L3 Lead Examiner Report 1806

June 2018

Level 3 Nationals in Engineering

Unit 3: Engineering Product Design and Manufacture

(31708H)

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Grade Boundaries

What is a grade boundary?

A grade boundary is where we set the level of achievement required to obtain a certain grade for the externally assessed unit.

Setting grade boundaries

When we set grade boundaries, we look at the performance of every learner who took the external assessment. When we can see the full picture of performance, our experts are then able to decide where best to place the grade boundaries – this means that they decide what the lowest possible mark should be for a particular grade.

When our experts set the grade boundaries, they make sure that learners receive grades which reflect their ability. Awarding grade boundaries is conducted to ensure learners achieve the grade they deserve to achieve, irrespective of variation in the external assessment.

Variations in external assessments

Each external assessment we set asks different questions and may assess different parts of the unit content outlined in the specification. It would be unfair to learners if we set the same grade boundaries for each test, because then it would not take into account that a test might be slightly easier or more difficult than any other.

Grade boundaries for this, and all other papers, are on the website via this link:
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

Unit 3: Engineering Product Design and Manufacture

Grade	Unclassified	Level 3			
		D	M	P	N
Boundary Mark	**0**	42	30	18	9

Introduction

Unit 3 (Engineering Product Design and Manufacture) is a mandatory synoptic unit that requires learners to complete a set task to redesign an engineering product. There are five activities to complete for the whole task. This was the third live task for this unit and learners were required to redesign a filter for a tumble dryer.

The external assessment task is structured to address the assessment outcomes for the unit. The assessment outcomes are:
AO1: Demonstrate knowledge and understanding of engineering products and design
AO2: Apply knowledge and understanding of engineering methodologies, processes, features and procedures to iterative design
AO3: Analyse data and information and make connections between engineering concepts, processes, features, procedures, materials, standards and regulatory requirements
AO4: Evaluate engineering product design ideas, manufacturing processes and other design choices
AO5: Be able to develop and communicate reasoned design solutions with appropriate justification

There is a marking grid for each of the five activities that make up the whole task. The examiners allocate marks to the assessment evidence provided by the learners, for each of the five activities, using a holistic 'best-fit' approach. They compare the evidence for each activity to the corresponding marking grid and the bands/strands/descriptor bullet points within.

Please note that all of the examples of learner assessment evidence provided in this report are extracts. As a result, they can only be considered to be representative of evidence that would be awarded a mark from a certain band. All of the assessment evidence for a given activity (which is generally quite extensive) must be considered when awarding a mark for that activity.

Learners are required to submit the Part B task booklet for marking. Any extra pages of assessment evidence must be headed with the appropriate activity number and securely fastened into the correct place in the task booklet using a treasury tag. Learners should not submit any of their research notes, the Part A documentation or the Part B information booklet, as none of the aforesaid are considered when marking.

Introduction to the Overall Performance of the Unit

Pleasingly, the majority of learners appeared to find the task accessible. The examiners were able to award a full range of marks for each of the activities and across the task as a whole.

The written content provided by learners was again highly varied, but many attempted to structure their responses with sub-titles for certain activities (such as Activities 2, 4 and 5) and this should be encouraged.

Similarly, the sketches/drawings provided by learners varied in quality; however, most were legible, drawn in three dimensions and communicated the proposals/solution to a suitable standard (and in comparison, with the previous series, there were more isometric drawings/a higher standard of orthographic projections for Activity 4, which is to be encouraged). In addition, most sketches were annotated with a commentary rather than labels, and again this is to be encouraged.

It was not always obvious that learners had used the research collected during Part A in the most appropriate manner. For example, the Part A Set Task Brief advised learners to carry out research on existing designs for filters. In general, there were some generic and/or specific comments about the features of existing filters in the assessment evidence for Activity 4; however, actual sketches or diagrams showing how certain features (of existing filters) had been incorporated into the learner's solution were seen infrequently. In addition, it was not clear that learners had researched sustainability at all stages of the product life cycle, as most responses simply focused on recycling. Nonetheless, it was pleasing that many learners clearly did use their research when commenting on the suitability of materials and manufacturing processes in Activity 4.

In the most part, suitable responses were seen for Activities 2, 3, 4 and 5; however, most learners are still providing an unsuitable response for Activity 1. Learners' responses to all of the five activities that make up the whole task are considered in the next parts of this report.

Activity 1 - Planning and design changes made during the development process

This activity is designed to test the learner's ability to forward plan and to review/justify the changes made during Activities 2 to 5, to fulfill the requirements of the Part B Client brief. The assessment focus is to 'Carry out an iterative development process'.

Many/most learners (including those of a higher ability) again seemed to interpret this activity as simply requiring a generic time plan and retrospective diary/reflective log, which mainly resulted in marks from Band 1. For example:

Activity	Marks	Time for each activity (mins)		Spare Time
①	6	(6 × 8 mins)	45 mins	3 mins
②	6	(6 × 8 mins)	45 mins	3 mins
③	9	(9 × 8 mins)	70 mins	2 mins
④	30	(30 × 8 mins)	4 hours	none
⑤	9	(9 × 8 mins)	70 mins	2 mins

Session 2: Completed Activity 3 and part of 4, design ideas were put forward and a final design sketched. Next session I will discuss how the redesigned product is effective. (2 hours)

To gain higher marks, learners should (please refer to the Activity 1 marking grid):

- Provide a more detailed outline time plan that refers to the product being redesigned (a filter in this case). In Extract 1, the plan is more detailed for Session 2 but still quite generic with no focus on the product to be redesigned and therefore it is still not representative of Band 3 evidence. Given that learners have a period of time to undertake research (for Part A) before they are provided with the Part B task, the initial plan should also refer to how the said research will be applied during Activities 2 to 5.
- Generate action points for the next session at the end of each session as part of Activity 1. The said action points should show forward planning that is clearly linked to the specifics of the product being redesigned, with some consideration of what happened in the previous session. Action points such as 'In the next session I will design four ideas' will not gain much credit. In Extract 2, the learner has generated a future action point for Activity 3 (in an upcoming session) that relates to the Part B Client brief and their previous designing activities. This type of response is representative of Band 3 evidence.

- Justify the changes made throughout the development process to fulfill the requirements of the Part B Client brief. In Extract 3, the learner has provided solid reasons for the changes made to an initial design idea during Activity 3. This type of response is representative of Band 3 evidence.

