Moderators' Report/
Principal Moderator Feedback

Summer 2015

Pearson Edexcel GCSE in Engineering

5EG02 Paper 01

Engineered Products

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Unit 5EG02

Engineered Products

General Comments

The performance of centres in this examination was similar to that in the previous series.

Those centres whose candidates tended to achieve the higher mark ranges were characterised by:

- Selecting a product to be produced that had an appropriate degree of demand for their candidates.
- Providing their candidates with clear and detailed manufacturing specifications.
- Allocating an appropriate amount of time for all of the assessment criteria to be addressed by their candidates.
- Supporting their candidates' achievements with detailed and comprehensive observation records and/or photographic records.

It is the final bullet point made above that had the most influence over the results achieved by learners in this examination series. Of the eight assessment criteria assessed in the unit, six depend on witness testimony to support the ephemeral evidence of learner independence. Where centres awarded high marks for independence, this needed to be supported by appropriate learner evidence in their portfolio and specific personalised witness testimony in order for the moderator to agree centre awarded marks. Where one aspect of this evidence was absent, centres were often judged to be lenient in their assessment decisions. Examples of the different styles of witness testimony provided by centres are shown below.

This first example is a generic witness testimony that does not indicate to the moderator how the performance of the learner differed from others.

Project Title **Practical Assessment sub-section d appropriate selection of materials**

This form should be included in the candidates work which is submitted for moderation

What task/activity are you assessing?

Sub-Section d: Appropriate selection of materials

How has the task/activity met the requirements of the Specification?

This witness statement is to verify that the learner has satisfied the requirements for sub-section d criteria.

The Learner complied with the duties and obligations in accordance with the Health and Safety at Work Act 1974 and applied safe working practices and procedures at all times. The activity was planned before the start and the work area prepared to carry out the engineering activities.
The learner was set a test to identify the right Sheet Metal from a selection of sheet materials. They then went onto fabrication the tool box.

On completion of tasks, the finished work was inspected for defects and conformance to design specifications. The area was cleaned and reinstated for further tasks.

HEALTH AND SAFETY:

College Policy PPE to be worn at all times. Appropriate working area designated Specific eye protection available if required

Gloves available if handling sheet metal Suitable overalls worn Safety boots worn deburr & remove all sharp edges

UNIT OVERVIEW

Level of response not worthy of credit.	0
Identify and prepare, with guidance, some appropriate materials, using them safely with some skill to make a product.	1–2
Identify and prepare, with limited guidance, appropriate materials, using them safely with skill to make a product.	3–4
Identify and independently prepare appropriate materials, using them safely with skill and accuracy to make a product.	5–6

The learner gained the following marks:

4

This second example of a witness testimony is focused on the performance of the specific individual learner and links the observed attributes of the learner with the evidence presented in the portfolio. Please note that the learner's name has been removed from the image.

Activity context: <u>Production of Metal Polisher</u>

Making all the component parts for the polisher, electrical circuit and assembling. Including the manufacture and assembly of the base and front cover, the wheel, the body, selecting the material, selecting appropriate materials for the parts of the polisher, setting up the appropriate machinery for the manufacture according to Health and Safety regulations and using it in a safe manner. Testing of the parts for quality and against the specification.

Assessment evidence

(d) Identify, prepare and use materials

(e) Identify, prepare and use parts and components

(f) Select and use processes, tools and equipment

(g) Produce an engineered product

(h) Testing and evaluating the product against the specification

Observation notes

Sub-section (d): ***Mark Band 3.*** selected his own materials from the relevant store room according to his production plan. His material choices and how he prepared them are detailed in his production logs, which also include information about the Health and Safety points followed during production (folder section 3).

Sub-section (e): ***Mark Band 3.*** He identified the parts and components he needed to use and requested them with accuracy, noting his choices in his production log. Safety was again well considered, and he included information about safe working in his production records.

Sub-section (f): ***Mark Band 3.*** demonstrated a deep knowledge of the machinery, tools and equipment available and a sound understanding of how to best use it to produce the product. He always worked safely and the parts he produced were good quality. used machines and equipment without the need for supervision or guidance. In folder section 3 he used his production logs, along with sketches and notes, to demonstrate his knowledge of the processes he used.

Sub-section (g): ***Mark Band 3.*** 's finished polisher is very high quality. Parts fit well together and he has paid attention to detail. In folder section 3 he has included his inspection sheet which was used to check the parts he made were within tolerance.

