L3 Lead Examiner Report 1801

January 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. We set grade boundaries for each grade, Distinction, Merit and Pass.

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		
		P	M	D
Boundary Mark	0	19	30	41

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 second live task for this unit and learners were required to redesign a stop for a manual arm access barrier.

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. 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/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. In reality, 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 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.

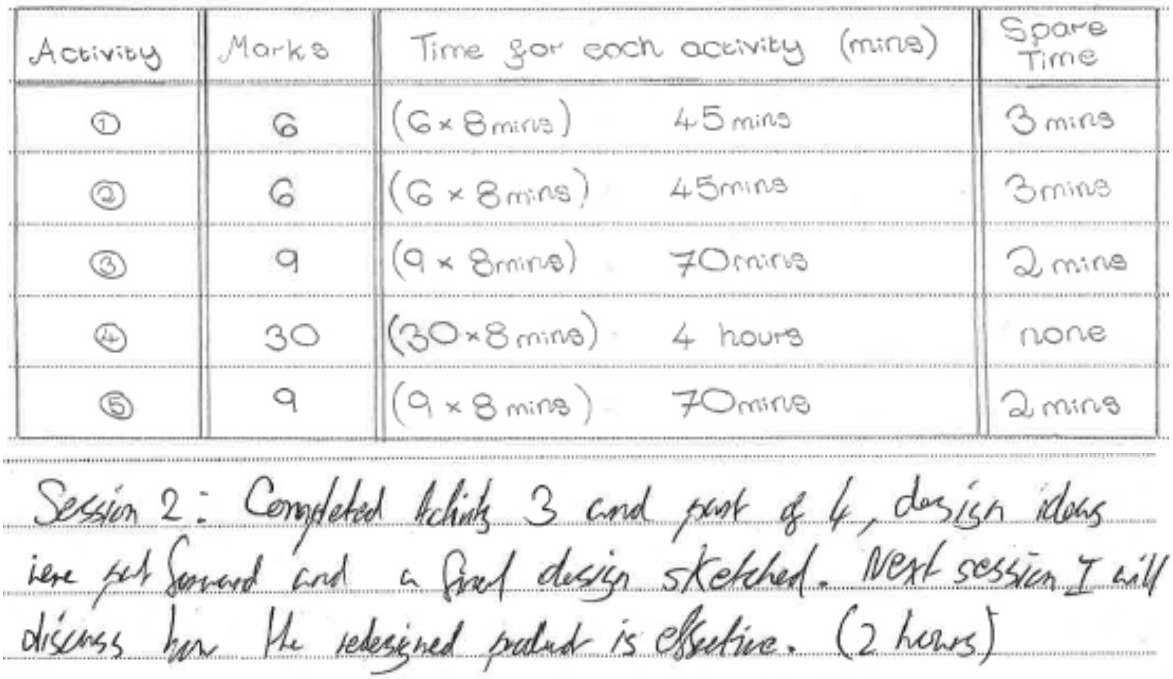
Similarly, the sketches/drawings provided by learners varied in quality; however, most were legible, drawn in three dimensions and communicated the proposals/solution to a suitable standard (although in comparison to the previous series, more isometric drawings and fewer orthographic projections were evident for Activity 4). 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 carried out appropriate research based on the Part A documentation. For example, the Part A Set Task Brief suggested that learners should research existing designs for stops. In general, there were some comments about existing products in the evidence for Activity 4, but sketches or diagrams showing how certain features had been incorporated into the learner's solution were rarely seen, and sometimes they just focused on the function of the manual arm access barrier, rather than the product to be redesigned (the stop). In addition, it was not clear that learners had researched sustainability at all stages of the product life cycle, as many 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, many learners provided 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, in order 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) 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 × 8mins)	45 mins	3 mins
②	6	(6 × 8 mins)	45mins	3mins
③	9	(9 × 8mins)	70mins	2 mins
④	30	(30×8 mins)	4 hours	none
⑤	9	(9 × 8 mins)	70mins	2 mins

Session 2: Completed tasks 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 achieve 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 stop 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 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. At the bottom of Extract 2, the learner has generated a future action point for Activity 4 (in an upcoming session) that is somewhat generic but relates to the Part B Client brief and their previous designing activities. This type of response is representative of Band 2 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 the original design 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

Activity ③

- Reinforcing the underside of the stop is essential for strength especially as the arm is allowed to free fall. Although this makes the designs more complex it is needed if the stops are to meet the required life cycles.
- Grooves were cut in surfaces and screws / bolts countersunk to prevent any damage to the arm.
- Activity ④ should have the brief requirements as the main priority and not include any unique features or functions if they are not valued so complexity is decreased.