Extract 1 - An initial outline time plan for one session

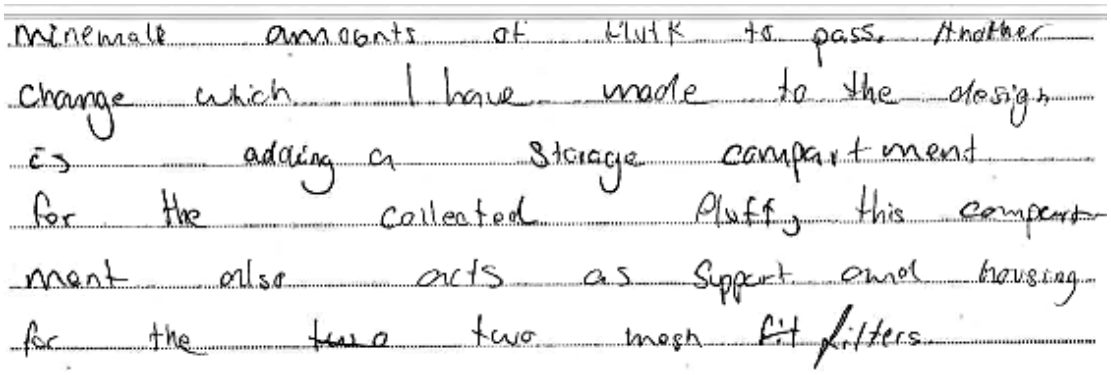
2	I will interpret the design brief to decifer the operational requirements of the product. This will include the: product requirements, opportunities & restraints when redesigning the product and analysing/interpreting the data given.	50 mins

Extract 2 - An action point for an upcoming session

I also came up with the idea of have a section of design 2 to sit flush, into the hole so that it stays there securley. In my next session I will be trying to figure out a way to incorporate these two so that I can get both a filter that is easily accessable yet held in securly.

Extract 3 - Changes made during the session

In my third initial idea I went to bag and reused my reg rectangular filter with a stainless steel ~~mess~~ mesh idea, however the changes I made were, ~~to~~ including one more filter to provide a two stage filtration, this means that the holes in the mesh on the lower filter will have to be much finer then those in the upper part to allow maximum air flow and allow



The format of the assessment evidence provided for Activity 1 varied greatly. The evidence required for Activity 1 should be provided in the following format:

- An initial outline time plan in a table that is specific to the product being redesigned (this must not be generic and should not simply reiterate the statements underneath the activity headings in the task booklet)
- Action points for the upcoming session/s that are specific to the product being redesigned (these must not be generic and should not simply reiterate the statements underneath the activity headings in the task booklet)
- Changes made during the session/s that are specific to the product being redesigned (not generic) and justified

The latter two bullet points can be repeated as many times as necessary. This type of format will allow learners to provide evidence that shows they have addressed each of the strands in the Activity 1 marking grid. As Activity 1 is worth 6 marks from 60 marks available overall, learners should provide an overall response that is succinct and pertinent.

Activity 2 - Interpret the brief into operational requirements

The command word used in this activity is 'interpret'. Learners are required to identify clearly the key features of the Part B Client brief, and to use the aforesaid and the other information available (including the numerical data and drawings provided), to produce a set of suitable and cohesive operational and product requirements. In so doing, learners must also consider and make relevant comments on opportunities and constraints and key health and safety, regulatory and sustainability factors. The assessment focus is 'Interpreting brief into operational requirements'.
The vast majority of learners attempted this activity and a wide range of responses were seen, resulting in a full range of marks across Bands 1 to 3.

In this series, the following characteristics were often evident in the response from learners that gained lower marks for this activity:

- The interpretation included a lot of repetition from the Part B Client brief.
- Actual calculations were not present but some suitable interpretation/conclusions resulted from a review of the data in Tables 1 and 2.
- The consideration of health and safety factors was highly generic ('no sharp edges' etc.)/irrelevant (not specific to the context) and/or referred to, for example, HASAW 74, PPE, using safe machinery during manufacture etc.

Conversely, the following characteristics were often evident in the response from learners that gained higher marks for this activity:

- The interpretation included numerous comments that extended the Part B Client brief, for example, 'It would be appropriate to use a fine mesh to capture the most fluff as this would still allow maximum air flow so that the dryer doesn't overheat and it would still be strong enough to be able to be cleared with a vacuum cleaner.'
- Actual calculations were normally present and conclusions followed from them; in addition, further comments interpreted/articulated how the results could be used to improve the design for the modified product, for example by noting that the filter should have as large a surface area as possible irrespective of the size of the vent pipe.
- Health and safety factors were commented on in context and again often extended the Part B Client brief, for example 'the filter could have a method of capturing fluff so that when it's removed from the housing for cleaning it doesn't cause inhalation problems.'

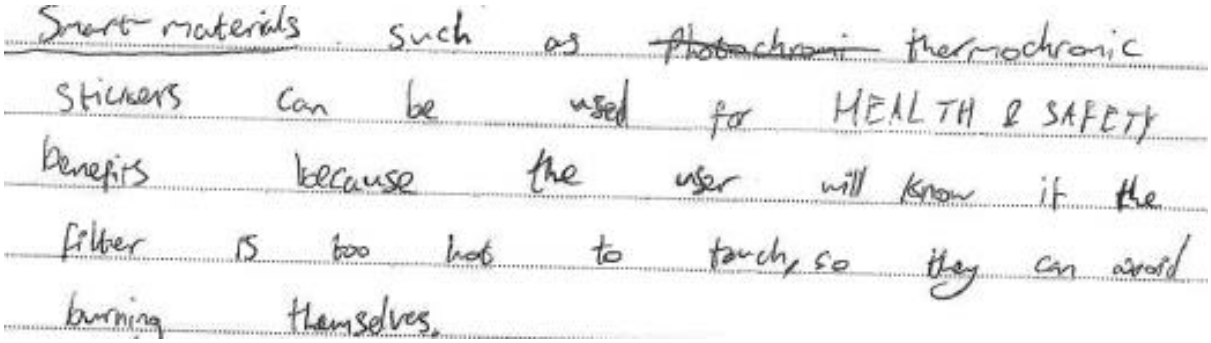
The following extracts show examples of some of the aforesaid characteristics (please refer to the Activity 2 marking grid):

- In Extract 1, the learner has interpreted the Part B Client brief and has made a succinct comment, with some justification, about a possible (technology-based) opportunity/method that may result in the redesigned