Sub-section (h): ***Mark Band 2.*** In folder section 3, noted the ways in which he made sure each part was made to specification. 's finished polisher is very high quality. Parts fit well together and he has paid attention to detail. In folder section 4 he tested the polisher against the specification and found it to meet the specification without needing any further action. 's use of specialist terminology is very good as is his spelling, punctuation and grammar.

For 5EG02, learners are provided with a full set of drawings and product specification. The drawings should include details of dimensions/tolerances etc., for each to enable learners to access the full range of marks for criterion (g) 'Produce an engineered product'. The specification should also provide performance details for the complete system to allow learners to access the full range of marks available for criterion (h) 'Testing and evaluation'.

Learners are rewarded for the identification, preparation and use of materials and components, including bought-in components, with safety and skill, and accuracy, at the upper mark range. Independence in these activities is evidenced by witness testimony.

Centres are able to choose their own product to be made and tested, and all of the work for the unit is produced under controlled conditions (33 hours max).

The quality of written communication (QWC) demonstrated by students is a progressively assessed component in three of the criteria: (b), (c) and (h). The eight-mark criterion (f) is for the safe and skilful use of processes, and can be seen as the reward for the demonstration of safe and accurate practical skills.

A wide range of 'engineered product' projects continue to be used for this unit. In order to enable access to the full range of marks available, the product should allow learners to demonstrate the processes of removal, shaping, joining, heat and chemical treatment, and surface finishing – as listed in the unit specification.

The quality of written communication (QWC) demonstrated by students has less prominence in this unit, being directly assessed at only three criteria (the two planning criteria and the product evaluation one at the end).

Assessment Criteria

(a) Read and interpret a product specification and engineering drawings/diagrams

In order for a learner to access the marks available from the high range, the evidence contained in the learner's portfolio must be supported by a witness testimony that confirms the learner operated independently. Where an appropriate witness testimony was not provided, moderators frequently determined that the centre's assessment was lenient.

Centres used a variety of approaches to generate evidence for the criterion. These included:

- Learners producing assembly drawings from individual component drawings.
- Learners annotating drawings of components to highlight key dimensions.
- Learners annotating drawings of components to consider manufacturing requirements.
- Learners annotating schematic diagrams to explain the function of components.
- Learners extracting and recording details of the "measureable" aspects of the product's performance.

Those learners that used a combination of approaches tended to access higher marks than those who used a single style.

(b) Produce a production plan which includes information about resources and processing requirements

In order for a learner to access the marks available from the high range, the evidence contained in the learner's portfolio must be supported by a witness testimony that confirms the learner operated independently. Where an appropriate witness testimony was not provided, moderators frequently determined that the centre's assessment was lenient.

For this criterion learners need to provide evidence in the form of a production plan that details resources and processing requirements. In order to access the high mark range, learners need to consider materials, parts, components, tools and equipment, and any assembly techniques required. Learners also need to include information related to the measuring equipment to be used for criteria (g) and (h). Learners also need to provide evidence of processing requirements, such as details of processes to be used.

(c) Produce a production plan which includes information about production details and constraints

In order for a learner to access the marks available from the high range, the evidence contained in the learner's portfolio must be supported by a witness testimony that confirms the learner operated independently. Where an appropriate witness testimony was not provided, moderators frequently determined that the centre's assessment was lenient.

For this criterion learners need to provide evidence in the form of a production plan that details machine settings and speeds, tooling details, sequence of production, health and safety requirements for the process. The most frequent omission from learners' evidence related to machine settings and speeds. This is an area centres should ensure is addressed in future series if learners are to access the full range of marks available.

Learners also need to consider production constraints including quality control points, deadlines, machine availability, inspection procedures, cost of materials and machine time. Very few learners provided evidence of considering machine availability and machine time. Centres should consider how they can support learners to help them generate appropriate evidence for the factors. For example learners might be required to complete a document to request access to specified equipment at particular times. This system might also help generate appropriate evidence for deadlines as other learners may have requested access to the same equipment at a later date/time.

(d) Identify, prepare and use materials

In order for a learner to access the marks available from the high range, the evidence contained in the learner's portfolio must be supported by a witness testimony that confirms the learner operated independently. Where an appropriate witness testimony was not provided, moderators frequently determined that the centre's assessment was lenient.

