aesthetics of the materials used have to be good otherwise the child will not enjoy playing with the product or might not even like it at first so it won't sell. The physical properties of materials also are important as if the materials aren't durable the product will break easily. Also the material has to be safe to use everyday and should not be potentially harmful to anyone. Also materials that snap easily could be potentially harmful e.g. wood splinters.

Awarded 2 marks

Question 3

This question tested candidates' practical knowledge of working with aluminium and an understanding of die-casting.

- (a) Many candidates stated that a benefit of using plastic for the rail of the towel rack was that it was heatproof, waterproof or that it had an attractive, coloured appearance.
- (b) Many candidates stated a sensible item of research when designing the towel rack; including the size or weight of the towel, the size of the radiator and the existence of a target market.
- (c) This question tested candidates' knowledge of a 'new' area of the specification: die-casting. The vast majority of candidates were unable to answer this question.
- (d) The simplest method of locating and securing the plastic tube in the aluminium end was to drill a hole in the aluminium end, insert the plastic tube and then secure it by means of a countersunk head screw from underneath. Only a very small minority of candidates provided a solution similar to this.

- (d) The rail is made from plastic tube.
 Fig. 5 shows the plastic tube positioned for fitting to one of the aluminium ends.
 Show on Fig. 5 how the plastic tube could be located and secured to the aluminium end.

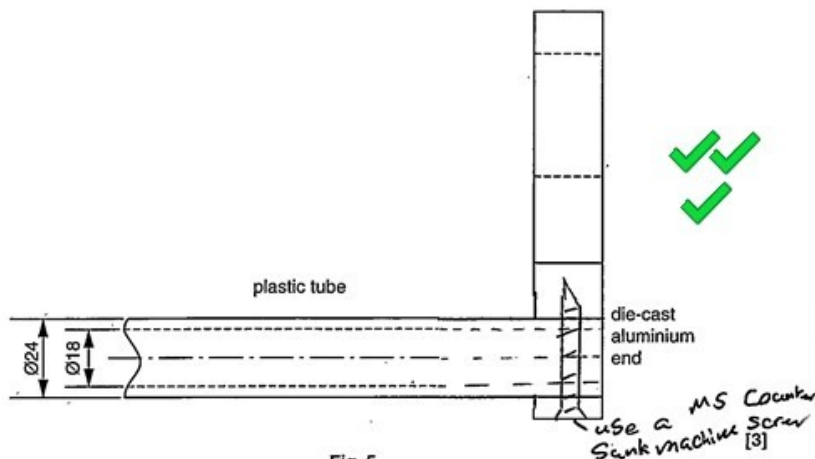
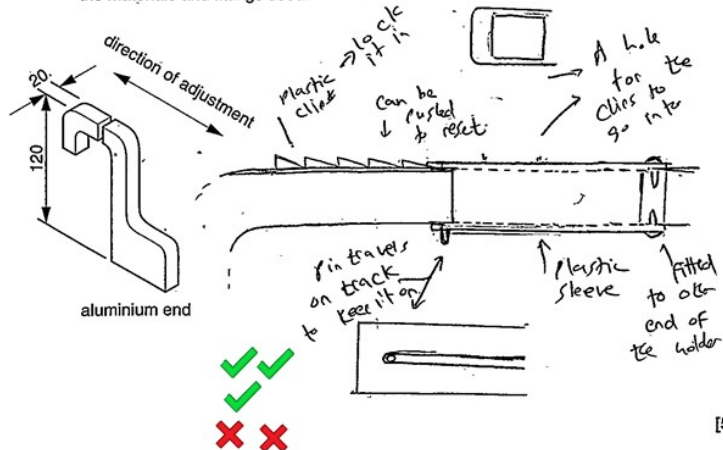


Fig. 5

- (e) This question required an ability to provide a practical solution to a design problem using sketches and notes. Many candidates do not appear to have sufficient skills to undertake this type of question.