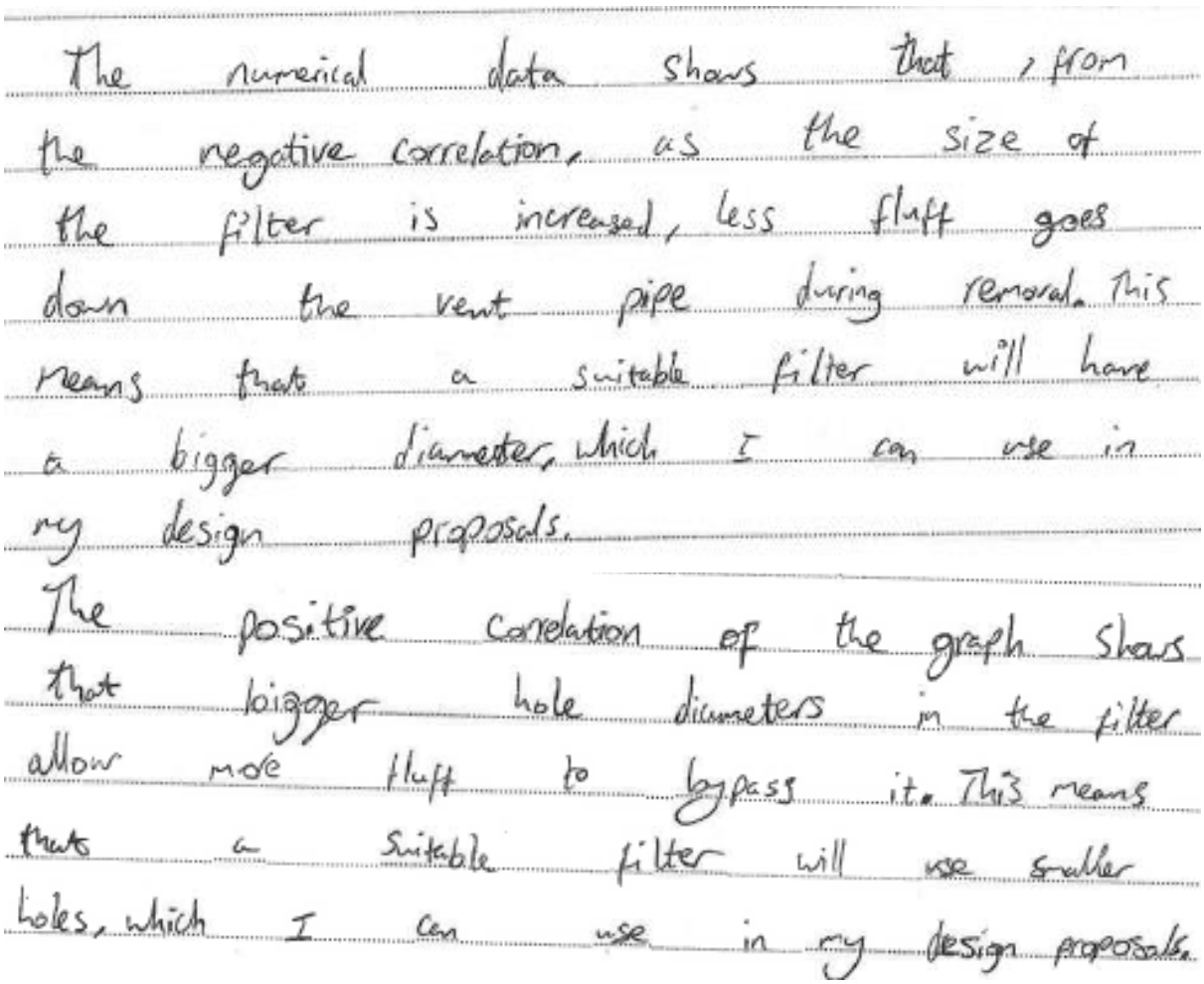
filter being safe to use/handle (enhanced product performance). This type of response is representative of Band 3 evidence.

- In Extract 2, the learner has used their calculations ('Table 1' and 'Table 2' - not provided here) to determine requirements that may allow the filter to be more effective over time (enhanced product performance). This type of response is representative of Band 3 evidence.
- In Extract 3, the learner has made comments about health and safety that have some relevance; however, the said comments are mostly generic and would apply to virtually any product. This type of response is representative of Band 1 evidence.

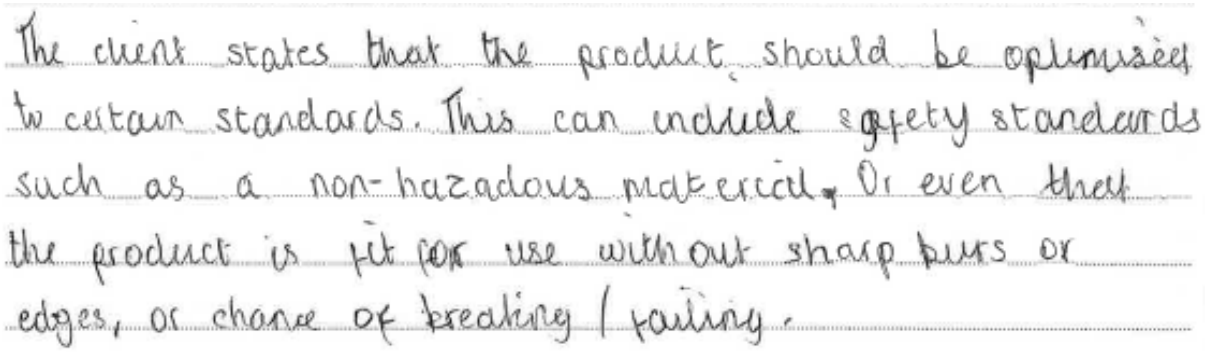
Extract 1



Extract 2



Extract 3



The format of the assessment evidence provided for Activity 2 varied; nonetheless, the majority of learners that performed well on this activity:

- Extracted and then provided a list of all the issues and relevant operational requirements from the Part B Client brief
- Carried out some calculations based on the numerical data and then provided some comments/conclusions to interpret the results and suggest some product requirements
- Generated a series of comments in bullet point form under a series of sub-titles that related to product requirements, opportunities/ constraints, health and safety and regulatory/sustainability factors; in addition, the said comments were mostly justified in relation to the issues and operational requirements identified from the Part B Client brief

This type of format allowed learners to provide evidence that showed they had addressed each of the strands in the Activity 2 marking grid. As Activity 2 is also worth 6 marks from 60 marks available overall, learners should again provide an overall response that is succinct and pertinent.

Activity 3 - Produce a range of initial design ideas based on the client brief

Activity 3 requires learners to produce a range of (three or four) initial design ideas based on the Part B Client brief and their outcomes from Activity 2. The unit specification ('Key terms typically used in assessment') states that a design is 'a drawing and/or specification to communicate the form, function and/or operational workings of a product prior to it being made or maintained'. Activity 3 in the task booklet directs learners to use a combination of sketches and annotations; as a result, both must be present in order for learners to be able to achieve higher marks. The assessment focus is 'Initial design ideas'.
Again, the vast majority of learners attempted this activity and a wide range of responses were seen, resulting in a full range of marks across Bands 1 to 3.