Extract 3 - Changes made during the session

Session 2

During today's session I drew up 3 possible changes that could change and improve the design of the stop given and chose my final design. The design I chose had extra components to help improve the original design and make it safer. I added a metal bar underneath the stop to help support it and stop it from fracturing, also I added a lip onto the end to keep the bar more stable when either coming down or when it's in that position. As well as to make it more safe, as hopefully it would stop people putting their hands in the way better. Curved edges were also added to make it safer and reduce the chance of fracturing the stop. Next session I will complete one extra sample drawing then choose my final drawing and start activity

The format of the 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
- Action points for the upcoming session/s that are specific to the product being redesigned
- Changes made during the session/s that are specific to the product being redesigned

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), to produce a set of suitable and cohesive operational and product requirements. In doing so, 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 achieved 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 basic interpretation resulted from a review of the data in Table 1.
- The consideration of health and safety factors was generic/irrelevant (not specific to the context) and referred to, for example, the use of machinery, contamination etc.

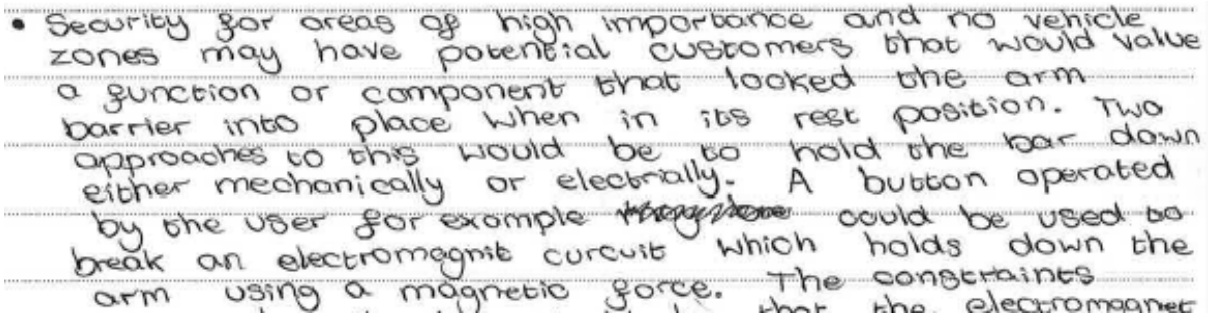
Conversely, the following characteristics were often evident in the response from learners that achieved higher marks for this activity:

- The interpretation included numerous comments that extended the Part B Client brief, for example, 'It would be appropriate to use a material that can take a durable surface treatment or one that doesn't require treatment so it doesn't rust as the stop could be used inside or outside.'
- Actual calculations were present and further comments articulated how the results could be used to improve the design for the modified product, for example by noting that it would be appropriate to include features that reduce the impact force of the barrier arm on the stop.
- Health and safety factors were commented on in context, for example 'the stop could be three or four sided rather than open to reduce the trapping hazard.'

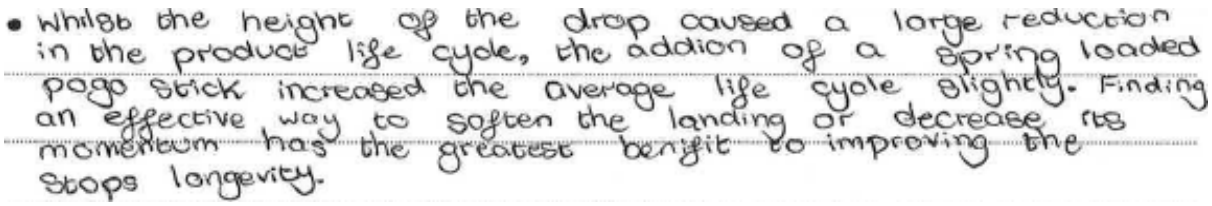
The following extracts show examples of some of the aforesaid characteristics (please refer to the Activity 2 marking grid):

- In Extract 1, the learner has interpreted the Part B Client brief and has made comments, with some justification, about a possible (technology-based) opportunity/method that may result in the redesigned stop improving the functionality of the manual arm access barrier (enhanced product performance). This type of response is representative of Band 3 evidence.
- In Extract 2, the learner has used their calculations ('Table 1' - not provided here) to determine a requirement that may allow the stop to be more durable 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.

