

CAMBRIDGE TECHNICALS LEVEL 3 (2016)

Moderators' report

ENGINEERING

05822–05825, 05873

Summer 2023 series

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Introduction

Our Lead Moderators' reports are produced to offer constructive feedback on centres' assessment of moderated work, based on what has been observed by the moderation team. These reports include a general commentary of accuracy of internal assessment judgements; identify good practice in relation to evidence collation and presentation and comments on the quality of centre assessment decisions against individual Learning Objectives. This report also highlights areas where requirements have been misinterpreted and provides guidance to centre assessors on requirements for accessing higher mark bands. Where appropriate, the report will also signpost to other sources of information that centre assessors will find helpful.

OCR completes moderation of centre-assessed work in order to quality assure the internal assessment judgements made by assessors within a centre. Where OCR cannot confirm the centre's marks, we may adjust them in order to align them to the national standard. Any adjustments to centre marks are detailed on the Moderation Adjustments report, which can be downloaded from Interchange when results are issued. Centres should also refer to their individual centre report provided after moderation has been completed. In combination, these centre-specific documents and this overall report should help to support centres' internal assessment and moderation practice for future series.

Online courses

We have created online courses to build your confidence in delivering, marking and administering internal assessment for our qualifications. Courses are available for Cambridge Nationals, GCSE, A Level and Cambridge Technicals (2016).

Cambridge Nationals

All teachers delivering our redeveloped Cambridge Nationals suite from September 2022 are asked to complete the Essentials for the NEA course, which describes how to guide and support your students. You'll receive a certificate which you should retain.

Following this you can also complete a subject-specific Focus on Internal Assessment course for your individual Cambridge Nationals qualification, covering marking and delivery.

GCSE, A Level and Cambridge Technicals (2016)

We recommend all teachers complete the introductory module Building your Confidence in Internal Assessment, which covers key internal assessment and standardisation principles.

Following this you will find a subject-specific course for your individual qualification, covering marking criteria with examples and commentary, along with interactive marking practice.

Accessing our online courses

You can access all our online courses from our teacher support website [Teach Cambridge](#).

You will find links relevant to your subject under Assessment, NEA/Coursework and then Online Courses from the left hand menu on your Subject page.

If you have any queries, please contact our Customer Support Centre on 01223 553998 or email support@ocr.org.uk.

General overview

It is important that centres liaise with their assigned moderator early in the year to discuss potential visit dates and agree deadlines for candidate evidence to be completed and entered for moderation. The centres can enter candidates through Interchange within the timeline requirements. (At least 10 working days before planned virtual moderation date.) This will allow moderators to select a centre sample and return it to the centre thereby allowing them to upload the required candidates' evidence. Centres also should be aware of the requirements to upload all selected candidates' evidence onto the ASFA portal at least 3 days before planned moderation date. OCR will also set up a TEAMS meeting link for the virtual moderation which the moderator will send to the centre.

OCR has produced a number of guidance documents relating to the uploading of candidate evidence and URS onto ASFA system, which centres should refer to.

At each visit, centres are required to provide a complete Unit Recording Sheet (URS) for each candidate that clearly shows where the candidate has gained each grading criteria along with the final grade that is entered on Interchange. The URS should also include clear page referencing to show where work against the particular grading criteria has been awarded. This can be supported with suitable annotation in the candidate's portfolio. The URS should also be uploaded onto the ASFA portal before the virtual moderation date.

Internal Verification and Standardisation

Centres are encouraged to conduct Internal Verification of assignment briefs if they are set by centre. They should also conduct Internal Standardisation when grading candidates' evidence (OCR has produced sample documents that the centres could use). Where this has been carried out in centres it clearly demonstrated consistent and accurate assessment of candidate evidence and helped in the moderation process. Remember the IV document is intended as feedback to the assessor on the assessment of candidates' evidence.

Meaningful Employer Involvement (MEI)

This is a requirement from DfE for all awarding bodies 'to confirm that providers have secured employer involvement for every learner' taking a Tech level qualification or a Technical Certification qualification that has been approved by DfE. This refers to all Cambridge Technical qualifications (except 05823) at both Levels 2 and 3. The employer involvement does not contribute to the overall qualification grading, but it is a requirement that all candidates must meet.

Authentication

It is important that each candidate provides a completed authentication statement for their work and understands the importance of authenticity in the evidence they are presenting. Centres only need to supply one authentication statement per candidate covering all units they are submitting.