In this series, the following characteristics were often evident in the response from learners that gained lower marks for this activity:

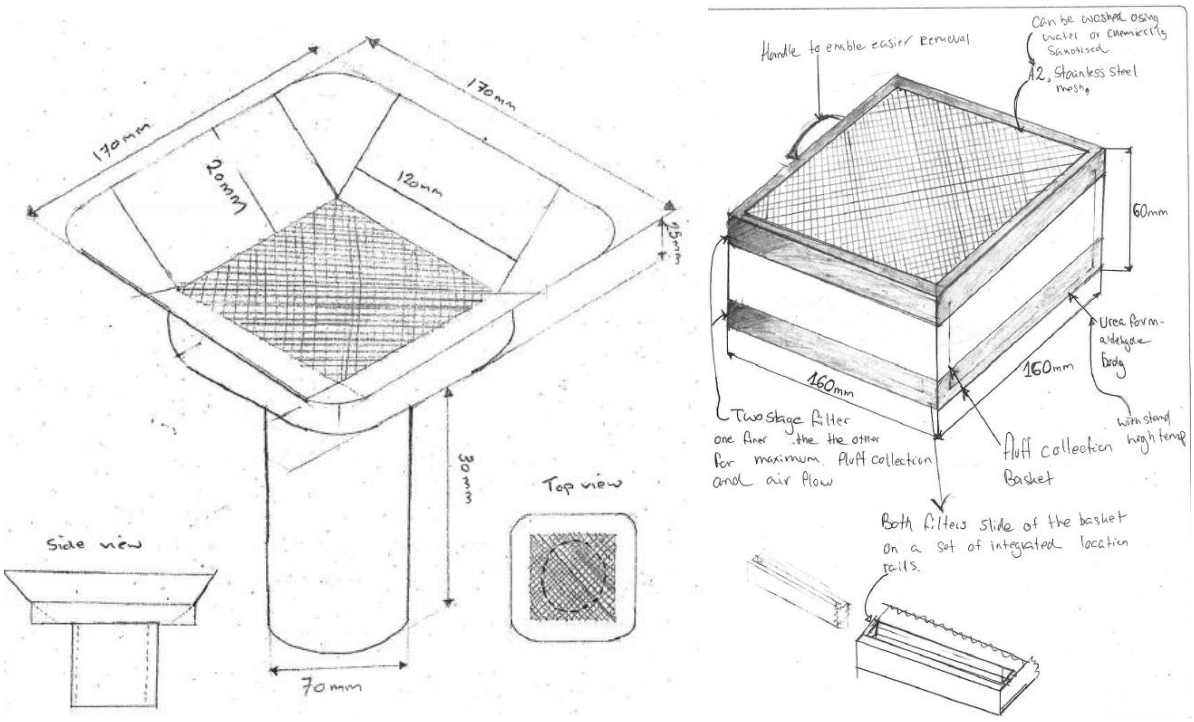
- The initial design ideas looked very similar to the existing filter (a deliberately poor design) and/or each other, with just two or three small adaptations that were minor improvements and addressed just one or two of the five bullet points at the bottom of the Part B Client brief.
- The initial design ideas did not take into account that the existing filter housing could not be redesigned and/or they did not consider positional stability (a relatively straightforward improvement).
- The annotation was fairly limited (but technically accurate in the main) and covered the learner's thoughts about the positives and negatives of each design idea without much reference to the five bullet points at the bottom of the Part B Client brief, for example, cost may have been a focus.

Conversely, the following characteristics were often evident in the response from learners that gained higher marks for this activity:

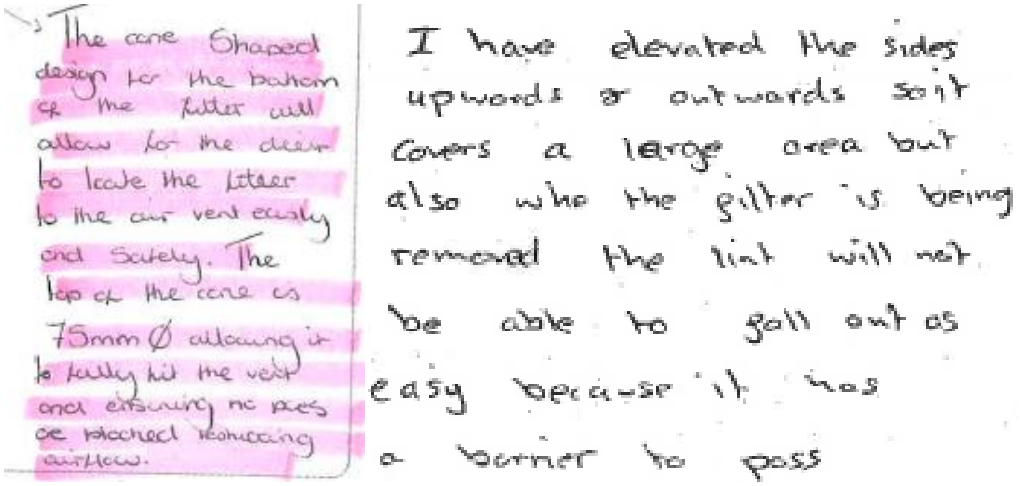
- The initial design ideas were feasible/reasonably different to the existing filter and each other, when considering both form and approach; in addition, they included adaptations that were major improvements when compared to the existing filter and at least three/four of the five bullet points at the bottom of the Part B Client brief.
- The initial design ideas took into account that the existing filter housing could not be redesigned and included improved features related to, for example: a) location (e.g. into the vent pipe/for positional stability); b) size (e.g. for positive location/a larger surface area to capture fluff); c) use of a mesh (e.g. to hold fluff over time/allow good air flow); d) accessibility (e.g. for simple insertion/removal); and e) ease of use (for cleaning/servicing).
- The annotation was technically accurate and covered the learner's thoughts/rationale about each design idea with some reference to the five bullet points at the bottom of the Part B Client brief; however, some generic/irrelevant comments about aspects such as aesthetics and extensive explanations related to manufacturing processes (which is a focus of Activity 4) were evident and gained no/less credit.

The following extracts show examples of some of the aforesaid characteristics (please refer to the Activity 3 marking grid):
In Extracts 1a and 1b, the learners have generated ideas that comprehensively address the Part B Client brief and, although they are not perfect, they both include features that are major improvements when compared to the existing filter. In addition, they are both generally feasible and fit for purpose, and different to the existing filter, when considering both form and approach. These types of response are representative of Band 3 evidence.
In Extracts 2a and 2b, the learners have used written text/technical terms to communicate further detail and to explain a design idea with some reference to suitable product requirements that have been derived from the Part B Client brief. These types of response are representative of Band 3 evidence.
In Extract 3, the learner has generated an idea that includes some features that are minor improvements (for example, a larger surface area) when compared to the existing filter; in addition, the written comments provide some simple contextual thoughts when considering some basic product requirements that are evident from the Part B Client brief. Nonetheless, the idea is still very similar to the existing filter and therefore this type of response is representative of Band 1 evidence.