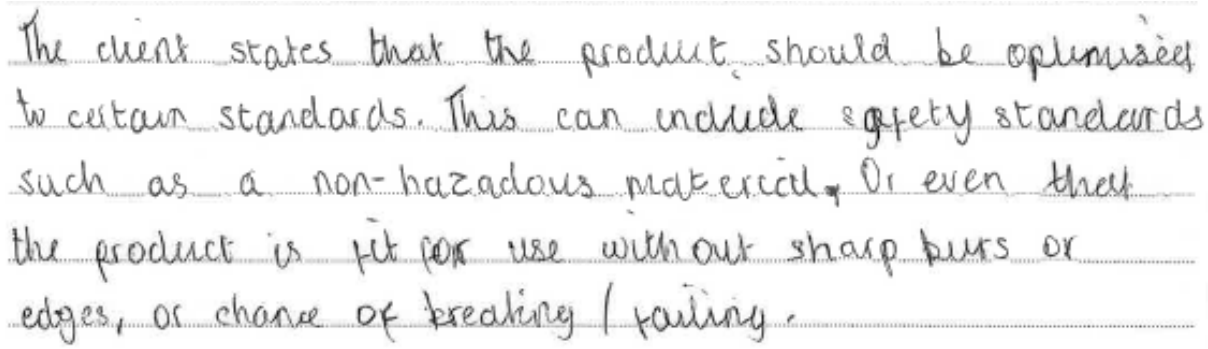
Extract 1



Extract 2



Extract 3



The format of the 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 achieved lower marks for this activity:

- The initial design ideas looked very similar to the existing stop and/or each other, with just two or three small adaptations that were minor improvements and addressed just one or two of the four bullet points at the bottom of the Part B Client brief.
- The initial design ideas did not take into account the requirement for retrofitting and/or they were orientated incorrectly when considering the positioning of the barrier arm.
- 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 four bullet points at the bottom of the Part B Client brief, for example, cost may have been a focus.

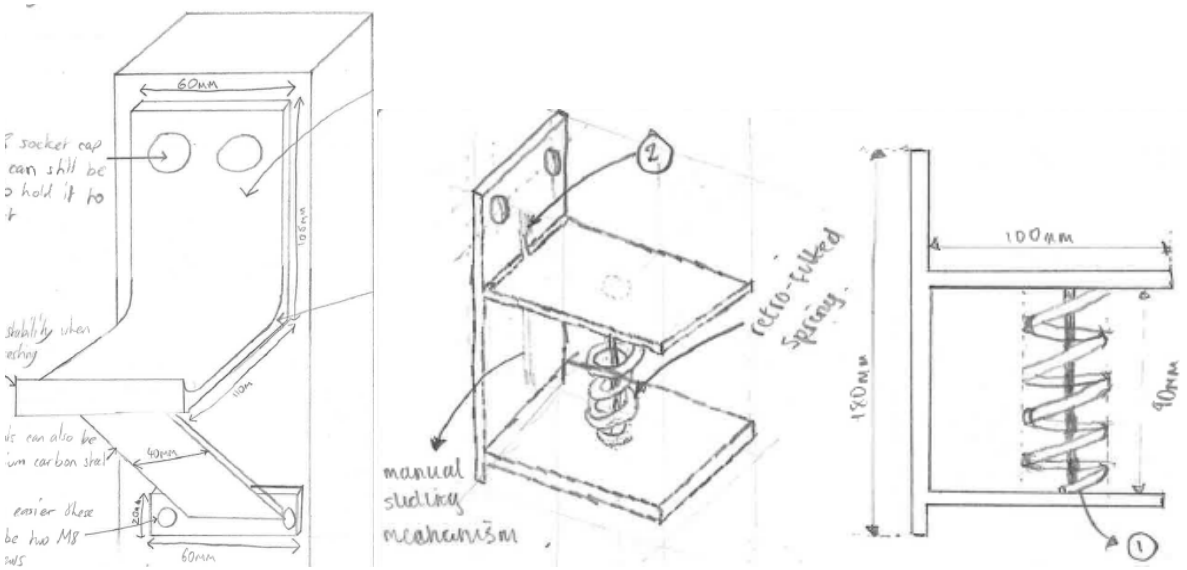
Conversely, the following characteristics were often evident in the response from learners that achieved higher marks for this activity:

- The initial design ideas were feasible/reasonably different to the existing stop and each other, when considering both form and approach, and included adaptations that were major improvements when compared to the existing stop and at least three of the four bullet points at the bottom of the Part B Client brief.
- The initial design ideas were able to be retrofitted to the existing catch post and included appropriate use of a compression spring(s) and/or a material(s) that cushions and/or a longer back plate so a supporting angle(s) could be longer/less acute and/or extra fixing points.

