CAMBRIDGE TECHNICALS

OCR
Oxford Cambridge and RSA

CAMBRIDGE TECHNICALS LEVEL 3 (2016)

Moderators' report

ENGINEERING

05822–05825, 05873

Summer 2024 series

Contents

Introduction 3
Online courses 3
General overview 4
Comments on individual units 6
Unit 5 – Electrical and electronic design 6
Unit 6 – Circuit simulation and manufacture 6
Unit 7 – Electrical devices 6
Unit 8 – Electrical operations 6
Unit 9 – Mechanical design 7
Unit 10 – Computer-aided design (CAD) 7
Unit 11 – Material science 7
Unit 12 – Mechanical simulation and modelling 7
Unit 13 – Mechanical operations 8
Unit 14 – Automation control and robotics 8
Unit 15 – Electrical, mechanical, hydraulic and pneumatic control 8
Unit 16 – Systems and programming 8
Unit 17 – Computer-aided manufacturing (CAM) 8
Unit 18 – Lean and quality 9
Unit 19 – Inspection and testing 9
Unit 20 – Business for engineering 9
Unit 21 – Maintenance 9
Unit 22 – Engineering and the environment 10
Unit 25 – Promoting continuous improvement 10

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Introduction

Our 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 comment on the quality of centre assessment decisions against individual Learning Objectives. The 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 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 can be viewed on the Interchange claim once processed by the moderator. 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

Communication with centres and allocated moderators should be as early as possible at the start of the academic year, to arrange potential dates for visits and enable centres to set appropriate deadlines for their candidates for qualifications being delivered. Centres can build claims within Interchange before submitting their claims. These claims should be entered at least 10 working days before the moderation visits to allow time for sampling and uploading of required samples. Centres should also make sure all required files and candidate samples are uploaded to the Assessment Specialist File Access (ASFA) portal at least three days before the moderation visit. OCR will send a Teams link to both centre and moderator before the visit date.

There are a number of guidance documents and supporting forms to be found on the OCR website for the Level 3 Cambridge Technical in Engineering and Teach Cambridge, covering uploading files and documenting candidate assessments and qualification requirements.

At each visit, centres are required to provide a completed Unit Recording Sheet (URS) for each candidate that clearly shows were the candidate has addressed each grading criteria, along with the final grade that is entered on Interchange. The URS should also include clear page referencing to identify work that centre assessors feel meet the particular grading criteria that has been awarded, along with supporting comments related to evidence produced. This can also be supported with suitable annotation in the candidate's portfolio. The URS should also be uploaded onto the ASFA portal into the relevant candidate folder before the virtual moderation date.

OCR support – Internal Verification and Standardisation

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

Information on the OCR website about Administration

OCR support – 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 students must meet.

Information on the OCR website about Meaningful employer involvement (MEI)

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. There are a number of units where these forms can further corroborate candidates' effective tool use, testing, machining processes, and safe and independent working. Witness statements should be individualised and referenced to candidates.

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.

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.

Most common causes of centre not passing/doing well

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.

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. Observations show candidates need to clearly show their understanding of Kirchhoff's Laws and how to apply the laws effectively.

There are several 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. Use of real-world contexts may also help with designs. All grading criteria must be clearly shown in candidate evidence.

Unit 6 – Circuit simulation and manufacture

Candidates moderated during this moderation period presented photographic evidence and screen shots of their work with descriptive annotation or clear step-by-step descriptions to meet the grading criteria. This is an effective method due to the practical nature of the unit requiring circuit simulation and manufacture. A range of CAD software was used effectively to simulate circuits and demonstrated well using both simulation videos and supporting screenshots.

The use of a witness statement to support candidates' evidence is helpful and can cover most practical activities related to the unit grading criteria.

It was found that Distinction grading criteria across this moderated unit needs a more in-depth response from candidates to show clear understanding and knowledge of the grading criteria in question.

Unit 7 – Electrical devices

This unit was only delivered by a few centres this academic year. Some candidates appeared to confuse the operation of a range of electrical actuators. It was found that some work was presented that referred to analogue to digital conversion and DAC rather than explaining electric linear, rotary and solenoid actuators. Candidates 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.

The use of electrical cable tables would allow candidates to calculate cable sizes for different voltage and current applications (IEE wiring regulations). Candidates should be encouraged to use fault-finding plans. Candidate safe working, tool use and testing for this unit could be further backed up with the use of witness statements.