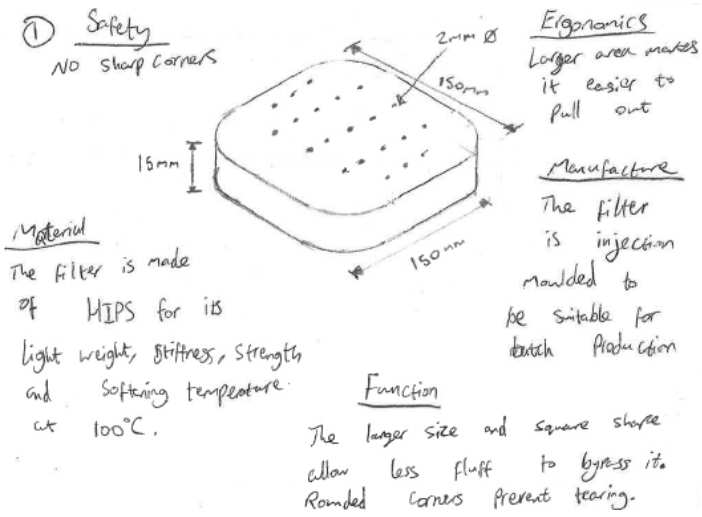
Extracts 1a and 1b



Extract 2a and 2b



Extract 3



The format of the assessment evidence provided for Activity 3 was very similar in the most part, irrespective of the marks gained. Most learners provided:

- Sketches of ideas in isometric with some further drawn views, possibly as an explosion and/or as a side, front or plan elevation according to what the learner was trying to communicate
- Annotations (not labels) that explained the ideas, with those who gained higher marks providing comments that directly referenced the five bullet points at the bottom of the Part B Client brief

This type of format allowed learners to provide evidence that showed they had addressed each of the strands in the Activity 3 marking grid. As Activity 3 is worth 9 marks from 60 marks available overall, learners should provide an overall response that includes some detail.

Activity 4 - Develop a modified product proposal with relevant design documentation

Activity 4 requires learners to develop a modified product proposal based on the Part B Client brief and their outcomes from Activities 2 and 3. There is guidance as to what is required for a fully developed proposal in the task booklet [The proposal must include a solution including a final drawing and must consider existing products, materials, manufacturing processes, sustainability, safety and other relevant factors], and each of these should be addressed in the response in order to gain higher marks. The assessment focus is 'Develop a modified product proposal (form, materials and/or manufacturing processes)' and the subtask is 'Solution'.

Learners should include a range of relevant design documentation to support their proposal. The said documentation is exemplified in section C2 of the Unit 3 specification. As with Activity 3, learners should use appropriate sketching and graphical techniques, along with technically accurate written content, to articulate fully their modified product proposal. The assessment focus is 'Develop a modified product proposal (form, materials and/or manufacturing processes)' and the subtask is 'Design Documentation'.

Again, the vast majority of learners attempted this activity and a wide range of responses were seen, resulting in a full range of marks across Bands 1 to 4.

In this series, the following characteristics were often evident in the response from learners that gained lower marks for this activity:

- The solution generated: a) was a fairly minor improvement on the existing filter; b) showed some variation in form (rather than approach) when compared to the existing filter and had, for example a larger surface area (a relatively straightforward improvement); and c) was safer than the existing filter.
- The annotation/notes/text: a) simply referred to existing products in a very generic sense, without providing any comments on how they were used when redesigning the filter; b) referred to/considered just one non-optimal material (such as aluminum alloy or stainless steel), but it was mainly suitable and sensible reasons for its use were stated; c) referred to/considered just one or two manufacturing processes, but they were suitable and sensible reasons for their use were stated; and d) did not consider sustainability in an explicit fashion.
- Technical terminology was reasonably accurate throughout and the drawings/annotation/written text/notes would have allowed a competent third party to understand the solution, due to an appropriate level of communication in the aforesaid; for example, sub-titles were evident and the drawings were straightforward to comprehend.

Conversely, the following characteristics were often evident in the response from learners that gained higher marks for this activity:

- The solution generated: a) was a clear improvement on the existing filter; b) showed a clear variation in form/approach when compared to the existing

filter, for example it took into account the movement of/airflow through the tumble dryer when in use and the necessity for effective removal to enable cleaning; and c) was much safer than the existing filter, as the solution meant that the tumble dryer was far less likely to overheat due to fluff build up in the vent pipe.

- The annotation/notes/text: a) referred to existing products from research in a specific manner, and it was normally evident how the features of a different existing filter(s) were used in the chosen solution; b) referred to/considered a range of different/optimal materials (such as polyethylene or nylon) and gave suitable reasons for their selection; c) referred to/considered a range of different/appropriate manufacturing processes and gave suitable reasons for their selection; and d) mentioned sustainability at several points (but this may have been a weaker aspect of the response). For the latter, there should be consideration of, for example, raw materials extraction, material production, production of parts, assembly, use and disposal /recycling in the context of the chosen solution.
- Accurate technical terminology was used throughout and the drawings/annotation/written text/notes would have allowed a competent third party to attempt to manufacture the solution, due to the aforesaid being 'effective'; for example, a reasonably accurate orthographic projection was evident.

The following extracts show examples of some of the aforesaid characteristics (please refer to both parts of the Activity 4 marking grid):

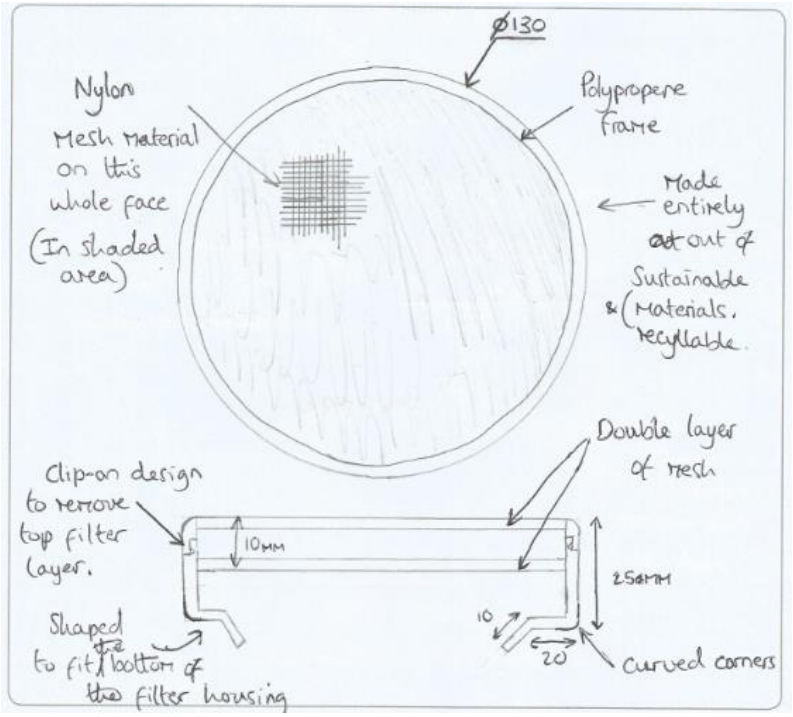
In Extract 1, the learner has provided an optimised solution with some annotated comments that explain the features of, and suggest possible materials for the redesigned filter. The idea has clearly 'designed out' most of the issues with the existing filter. This type of response is representative of Band 4 evidence.