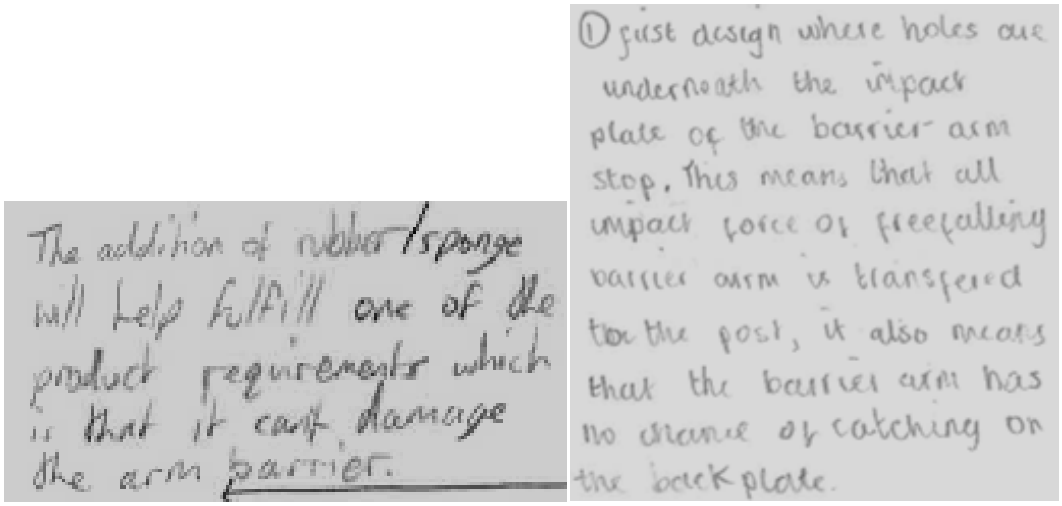
- The annotation was technically accurate and covered the learner's thoughts/rationale about each design idea with some reference to the four bullet points at the bottom of the Part B Client brief; however, some generic comments about aspects such aesthetics, one-off manufacture etc were also evident (and achieved 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 learner has provided 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 stop. In addition, they are both feasible and fit for purpose, and different to the existing stop, when considering both form and approach. These types of response are representative of Band 3 evidence.
In Extracts 2a and 2b, the learner has used written text/some technical terms to communicate further detail and to explain a design idea with some reference to the four bullet points at the bottom of the Part B Client brief. These types of response are representative of Band 3 evidence.
In Extract 3, the learner has provided an idea that is similar to the existing stop; in addition, the written comments don't provide any contextual thoughts or a rationale when considering the four bullet points at the bottom of the Part B Client brief. This type of response is representative of Band 1 evidence.

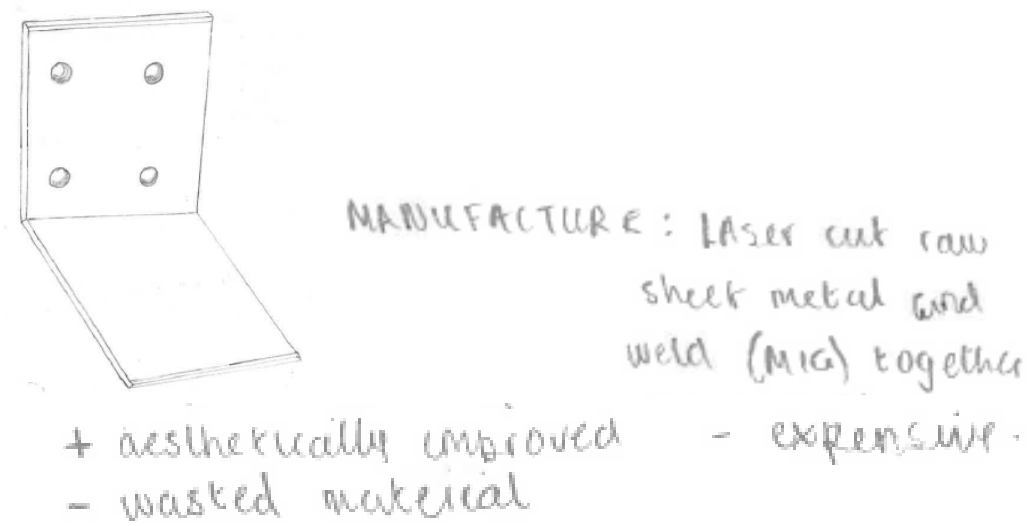
Extracts 1a and 1b



Extract 2a and 2b



Extract 3



The format of the evidence provided for Activity 3 was very similar in the most part, irrespective of the marks achieved. 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 achieved higher marks providing comments that referenced the four 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), existing products, materials, manufacturing processes, sustainability, safety and other relevant factors'], and each of these should be addressed in the response in order to achieve 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 achieved lower marks for this activity:

- The solution chosen: a) was a fairly minor improvement on the existing stop; b) showed some variation in form (rather than approach) when compared to the existing stop and included,, for example a shallow support angle (a relatively straightforward improvement); and c) was safer/more durable than the existing stop.
- The annotation/notes/text: a) simply referred to existing products, without providing any comments on how they were used when redesigning the stop; b) referred to/considered just one non-optimal material (such as aluminium alloy), but it was 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 achieved higher marks for this activity:

- The solution chosen: a) was a clear improvement on the existing stop; b) showed a clear variation in form/approach when compared to the existing stop, for example it took into account, in an explicit fashion, that the barrier arm may move laterally in the wind when outside due to its length (a relatively straightforward improvement in design terms, but recognition of the aforesaid demonstrated good understanding of the issues with the existing stop); and c) was much more safe/durable than the existing stop.
- The annotation/notes/text: a) referred to existing products from research and it was normally evident how the features of a different existing stop were used in the chosen solution; b) referred to/considered different/optimal materials (such as stainless steel) and gave suitable reasons for their selection; c) referred to/considered 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 this aspect, 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 the Activity 4 marking grid):

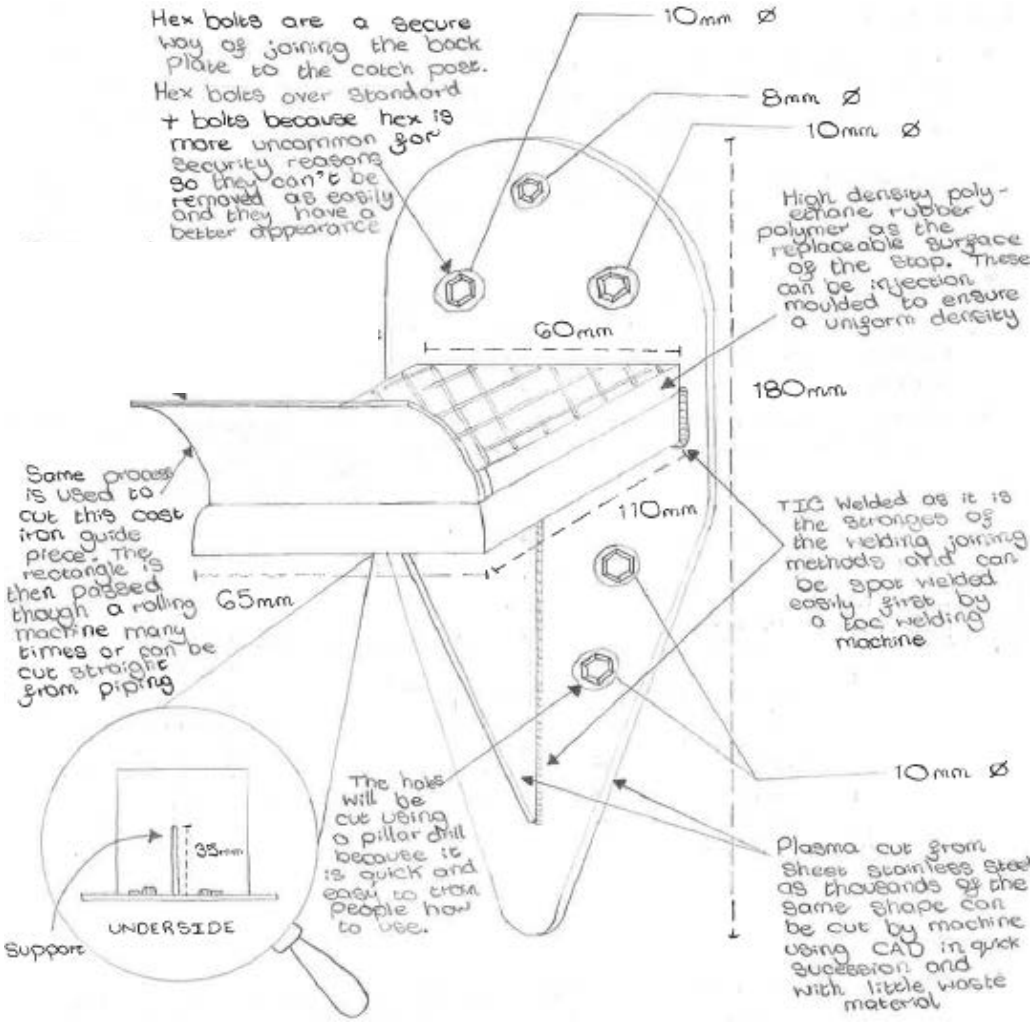
In Extract 1, the learner has provided an optimised solution with some annotated comments that suggest possible materials and approaches to manufacturing the redesigned stop. The idea has clearly 'designed out' the existing fracture/safety risks. This type of response is representative of Band 4 evidence.