Witness statements

Centres are encouraged to use witness statements to support candidates' work - noting that these cannot be used as a single source of evidence against grading criteria. An example of where this is effective is in Unit 13 when using a range of hand tools safely and effectively (P5). Witness statements can be used to support and corroborate evidence such as confirming safe and independent working. Witness statements should be individualised and referenced to candidate.

Referencing

All candidates must be encouraged to reference their work. This could be as simple as footnotes on each page showing the source material used, along with numbered annotation within the work which should reference to particular grading criteria covered by the candidate's evidence.

Comments on individual units

Unit 5 Electrical and electronic design

Candidates were able to demonstrate general understanding of electrical and electronic principles through well designed centre assignments. Candidates need to clearly show their understanding of Kirchhoff's Laws and how to apply the laws effectively.

There are a number of synoptic assessment links to Units 2 and 4 which are referenced in the grading criteria and must be clearly demonstrated in candidate evidence. One example where this might be achieved is in grading criteria D2 which requires electrical theory related to generators and motors. All grading criteria must be clearly shown in candidate evidence.

Unit 6 Circuit simulation and manufacture

Most candidates moderated during this moderation period have presented photographic evidence and screen shots of their work with descriptive annotation or clear step by step description to meet the grading criteria. This is an effective method due to the practical nature of the unit requiring circuit simulation and manufacture.

The use of a Witness Statement to support candidate evidence is helpful and can cover most practical activities related to the unit grading criteria.

To allow candidates to gain marks and understanding for fault finding (Learning Outcome 4) centres could provide a number of circuits that allow candidates to demonstrate different fault finding techniques.

Unit 7 Electrical devices

Candidates have used photographic evidence with clear description of operation of various devices to meet grading criteria. Candidates need to make sure that all evidence is clearly referenced, and information sources clearly identified. Within this unit there is a synoptic link to Unit 4.

Unit 8 Electrical operations

Candidates provided a range of evidence for this unit to demonstrate their understanding, often using tables and images of electronic components and devices with a description. Centres must remind candidates that their evidence for items they explain must be supported with technical data and/or referenced to the source they used.

Learning Outcomes 2, 3 and 4 were most clearly presented when candidates provided annotated photographic evidence along with Witness Statements rather than just trying to explain what they did.

Unit 9 Mechanical design

All candidates provided a range of diagrams and drawings in 2D and 3D format to demonstrate their understanding of these unit requirements. Candidates also supplied explicit evidence to meet synoptic evidence required for P7. (Synoptic link to Unit 1.)

Centres must encourage candidates to make sure that all their formal drawings use British Standard conventions where possible. There is no need for candidates to show every drawing they have created but a number to clearly show their design ideas. Candidates should also clearly define their understanding of DFMA principles.

Unit 10 Computer aided design (CAD)

This is the most commonly used unit for all qualifications in engineering across all centres. The centres have used various CAD software packages to allow candidates to produce evidence that meets all grading criteria.

Candidates have presented images with descriptions to demonstrate their practical use of CAD features.

Final drawings should enable the component or product to be manufactured and must be to BS and ISO drawing standards.

Unit 11 Materials science

Candidates provided evidence in the form of written reports with images to demonstrate their understanding of material science unit requirements. The testing of materials evidence could be enhanced by a Witness Statement which would support annotated photographic evidence presented by candidates. (Within this unit a synoptic link to Unit 2.)

Unit 12 Mechanical simulation and modelling

In this unit the candidates must demonstrate a clear understanding of FEA and CFD simulation and apply them to a component or product. Candidates found difficulty in applying mathematical, scientific, and engineering principles to prove the accuracy of FEA and CFD system. (P5 and P8)

Unit 13 Mechanical operations

In this unit candidates have used photographic evidence which has been annotated to cover a range of grading criteria with the centre also supplying Witness Statements to cover practical activities. Candidates also created production plans which contained various topic headings (tooling, equipment, health and safety requirements, etc.) which could be related to grading criteria. (Synoptic link to Unit 1.)

Unit 14 Automation control and robotics

This unit was only delivered by a small number of centres, mainly due to the resources required to deliver the unit and allow candidates to achieve all grading criteria. Candidates used research material which was clearly referenced and identified to produce evidence for the Merit and Distinction criteria. Candidates need to develop and present good analytical skills to produce evidence for the Merit and Distinction criterion.

Unit 15 Electrical, mechanical, hydraulic and pneumatic control

This unit was only delivered by a small number of centres, mainly due to the resources required to deliver the unit and allow candidates to achieve all grading criteria. Candidates used research material which was clearly referenced and identified to produce evidence for the Merit and Distinction criteria. Candidates need to develop and present good analytical skills to produce evidence for the Merit and Distinction criterion.