In Extract 2, the learner has provided suitable comments that relate to the specific features of existing products (filters); in addition, the comments have been used to inform the proposal as some of the features are evident in the solution shown in Extract 4b. This type of response is representative of Band 4 evidence.

In Extract 3, the learner has chosen a suitable manufacturing process for their solution (injection moulding) and has given a basic explanation of how the said process operates; however, the text does not consider other options and lacks specific technical details that justify why the stated manufacturing process is suitable for the solution. As a result, this type of response is representative of Band 2 evidence.

In Extracts 4a and 4b, the learners have provided effective drawings that, along with further annotation/written text/notes would allow a competent third party to attempt to manufacture the solution. These types of response are representative of Band 4 evidence (for the 'Design Documentation' sub-task).

Extract 1



Extract 2

Existing products

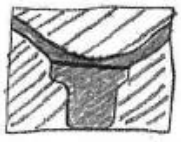
commonly known as Lint traps there are many different existing products however all the most popular and successful lint traps (fluff filters) have various meshes some from polymers, some from metals however they all have fairly large surface areas and a high frequency of holes with in that surface area which support the previous findings in the tables data ~~earlier~~ earlier. Existing products also have some way of making the removal of the filter easier by putting small grips or handles of some kind on the filter. most filters seem to slide into place without much needed effort or excessive force. as most if not all have some kind of fairly smooth surface.

Extract 3

Manufacturing process

Step 1

Put the ~~mesh~~ stainless steel mesh into the mold and then close the mold. The mould will keep mesh in place.



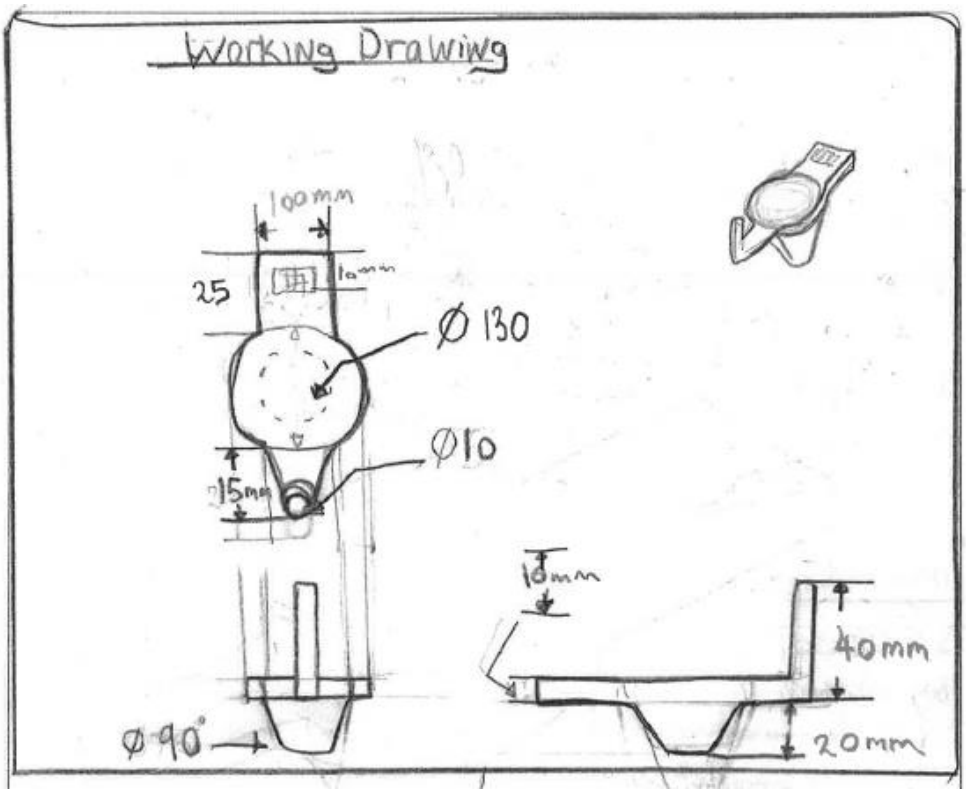
Step 2

start injecting the Melted Nylon into the mould and let it sit there to harden.