In Extract 2, the learner has referred to existing products and has commented on how their knowledge of the aforesaid influenced their solution; in addition, the comments are accurate and evidential, as they relate to the design in Extract 1. This type of response is representative of Band 4 evidence.

In Extract 3, the learner has chosen some suitable manufacturing processes for their solution; however, the text does not consider other options and lacks some specific technical details that justify why the stated processes are suitable for each of the features mentioned. 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.

Extract 1

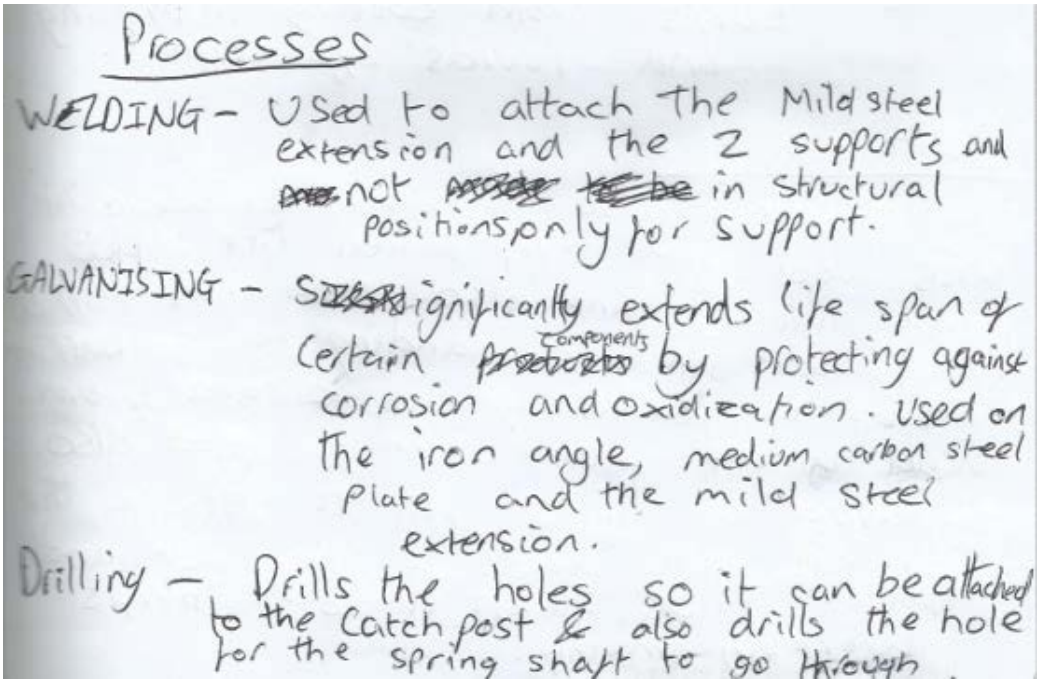


Extract 2

Existing products...

- Most existing products currently on the market have bucket shaped stops with flat bottoms to prevent the arm from slipping or being blown out of its rest position.
- To improve this existing feature I used the backplate and a cheap 'slope' as an alternative for the bucket design to keep the arm in a firm position.
- Existing products also usually have the stops mounted on top of a catch post rather than attached to the side.
- To overcome this and adhere to the brief I used a backplate with as much surface area as possible so my chosen joining method would be as strong as possible