Centres used a variety of approaches to generate evidence for the first part of this criterion, the identification and preparation of materials. These included:

- Notes produced by learners allowing them to identify appropriate materials.
- Annotated photographs of learners selecting the materials required from a stock of materials that contained alternatives.
- Comments contained with the production plan detailing the preparation of the materials.
- Annotated photographs of learners preparing the materials.

The second part of the criterion requires learners to submit evidence of their safe use of materials with skill and accuracy. Evidence related to safety was recorded appropriately by the majority of centres with evidence being provided in the production plan and annotated photographs of the users working safely.

Evidence of learners demonstrating skill and accuracy tended to not be so clearly evidenced by centres. Centres tended to present photographs of complete products, rather than detailed images of the components that make up the whole product. Centres are advised that it would help the moderator agree centre allocated marks if photographs were provided that clearly show the high quality of the manufactured components. It is likely that a high quality product will have been produced as a result of the learner demonstrating skill and accuracy.

Evidence from criterion (g) will also be used to support the marks awarded for this criterion.

(e) Identify, prepare and use parts and components

In order for a learner to access the marks available from the high range, the evidence contained in the learner's portfolio must be supported by a witness testimony that confirms the learner operated independently. Where an appropriate witness testimony was not provided, moderators frequently determined that the centre's assessment was lenient.

This criterion requires learners to work with "bought-in" components.

Centres used a variety of approaches to generate evidence for the first part of this criterion, the identification and preparation of appropriate parts and components. These included:

- Notes produced by learners allowing them to identify components, such as identifying the appropriate colour bands of the resistors being used.
- Annotated photographs of learners selecting parts and components from stock.
- Comments contained with the production plan detailing the preparation of parts and components.
- Annotated photographs of learners preparing to use parts and components. This often took the format of the components of an assembly being laid out before being joined together.

The comments made for the use of materials above also apply to this criterion for the use of parts and components.

(f) Select and use processes, tools and equipment

In order for a learner to access the marks available from the high range, the evidence contained in the learner's portfolio must be supported by a witness testimony that confirms the learner operated independently. Where an appropriate witness testimony was not provided, moderators frequently determined that the centre's assessment was lenient.

For this criterion most centres provided a good range of photographs that clearly recorded learners using a wide range of processes, tools and equipment. As the

criteria (d) and (e) are also related to the skilful use of tools and equipment, evidence presented by learners frequently was credited across several criteria. This in turn meant that the marks awarded across all three criteria were typically in the same mark ranges (high, middle or low).

(g) Produce an engineered product

Marks are awarded in this criterion for the quality and accuracy of the components that make up the complete finished product and assemblies. Witness testimony should be combined with photographs that are sufficiently detailed to allow the moderator to make judgements on the characteristics of the components that make up the complete product. These attributes tended to be accurately assessed by the majority of centres.

The second element of the criterion requires learners to complete inspection sheets that record physical dimensions, or outputs of subsystems. This element was not successfully addressed by a number of centres.

Where centres awarded marks from the middle and higher mark ranges, the following situations were observed that resulted in the moderator determining that centre assessment was lenient:

- Inspection sheets that compare the product to a toleranced dimension and simply record pass/fail.
- Inspections sheets that record dimensions without providing the moderator with an indication of what feature the measurements relate to.
- Learners recording dimensions to high degrees of accuracy without providing evidence of the ability to measure to that accuracy, e.g. recording a measurement of 10.1mm using a steel rule.

It would help moderators agree centre awarded marks if witness testimonies referred to the validity and accuracy of learner's completed inspection sheets.

(h) Testing and evaluation

This criterion requires that the completed functional product is tested against the specified product performance, rather than the detailed production control measurements that are rewarded in (g). In order to access the full range of marks available for this criterion, the design brief and associated specification must provide learners with measurable success criteria for the completed product.

Once learners have acquired data from tests they need to present it clearly. Typically those centres whose learners accessed the high marks available for this criterion presented their data graphically.

For both criteria (g) and (h), moderators sometimes gained the impression that learners had completed these final two criteria to a lower standard than the preceding ones. A potential cause of this degradation may have been insufficient time available for learners to complete the criteria to the best of their ability.

Learners, and centre assessors, are again congratulated in 2015 for their work done towards the completion and testing of their engineered products. There was the typical range of success, rewarded appropriately after moderation, and student photo-narratives showed application, attention to safety and again some pride. Portfolios again gave an impression of the enjoyment of a worthwhile engineering experience, and it can be hoped that this will be built upon in progression opportunities, which are also likely to require a blend of practical and communication skills measured against criteria.

Grade Boundaries

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