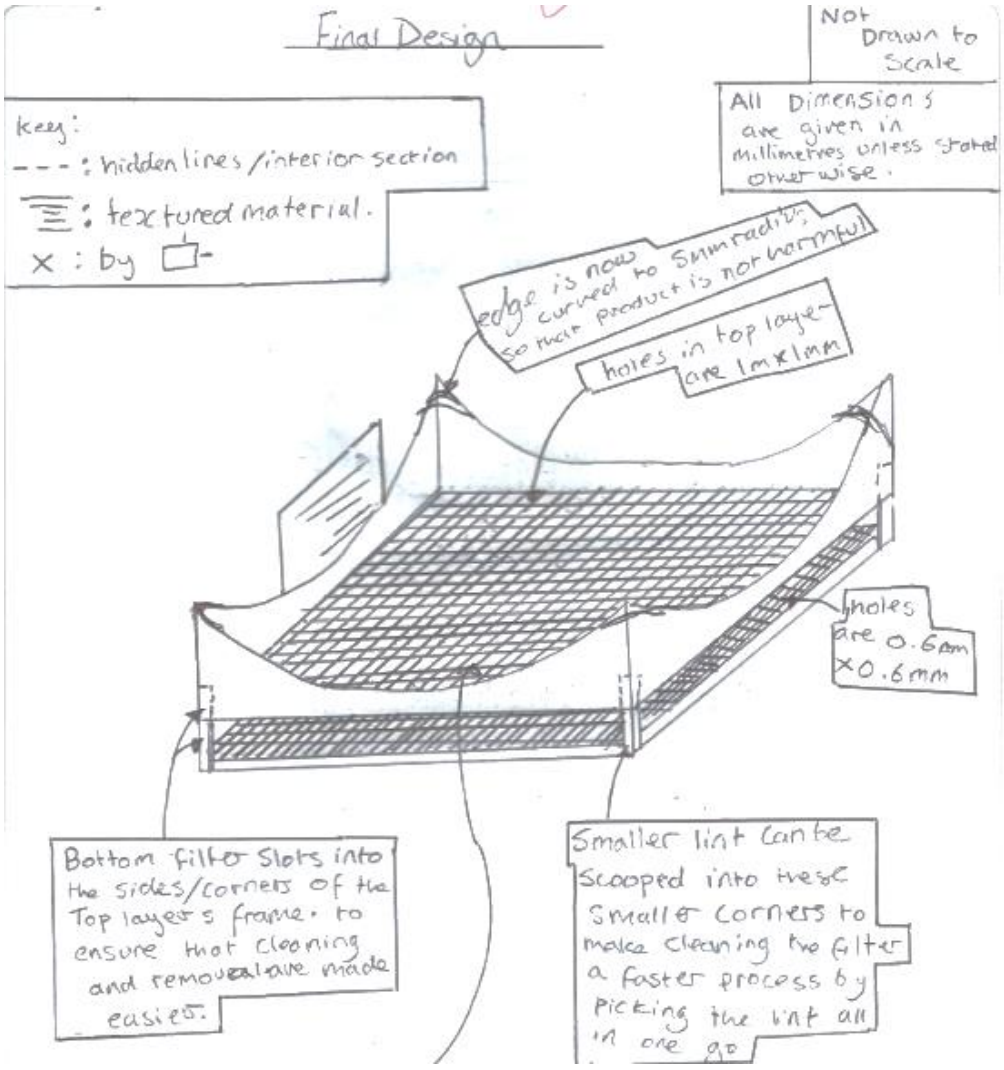
Step 3

take the mould away and your final piece will come out.

Extract 4a



Extract 4b



The format of the assessment evidence provided for Activity 4 varied; nonetheless, the majority of learners that performed well on this activity:

- Provided a final design drawing of an optimised solution in isometric and via an orthographic projection
- Generated further drawings and detailed technical annotation (of all the drawings) as appropriate to ensure that the solution was communicated effectively and would allow a competent third party to interpret how to manufacture it
- Produced a series of relevant technical comments (with justification) under a series of sub-titles that related to their consideration/use of existing products, materials selection for different parts of the solution, manufacturing process selection for different parts of the solution and sustainability at all stages of the product life cycle

This type of format allowed learners to provide evidence that showed they had addressed each of the strands in the Activity 4 marking grid (both parts). As Activity 4 is worth 30 marks from 60 marks available overall, learners should spend more time on this activity than any of the others and must ensure that they address all the bullet points stated in the task booklet in their response.

Activity 5 - Evaluate the design proposal

Activity 5 requires learners to evaluate their design proposal. Learners should reflect on their own solution (from Activity 4) in relation to the Part B Client brief and the original design (in this case, a filter for a tumble dryer) and provide a rationale for why their solution is more effective. The evaluation needs to consider several factors: the success and limitations of the solution; the indirect benefits and opportunities of the solution; and any constraints related to the solution. The evaluation should also reflect on how technology-led modifications could optimise the solution suggested. The assessment focus is 'Validating the design proposal'. Again, the vast majority of learners attempted this activity and a wide range of responses were seen, resulting in a full range of marks across Bands 1 to 3.

In this series, the following characteristics were often evident in the response from learners that gained lower marks for this activity:

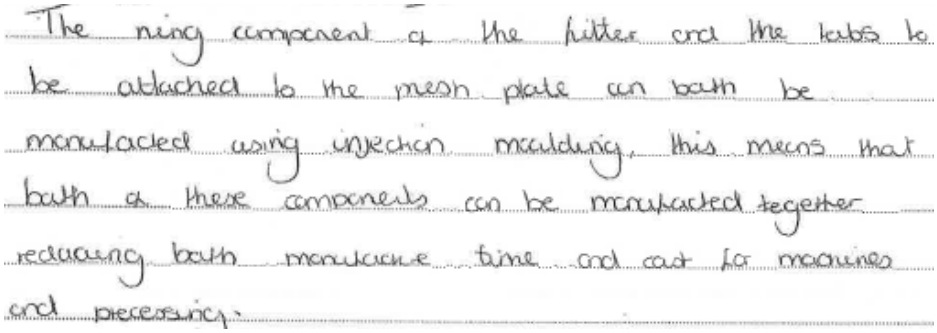
- The appraisal focused, in an explicit fashion, on why the design solution was a success but sometimes referred to simplistic/generic/non-specific considerations, such as price/strength. Opportunities/limitations/constraints/indirect benefits were normally not considered in detail, but some salient points were evident.
- The rationale gave some appropriate reasons as to why the solution was considered more effective than the existing filter, but it was self-congratulatory in places and only referenced the five bullet points at the bottom of the Part B Client brief in an implicit fashion or to say they had been met.
- Comments on some further technology-led modifications were evident but they were very generic and/or irrelevant, for example, they referred to the use of additive manufacturing without stating why the application of the technology would be beneficial when manufacturing the solution for a new filter.

Conversely, the following characteristics were often evident in the response from learners that gained higher marks for this activity:

- The appraisal focused, in an explicit fashion, on the successes, limitations/constraints and opportunities associated with the particular design solution, for example 'Now that the design will capture far more fluff due to the tight mesh the ease of removal is a vital factor as if it is difficult the filter will be cleaned less often and this will reduce efficiency. There may be an opportunity for the filter to self-clean using a small vacuum pump (based in the filter housing) into a draw tray. This would mean the filter wouldn't have to be touched at all so removal wouldn't be an issue.'
- The rationale gave good reasons as to why the solution was effective and referenced some of the five bullet points at the bottom of the Part B Client brief.
- Contextualised comments on some further technology-led modifications were evident and referred to, for example, sensors in the filter housing to monitor and respond to reduced airflow that could enable a warning light and/or disable the tumble dryer.

The following extracts show examples of some of the aforesaid characteristics (please refer to the Activity 5 marking grid):
In Extract 1, the learner has provided an appraisal of an indirect benefit. The appraisal is particular to the solution itself and recognises the possibility/advantages of using a single process when manufacturing (and therefore implicitly references bullet point 5 at the bottom of the Part B Client brief). This type of response is representative of Band 3 evidence.
In Extract 2, the learner has provided a sound rationale for why their solution is more effective when compared to the existing filter. The rationale is particular to the solution itself and references, in a specific fashion, at least three of the five bullet points at the bottom of the Part B Client brief. This type of response is representative of Band 3 evidence.
In Extract 3, the learner has provided comments that refer to the successes of the solution; however, the said comments generally just repeat (using different words) some the statements in the bullet points at the bottom of the Part B Client brief. Detailed examples and/or justifications as to why the solution meets the stated product requirements are missing. As a result, this type of response is representative of Band 1 evidence.