Extract 3



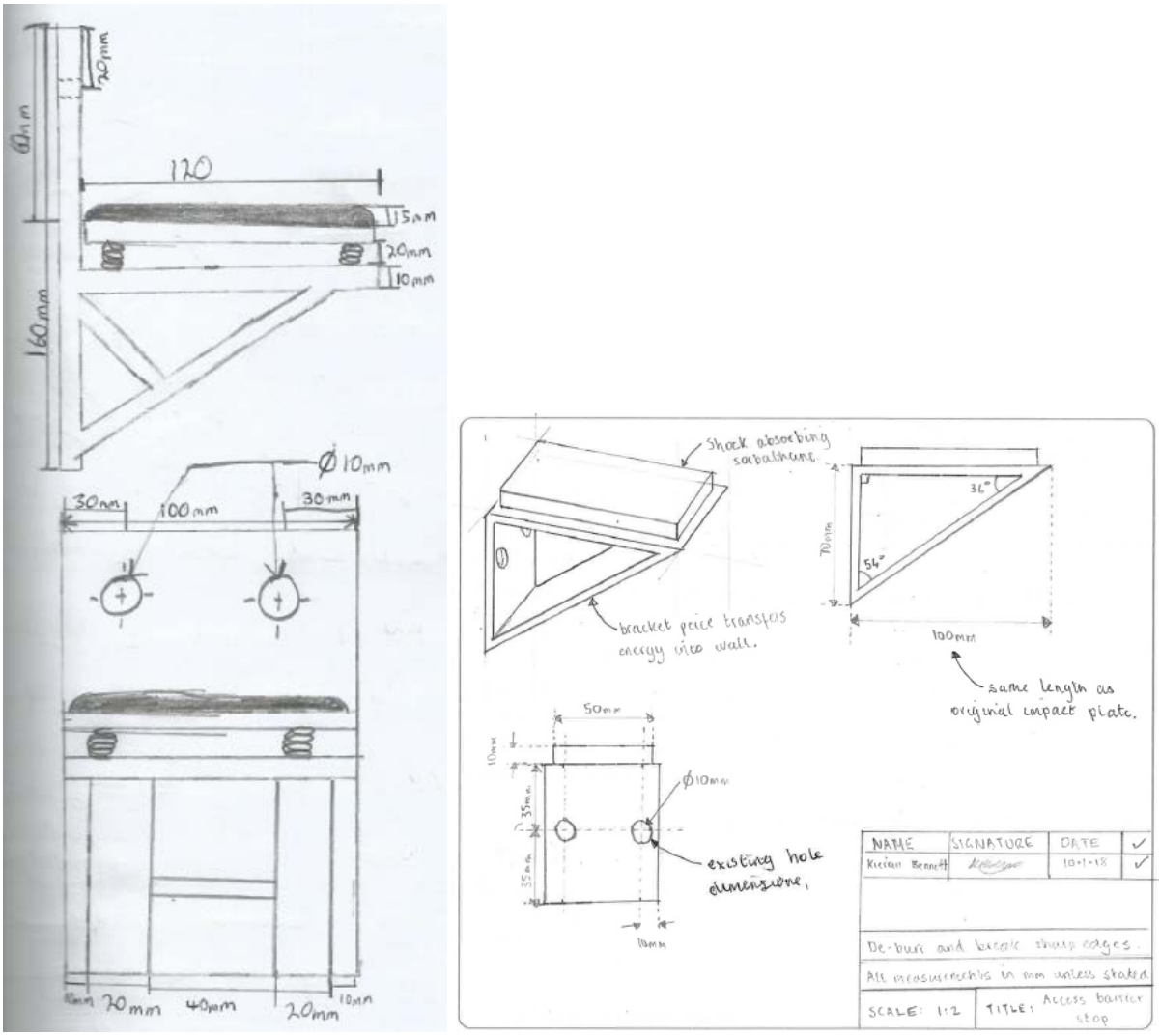
Processes

WELDING – Used to attach the Mild steel extension and the 2 supports and ~~does~~ not ~~assist~~ ~~be~~ in structural positions only for support.

GALVANISING – ~~Stops~~ significantly extends life span of certain ~~products~~ components by protecting against corrosion and oxidization. Used on the iron angle, medium carbon steel plate and the mild steel extension.

Drilling – Drills the holes so it can be attached to the catch post & also drills the hole for the spring shaft to go through.

Extract 4a and 4b



The format of the 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 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 of 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 stop) 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 achieved lower marks for this activity:

- The appraisal focused on, in an explicit fashion, why the design solution was a success and referred to some simplistic considerations, such as price/mass. Opportunities/limitations/constraints/indirect benefits were 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 stop, but it was self-congratulatory in places and only referenced the four bullet points at the bottom of the Part B Client brief in an implicit fashion.
- Comments on some further technology-led modifications were evident but very generic and/or irrelevant, for example, they referred to the use of warning lights on the barrier arm itself (which was not the product in hand) when it is being lowered.