There were, however, some potentially good solutions involving the use of threaded rods and tubes that fitted over the two parts of the end shown. The method of locking often involved the use of spring loaded buttons or clips and metal pegs. Although the answer below did not achieve maximum 5 marks, mainly because of a lack of details about materials and constructions involved, the basic idea could be developed into a practical solution.

- (e) Use sketches and notes to show how the aluminium ends could be modified to make them adjustable to fit over radiators of different thickness.
Your modification must include:
- the method of locking the adjustment
 - the materials and fittings used.



Section B

Question 4

This question tested candidates' knowledge and understanding of working with acrylic and CNC machining.

- (a) The vast majority of candidates were able to provide three stages in planning the manufacture of the remote control holder. The most common referred to marking and cutting out the slots and the heating and bending of the acrylic.
- (b) Many candidates were able to achieve at least one or two marks for showing a practical solution to prevent the remote control from sliding on the base of the holder. The most common solutions involved the use of acrylic strips, indentations or holes to locate the remote control. However, for maximum marks these solutions required additional notes to describe, for example, what the added material was made from, the sizes, or how it could be joined or fitted to the holder.
- (c) (i) Many candidates named a laser cutter correctly as an appropriate CNC machine. There were very few alternatives provided.
- (ii) Descriptions of the process by which the shape of the remote control holder would be cut out were generally poor. The kind of information that would have achieved a maximum three marks was not that difficult if candidates had practical experience of CNC machining. The Mark Scheme rewarded stages including: how the data from a computer would be transferred to the CNC machine, the acrylic positioned in the machine and the machine parameters set up.

(ii) Describe the process of cutting out the remote control holder using a CNC machine.

✓ secure the work in position, load design
✓ to CNC machine, make machine cut acrylic
✓ then remove it from machine and finish off work

[3]

- (d) This question tested the candidate's knowledge and understanding of a 'new' area of the specification: rapid prototyping. The vast majority of candidates failed to provide any specific benefits of rapid prototyping. Most candidates were able to apply their understanding of general 'modelling' rather than that of rapid prototyping. These answers were not rewarded.

Question 5

This question tested candidates' knowledge and understanding of anthropometrics and the use of mild steel and plastic in the design of a wall-mounted bench. In addition, candidates had the opportunity to demonstrate their understanding of the 6Rs.

- (a) Candidates' knowledge and understanding of anthropometrics was generally poor. The best answers referred to specific dimensions relating to the human body. Any reference to the height of human beings using the bench was rewarded.
- (b) The question required candidates to show, using sketches and notes, how the seat could be joined and fixed to the frames. This should have been the focus for the design solutions. Only a minority of candidates showed some form of recess or bracket to which the seat could be joined and then the use of screws or bolts to fix it in position. Some candidates provided a potentially practical solution, using locating pins for the seat and frame.
- (c)* The earlier comments made for **Q.2(c)*** about the format of this type of question also apply to this question. However, the answers to this question were better than **Q.2(c)***. There were many good individual points made by candidates but the overall quality of the answers, in terms of structured, coherent, extended writing, was disappointing. Some of the relevant points made included reference to how the designer had 'reduced' the materials used by making it wall-mounted, therefore not requiring legs or a back. There were good comments relating to the ease of 'repair' and the use of 'recycled' materials. Relevant comments relating to 'refuse', 'rethink' and 'reuse' were less common.

- (c*) Discuss the extent to which the designer has considered the 6Rs: Reduce, Reuse, Rethink, Refuse, Repair and Recycle in the design of the seat.

The designer has reduced the amount of steel he needs by having a hole in the frame. The seat can be dismantled from the wall and reused somewhere else. As it is self assembly it can be repaired by just getting it reduces the cost of transport. It comes in 3 parts so to repair it you only need to get one thing instead of the whole product. The flashes may be recyclable. This may not be the best design so the designer has rethought the design and made it better.

Awarded 3 marks

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