Extract 1



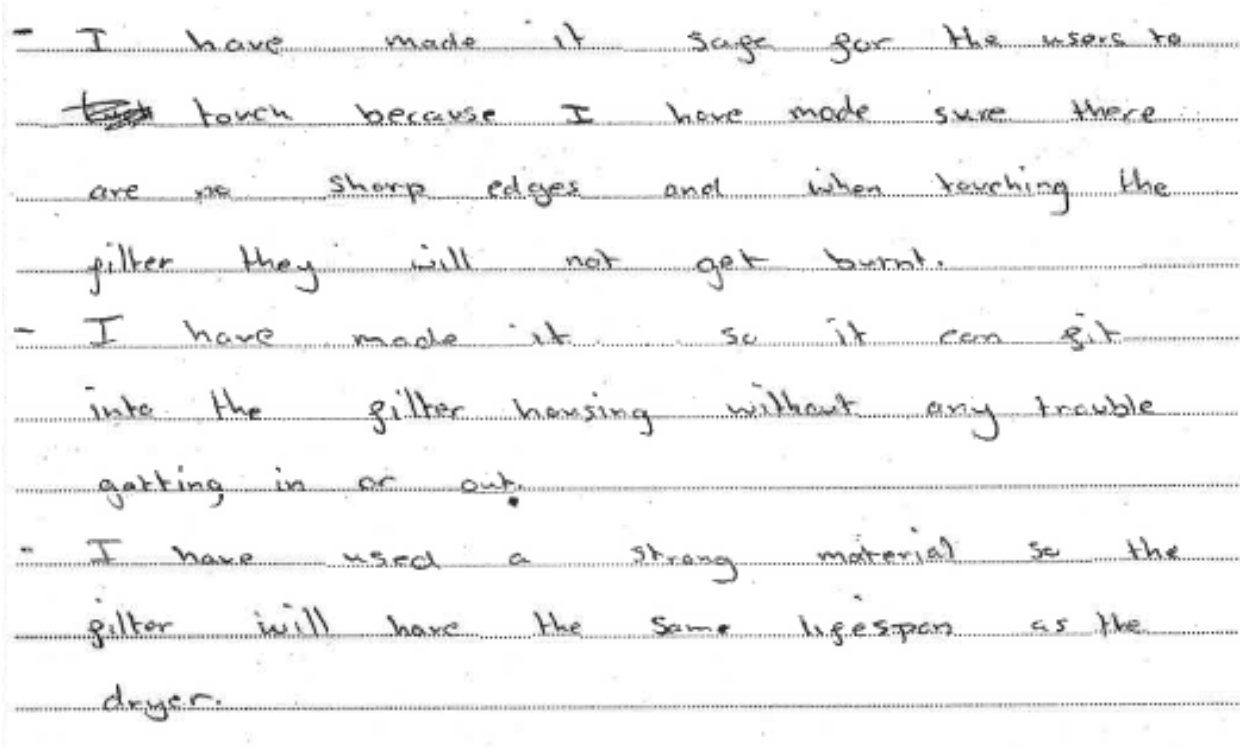
Extract 2

- Due to the mesh filter and low porosity polymer they form a dual layer filter which is able to filter the particles more efficiently without blocking up the filter. The 1cm mesh filter catches larger particles yet the smaller ones go through. These are then caught along the thick low porosity polymer filter therefore increasing the surface area a dust loading which will help to catch 90% dust and fluff particles and allows 80% of the original airflow to still go though.
- The ABS ring at the bottom will allow the client to position the filter correctly and allow the filter to work at maximum efficiency eg. as all the pore spaces are open allowing for maximum airflow.
- Cleaning of the filter is made easy as the acrylic tabs on the top of the mesh filter allow the client to remove it and clean each stage of the filter seperately. The tabs on the side ensure that the mesh filter is placed on top correctly with minimum effort from the client.

Extract 3

Success

- I have made a solution which is easy to remove & clean. This will be able to be done without excessive force or the use of tools.



The format of the assessment evidence provided for Activity 5 varied; nonetheless, most learners that performed well on this activity provided a series of relevant comments (with justification) under a series of sub-titles that related to:

- The successes and limitations of their solution (with reference to the Part B Client brief and/or the issues and operational requirements highlighted in Activity 2)
- The indirect benefits and opportunities resulting from their solution
- The constraints of their solution
- Further technology-led modifications

This type of format allowed learners to provide evidence that showed they had addressed each of the strands in the Activity 5 marking grid. As Activity 5 is worth 9 marks from 60 marks available overall, learners should provide an overall response that includes some detail.

Summary

Based on the outcomes and performance of learners for this task, learners in subsequent series should:

Activity 1

- Link forward planning to the specifics of the product being redesigned, based on a consideration of what has happened in previous sessions (this must not be generic and should not simply reiterate the statements underneath the activity headings in the task booklet).
- Provide explanations/justifications for the specific changes made during each session in order to fulfill the requirements of the Part B Client brief.

Activity 2

- Use their conclusions from the interpretation of numerical data to suggest some justifiable product requirements.
- Generate a series of relevant, contextualised comments in bullet point form under a series of sub-titles related to product requirements, opportunities/constraints, health and safety and regulatory/sustainability factors, and ensure they are justified in relation to the issues and operational requirements identified from the Part B Client brief.

Activity 3

- Sketch three or four different and fit for purpose proposals in isometric that address all of the aspects in the Part B Client brief and provide further drawings/views dependent upon the idea being communicated.
- Use annotations (not labels) to explain the ideas, and refer to the five bullet points at the bottom of the Part B Client brief.

Activity 4

- Generate drawings and detailed technical annotations as appropriate to ensure that the most suitable solution is communicated effectively and would allow a competent third party to interpret how to manufacture it.
- Produce a series of relevant, contextualised technical comments (with justification) under a series of sub-titles that relate to the consideration/use of existing products, materials selection for different parts of the solution, manufacturing process selection for different parts of the solution and sustainability at all stages of the product life cycle.

Activity 5

- Provide a series of relevant, contextualised comments (with justification) under a series of sub-titles related to the successes and limitations of their solution (with reference to the Part B Client brief and/or the issues and operational requirements highlighted in Activity 2), the indirect benefits and opportunities resulting from their solution, the constraints of their solution and possible technology-led modifications.

The specifications for the 2016 Level 3 BTEC Nationals in Engineering are available from:

http://qualifications.pearson.com/en/qualifications/btec-nationals/engineering-2016.html

The Sample Assessment Materials (SAMs) for Unit 3 are available from:

http://qualifications.pearson.com/en/qualifications/btec-nationals/engineering-2016.coursematerials.html#filterQuery=Pearson-UK:Category%2FSpecification-and-sample-assessments

The tasks and Examiners' Reports for Unit 3 from previous series are available from:

http://qualifications.pearson.com/en/qualifications/btec-nationals/engineering-2016.coursematerials.html#filterQuery=Pearson-UK:Category%2FExternal-assessments

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