

CAMBRIDGE TECHNICALS LEVEL 3 (2016)

Moderators' report

ENGINEERING

05822–05825, 05873

Summer 2022 series

Contents

- Introduction3
- General overview4
- Unit 5 Electrical and electronic design5
- Unit 6 Circuit simulation and manufacture5
- Unit 7 Electrical devices5
- Unit 8 Electrical operations6
- Unit 9 Mechanical design6
- Unit 10 Computer aided design (CAD)6
- Unit 11 Material science6
- Unit 12 Mechanical simulation and modelling6
- Unit 13 Mechanical operations7
- Unit 14 Automation control and robotics7
- Unit 15 Electrical, mechanical, hydraulic and pneumatic control7
- Unit 16 Systems and programming.....7
- Unit 17 Computer aided manufacture (CAM).....7
- Unit 18 Lean and quality.....8
- Unit 19 Inspection and testing8
- Unit 20 Business for Engineering.....8
- Unit 21 Maintenance.....8
- Unit 22 Engineering and the environment.....8
- Unit 25 Promoting continuous improvement9
- Most common causes of centres not achieving9
- Common misconceptions9
- Avoiding potential malpractice9
- Helpful resources9
- Additional comments9

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.

Would you prefer a Word version?

Did you know that you can save this PDF as a Word file using Acrobat Professional?

Simply click on **File > Export to** and select **Microsoft Word**

(If you have opened this PDF in your browser you will need to save it first. Simply right click anywhere on the page and select **Save as . . .** to save the PDF. Then open the PDF in Acrobat Professional.)

If you do not have access to Acrobat Professional, there are a number of **free** applications available that will also convert PDF to Word (search for PDF to Word converter).

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 the 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 candidate's evidence. Centres should also be aware of the requirements to upload all selected candidates' evidence onto the ASFA portal at least 3 days before the 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 the Unit Recording Sheet (URS) onto ASFA system, which centres should refer to.

At each visit, centres are required to provide a completed 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 have 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.

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 Technical level qualification or a Technical Certification qualification that has been approved by DfE. This refers to all Cambridge Technical qualifications except Level 3 Cambridge Technical Extended Certificate in Engineering 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 learners must met.

Authentication

It is important that each candidate provides a completed authentication statement for their work and understand 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.

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 candidate's evidence.

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.

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's 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 ensure that all evidence is clearly referenced, and information sources clearly identified.

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.

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 Material 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.

Unit 12 Mechanical simulation and modelling

In this unit the candidates must demonstrated 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 centre also supplying witness statements to cover practical activities. Candidates also created production plans which contained various topic headings (tooling, equipment, H&S requirements, etc.) which could be related to grading criteria.

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 creation. 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 creation. 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

Candidate 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 candidate understanding of all processes involved in manufacture of component.

Unit 18 Lean and quality

Candidates have present 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).

Unit 19 Inspection and testing

Candidates have to present 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 visit to a local manufacturing company where candidates 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.

Unit 20 Business for Engineering

Candidates have to present 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 ensure all key terms and explanations were within candidates' evidence (Learning Outcome 5).

Unit 21 Maintenance

Only a small number of centres delivered this unit. Candidates mainly only produced evidence to meet the 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.

Unit 22 Engineering and the environment

Candidates have present evidence for this unit through research and evaluation. Candidates need to clearly reference their evidence and match it to the grading criteria and identifying the research sources. All terminologies used within unit must be clearly explained by candidates.

Unit 25 Promoting continuous improvement

Only a small number of centres delivered this unit. 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.

Most common causes of centres not achieving

Centres should ensure that the assessment criteria is looked at in conjunction with the unit specifications to ensure 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 moderator.

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 the [OCR qualification webpage](#). They should also sign up to the free events and webinars published on the [OCR CPD Hub site](#).

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.

Supporting you

Post-results services

If any of your students' results are not as expected, you may wish to consider one of our post-results services. For full information about the options available visit the [OCR website](#).

Keep up-to-date

We send a weekly roundup to tell you about important updates. You can also sign up for your subject specific updates. If you haven't already, [sign up here](#).

OCR Professional Development

Attend one of our popular CPD courses to hear directly from a senior assessor or drop in to a Q&A session. Most of our courses are delivered live via an online platform, so you can attend from any location.

Please find details for all our courses on the relevant subject page on our [website](#) or visit [OCR professional development](#).

Signed up for ExamBuilder?

ExamBuilder is the question builder platform for a range of our GCSE, A Level, Cambridge Nationals and Cambridge Technicals qualifications. [Find out more](#).

ExamBuilder is **free for all OCR centres** with an Interchange account and gives you unlimited users per centre. We need an [Interchange](#) username to validate the identity of your centre's first user account for ExamBuilder.

If you do not have an Interchange account please contact your centre administrator (usually the Exams Officer) to request a username, or nominate an existing Interchange user in your department.

Need to get in touch?

If you ever have any questions about OCR qualifications or services (including administration, logistics and teaching) please feel free to get in touch with our customer support centre.

Call us on
01223 553998

Alternatively, you can email us on
support@ocr.org.uk

For more information visit

 **ocr.org.uk/qualifications/resource-finder**

 **ocr.org.uk**

 **/ocrexams**

 **/ocrexams**

 **/company/ocr**

 **/ocrexams**

We really value your feedback

Click to send us an autogenerated email about this resource. Add comments if you want to. Let us know how we can improve this resource or what else you need. Your email address will not be used or shared for any marketing purposes.



I like this



I dislike this

Please note – web links are correct at date of publication but other websites may change over time. If you have any problems with a link you may want to navigate to that organisation's website for a direct search.



OCR is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored. © OCR 2022 Oxford Cambridge and RSA Examinations is a Company Limited by Guarantee. Registered in England. Registered office The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA. Registered company number 3484466. OCR is an exempt charity.

OCR operates academic and vocational qualifications regulated by Ofqual, Qualifications Wales and CCEA as listed in their qualifications registers including A Levels, GCSEs, Cambridge Technicals and Cambridge Nationals.

OCR provides resources to help you deliver our qualifications. These resources do not represent any particular teaching method we expect you to use. We update our resources regularly and aim to make sure content is accurate but please check the OCR website so that you have the most up to date version. OCR cannot be held responsible for any errors or omissions in these resources.

Though we make every effort to check our resources, there may be contradictions between published support and the specification, so it is important that you always use information in the latest specification. We indicate any specification changes within the document itself, change the version number and provide a summary of the changes. If you do notice a discrepancy between the specification and a resource, please [contact us](#).

You can copy and distribute this resource freely if you keep the OCR logo and this small print intact and you acknowledge OCR as the originator of the resource.

OCR acknowledges the use of the following content: N/A

Whether you already offer OCR qualifications, are new to OCR or are thinking about switching, you can request more information using our [Expression of Interest form](#).

Please [get in touch](#) if you want to discuss the accessibility of resources we offer to support you in delivering our qualifications.