Unit 9 – Mechanical design

All candidates provided a range of diagrams and drawings in 2D and 3D format to demonstrate their understanding of this unit's requirements. Candidates also supplied evidence to meet synoptic evidence required for P7; this could be more explicit to show the use of mathematical calculations to interpret the outcomes of design optimisation (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. From some centres the use of industry standard packages has enabled complex and detailed CAD designs, including embedded video animations within portfolios, a good practice.

Candidates 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 conventions.

Unit 11 – Material science

This is another commonly submitted unit, particularly with the Extended Certificate (05823). Candidates provided mainly detailed and well-presented portfolios with detailed research from most candidates. There was a good use of supporting images from candidates, which gave a little context to the relevant criteria. Centres should encourage candidates to continue to include relevant supporting images; these images should also be justified as to why they are there and what they are showing/supporting. Both Merit and Distinction criteria could be more detailed and in-depth. Candidates that interpreted thermal equilibrium diagrams had good depth of detail. Candidates could be encouraged to annotate the diagrams and discuss each element part to further support the interpretations. The testing of materials evidence could be enhanced by a witness statement which would support annotated photographic evidence presented by candidates. (This unit has 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. It was observed that the Distinction criteria would benefit from evaluations that are more detailed for FEA and CFD simulations to clearly show how product or systems modifications have improved operational performance of the product or system.

Centres could look at methods that allow candidates to include video evidence. This can be included within the presented evidence.

Unit 13 – Mechanical operations

In this unit candidates used photographic evidence which had been annotated to cover a range of grading criteria with most centres also supplying witness statements to cover practical activities. It was observed that the Merit and Distinction criteria could be more detailed to fully address the relevant awarded criteria. For M2-4, candidates should have specific evidence related to the practical tasks and include detailed reports on how they ensured activities were carried out correctly. For D1, candidates should have a detailed step-by-step for how to use the dividing head effectively. (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. Where possible, candidates should produce images/photos to enhance their evidence and show their clear understanding of the specific grading criteria covered,

For Merit and Distinction grading criteria, all candidates should produce in-depth analysis, evaluations and explanations for related grading criteria.

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. This unit requires candidates to research and develop their knowledge of the operation and control of electrical, mechanical, hydraulic and pneumatic systems and present their findings related to the grading criterion.

Centres should make sure all candidates provide detailed descriptions of equations related to motion and dynamic forces.

Candidates should fully explain what electrical sensors and actuators do within a given system and with the practical activity the use of a witness statement would enhance the candidate's evidence.

Unit 16 – Systems and programming

Again, this unit is only taken by a few centres due to resources and specialist equipment required. It was observed that the presented moderated samples would benefit from more depth and detail across the assessment criteria. Centres should make sure all candidates produce a program for an embedded device and that candidates explain the four accepted levels of testing.

Unit 17 – Computer-aided manufacturing (CAM)

This unit lends itself to the use of photographic evidence, which is annotated by candidates. It can also 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 component manufacture. It was observed that Merit and Distinction criteria lacked some depth in certain areas. Centres should make sure all candidates' analysis of computer advantages is detailed in their explanations. Also, centres should make sure all candidates provide in-depth analyses

of the advantages of using CAD/CAM software rather than manual programming for a CNC machine component for D1 (synoptic link to Unit 1).

Unit 18 – Lean and quality

Again, this is a unit only submitted by a few centres as part of the Diploma qualification options. Centres should make sure all candidates provide evidence that is specific to each grading criteria, rather than one piece of evidence covering a number of grading criteria. It was observed that the Merit and Distinction criteria awarded could have been more in-depth.

Candidates should have more in-depth responses to lean waste and quality solutions for M3. Also, candidates need to produce more in-depth justification directly related to lean and quality principles on new manufacturing layouts and clearly evaluate the impact of recommended solutions and, how these recommendations could be measured in a working environment for Distinction criteria.

Unit 19 – Inspection and testing

Again, this is a unit only submitted by a few centres as part of the Diploma qualification options. Candidates presented evidence for this unit through research, evaluation and analysing of inspection and testing techniques. It was observed from moderated samples that for both Merit and Distinction, candidates would benefit from more depth and detail. Centres should make sure candidates produce an in-depth analysis of the advantages and limitations of different automated inspection and testing techniques used in an engineering application and produce an in-depth testing schedule for a product to fully address the Merit and Distinction criteria.