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

- The appraisal focused on, in an explicit fashion, the opportunities, limitations and constraints of the design solution, for example 'The rigidity of the new stop may mean that the barrier arm itself sustains more damage each time it is dropped from a height, so it may be necessary to add cushioning to the underside of it where it hits the stop. This cushioning could be lined up with the rubber material on the right angle of the stop itself to minimise the impact problems and increase the life cycle.'
- The rationale gave good reasons as to why the solution was effective and referenced some of the four bullet points at the bottom of the Part B Client brief.

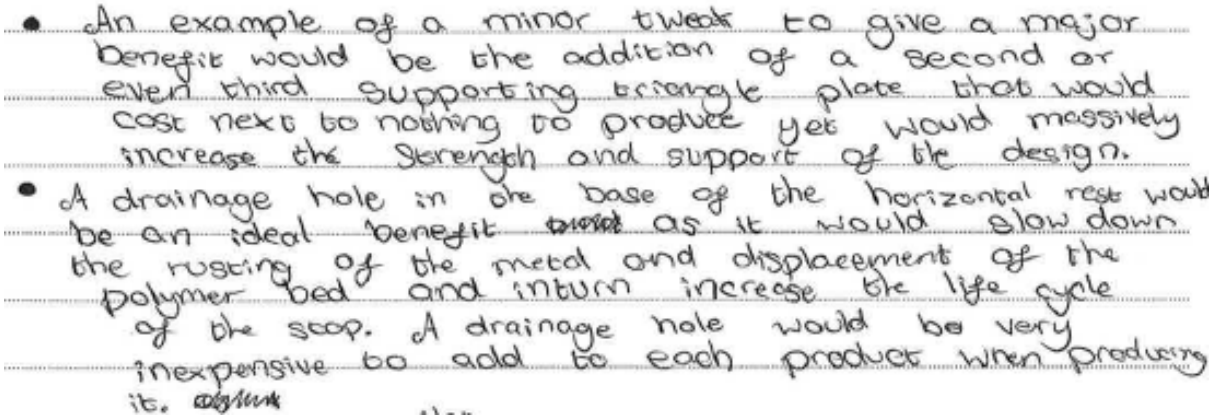
- Contextualised comments on some further technology-led modifications were evident and referred to, for example, using electromagnets to clamp the barrier arm onto the stop on contact.

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 some opportunities/features that could improve their solution. The appraisal is particular to the solution itself and considers specific factors such as further strength and durability (and therefore references bullet point 2 in 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 in relation to the Part B Client brief. The rationale is particular to the solution itself and references specifically at least three of the four bullet points in the said brief. This type of response is representative of Band 4 evidence.

In Extract 3, the learner has provided comments that refer to the whole manual arm access barrier when considering the opportunity for technology-led modifications, rather than the product in hand (the stop). The Part B Client brief states 'You also have an opportunity to reduce the issues with the existing design of the stop by considering equipment interfaces and retrofitting extra, low cost components'; however, the learner response suggests automation which would go well beyond 'retrofitting' and 'low cost'. As a result, this type of response is representative of Band 1 evidence.

Extract 1


- An example of a minor tweak to give a major benefit would be the addition of a second or even third supporting triangle plate that would cost next to nothing to produce yet would massively increase the strength and support of the design.
- A drainage hole in the base of the horizontal rest would be an ideal benefit as it would slow down the rusting of the metal and displacement of the polymer bed and inturn increase the life cycle of the scoop. A drainage hole would be very inexpensive to add to each product when producing it.

Extract 2

The designs proposed in task 3, and chosen in task 4, succeed in being a solution too the clients problem, by fitting the brief given. My final design is able too be manufactured in batches of 1000 easily since it has a simple 60mm x 300mm sheet metal cut net, which only requires folds, a single weld, two holes and an application of sorbathane to be complete. This is a very cheap and quick manufacturing process, making it ideal. The proposed design also solves the issue of the previous product, of not surving the full 12 years. This design is weatherproof, and directs the impact energy down the hypotenuse length, and into the catch post. As well as having sorbathane absorb it. The sorbathane also answers another requirement of the brief, as its soft landing prevents the damaging of the arm barrier. Saving the client money in repair costs.

Extract 3

How technology could improve the product

Automated / mechanical barrier - If the barrier was automated like in most multi-story car parks then access can be monitored and damage to the step could be reduced because rather than a person dropping the manual arm onto the step a motor could slowly lower it greatly reducing the impact force.

The format of the evidence provided for Activity 5 varied; nonetheless, the majority of 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 success 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.
- 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 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 four bullet points at the bottom of the Part B Client brief.

Activity 4

- Generate drawings and detailed technical annotation as appropriate to ensure 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 success 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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