This unit requires candidates to research and develop their knowledge of the operation and control of electrical, mechanical, hydraulic and pneumatic system and present their findings related to the grading criterion. In most cases this was through reports which included images, photos, and description of the systems.

Unit 16 Systems and programming

Candidates presented evidence in various formats which included written programs (ladder diagrams), photographic and explanation records, related to specific grading criteria.

Candidates provided programs for PLC and other embedded devices in a control system.

Unit 17 Computer aided manufacture (CAM)

This unit lends itself to the use of photographic evidence which is annotated from candidates that can be supported by Witness Statements due to the practical nature, of aspects of this unit. The use of a production plan template for a CNC machined component would show the candidates' understanding of all processes involved in manufacture of component. (Synoptic link to Unit 1.)

Unit 18 Lean and quality

Candidates have presented evidence for this unit through research, evaluation and analysing of lean waste manufacturing techniques, quality control in manufacturing and the creation of a production plan for a manufactured component taking into account lean and quality principles.

Candidates need to clearly reference their evidence to each grading criteria and present separate evidence for each grading criteria (no double counting). (Synoptic link to Unit 1.)

Unit 19 Inspection and testing

Candidates have presented evidence for this unit through research, evaluation and analysing of inspection and testing techniques. Candidates produced a testing schedule for the production of a product (this was shown in a centre through evidence from a visit to a local manufacturing company where candidates had seen the testing process in action).

Candidates found difficulty in producing SPC moving range charts from data. Centres are allowed to give candidates data in this instance for the candidates to present evidence that meets grading criteria. (Synoptic link to Unit 2.)

Unit 20 Business for engineering

Candidates have presented evidence for this unit through research, evaluation and analysing of various factors that affect engineering businesses. Centres found difficulty in creating a budget related to an engineering department that contained all relevant information for the Distinction grade. They could refer to local companies and make sure all key terms and explanations were within candidates' evidence (Learning Outcome 5). (Synoptic link to Unit 1.)

Unit 21 Maintenance

Only a small number of centres delivered this unit. Candidates mainly only produced evidence to meet Pass criteria. Centres need to have someone who may have worked in this environment (engineering maintenance) that can relate the practical activities to the learning the candidates are receiving. It also provides an opportunity to use MEI with local companies to enhance the candidates' learning experience related to this unit. (Synoptic link to Unit 1.)

Unit 22 Engineering and the environment

Candidates have presented evidence for this unit through research and evaluation. Candidates need to clearly reference their evidence and match it to the grading criteria and identify the research sources. All terminologies used within the unit must be clearly explained by candidates. Candidates should provide an in-depth analysis of environmental impact on global manufacturing and how it could be reduced. (Synoptic link to Unit 1.)

Unit 25 Promoting continuous improvement

This unit is related to personal development and candidates can relate evidence from other units to show actions or developments they have made to their personal and practical skills. Self-evaluation and justification of actions are required to be shown by candidates. Candidates should present evidence in the singular, not 'we' or 'us'.

Most common causes of centres not achieving

Centres should make sure that the assessment criteria are looked at in conjunction with the unit specifications to make sure that no elements of the assessment are missed. Candidate evidence must be explicit and not implicit for the grading criteria to be awarded. Any concerns or clarification should be discussed with the moderator. All candidate evidence must be clearly referenced to the specific grading criteria it is intended to cover.

Common misconceptions

Candidates are allowed to use templates where they are appropriate to complete tasks. These templates could be used for Risk Assessment or production planning. Structured writing frames are not permitted.

Avoiding potential malpractice

Centres are reminded that Witness Statements on their own provide insufficient independent evidence for candidates to be given a particular grading criteria. Where limited evidence is provided to satisfy Merit and Distinction criteria (in addition to the required Pass criteria) centres should be careful not to double count a single piece of evidence as satisfying for both grades. They should make sure that there is clear explanation to satisfy Merit and further evaluation for Distinction criterion to be met.

Helpful resources

Centres should refer to the Delivery Guide for each Unit and additional resources available on [Teach Cambridge](#) and on the [OCR website](#). They should also sign up to the free face-to-face events and webinars published on [OCR Professional development](#).

Additional comments

Centres should always refer to both the Learning Outcomes and Teaching Content for the unit to make sure that their assignments cover the appropriate content and help candidates to access all of the grading criteria.

All candidates must be encouraged to reference their work which could be satisfied through simple footnotes on each page of their evidence or numbered annotation alongside their evidence.

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