Unit 20 – Business for engineering

Candidates presented evidence for this unit through research, evaluation and analysis of various factors that affect engineering businesses. Portfolios presented met the awarded criteria well. The moderated samples would benefit from wider research to support the presented work. More in-depth explanations of scenarios/context, regulations and how they affect businesses P5 and 11. Merit criteria could be extended with detail, particularly costings for M6 and continuous improvement could also be more detailed. (Synoptic link to Unit 1.)

Unit 21 – Maintenance

Again, this is a unit only submitted by a few centres as part of the Diploma qualification options. Centres should make sure all candidates also cover the use of specific software related to the triggering of maintenance for P7. Distinction candidates would benefit from more in-depth evaluations for methods of predicting failure, the effectiveness of using reliably centred maintenance data for improving efficiency, and in-depth analysis of existing products/systems and how its maintenance could be designed for improvement. Witness statement forms can be used to further back up LO5, P10, 11, 12 and 13.

Unit 22 – Engineering and the environment

This is a common unit particularly with the Extended Certificate (05823). Candidates presented 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 the unit must be clearly explained by candidates. Candidates addressed awarded criteria with appropriate detail. Often stats are used for P6 by all and analysed; candidates should all be encouraged to show explicit calculations for the synoptic link. 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'.

Candidates were able to relate how their improvement plan could be followed in writing; suitable and relevant evidence that could be included to secure this grade could include photographic evidence where a practical outcome is being described for P6. Candidates were able to give some generic improvements to an engineered system; to be able to secure grades at Merit level, it would be helpful for candidates to include specific and quantifiable improvements for M2.

Supporting you

Teach Cambridge

Make sure you visit our secure website **Teach Cambridge** to find the full range of resources and support for the subjects you teach. This includes secure materials such as set assignments and exemplars, online and on-demand training.

Don't have access? If your school or college teaches any OCR qualifications, please contact your exams officer. You can forward them this link to help get you started.

Reviews of marking

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 monthly bulletin 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 for your subject on **Teach Cambridge**. You'll also find links to our online courses on NEA marking and support.

Signed up for ExamBuilder?

ExamBuilder is a free test-building platform, providing unlimited users exclusively for staff at OCR centres with an Interchange account.

Choose from a large bank of questions to build personalised tests and custom mark schemes, with the option to add custom cover pages to simulate real examinations. You can also edit and download complete past papers.

Find out more.

You will need an Interchange account to access our digital products. 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.

Online courses

Enhance your skills and confidence in internal assessment

What are our online courses?

Our online courses are self-paced eLearning courses designed to help you deliver, mark and administer internal assessment for our qualifications. They are suitable for both new and experienced teachers who want to refresh their knowledge and practice.

Why should you use our online courses?

With these online courses you will:

- learn about the key principles and processes of internal assessment and standardisation
- gain a deeper understanding of the marking criteria and how to apply them consistently and accurately
- see examples of student work with commentary and feedback from OCR moderators
- have the opportunity to practise marking and compare your judgements with those of OCR moderators
- receive instant feedback and guidance on your marking and standardisation skills
- be able to track your progress and achievements through the courses.

How can you access our online courses?

Access courses from Teach Cambridge. Teach Cambridge is our secure teacher website, where you'll find all teacher support for your subject.

If you already have a Teach Cambridge account, you'll find available courses for your subject under Assessment - NEA/Coursework - Online courses. Click on the blue arrow to start the course.

If you don't have a Teach Cambridge account yet, ask your exams officer to set you up – just send them this link and ask them to add you as a Teacher.

Access the courses **anytime, anywhere and at your own pace**. You can also revisit the courses as many times as you need.

Which courses are available?

There are **two types** of online course: an **introductory module** and **subject-specific** courses.

The introductory module, Building your Confidence in Internal Assessment, is designed for all teachers who are involved in internal assessment for our qualifications. It covers the following topics:

- the purpose and benefits of internal assessment
- the roles and responsibilities of teachers, assessors, internal verifiers and moderators
- the principles and methods of standardisation
- the best practices for collecting, storing and submitting evidence
- the common issues and challenges in internal assessment and how to avoid them.

The subject-specific courses are tailored for each qualification that has non-exam assessment (NEA) units, except for AS Level and Entry Level. They cover the following topics:

- the structure and content of the NEA units
- the assessment objectives and marking criteria for the NEA units
- examples of student work with commentary and feedback for the NEA units
- interactive marking practice and feedback for the NEA units.

We are also developing courses for some of the examined units, which will be available soon.

How can you get support and feedback?

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

We welcome your feedback and suggestions on how to improve the online courses and make them more useful and relevant for you. You can share your views by completing the evaluation form at the end of each course.

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
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