

## **CAMBRIDGE NATIONALS**

*Examiners' report*

# ***ENGINEERING DESIGN***



**J831, J841**

**R106 (moderated)**  
**R107 (moderated)**  
**R108 (moderated)**  
**Summer 2018 series**

Version 1

## Contents

Introduction .....	3
General overview .....	4
<b>R106 Product analysis and research</b>	
R106 Comments by LO .....	6
LO1 – Know how commercial production methods, quality and legislation impact on the design of products and components .....	6
LO2 – Be able to research existing products.....	6
LO3 – Be able to analyse an existing product through disassembly .....	6
<b>R107 Developing and presenting engineering designs</b>	
R107 Comments by LO .....	7
LO1 – Be able to generate design proposals using a range of techniques .....	7
LO2 – Know how to develop designs using engineering drawing techniques and annotation.....	7
LO3 – Be able to use Computer Aided Design (CAD) software and techniques to produce and communicate design proposals .....	7
<b>R108 3D design realisation</b>	
R108 Comments by LO .....	8
LO1 – Know how to plan the making of a prototype .....	8
LO2 – Understand safe working practices used when making a prototype.....	8
LO3 – Be able to produce a prototype.....	8
LO4 – Be able to evaluate the success of a prototype .....	8

## 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.

## General overview

It is important for moderators to receive candidate work from centres by the deadline date. There were isolated cases of work not being received by this date. Moderators will then need to contact centres to enquire when it will be sent. Delayed submission of samples slows down the moderation process, and the resolution of issues should they arise during moderation.

Centres should check carefully what sample work is being requested and ensure that the correct sample of candidates is sent to the moderator.

A completed Unit Recording Sheet (URS) is required for each candidate in the requested sample. If a URS is not included for every candidate, the moderator will contact the centre and request them to be sent. Without a correctly completed URS for each candidate moderation cannot take place and will be delayed.

### **Clerical errors**

Check the addition of marks on the URS and once they are transcribed to Interchange. If they are incorrectly totalled, we will need to reconfirm them with centres at moderation. This introduces delay to the moderation process.

A copy of the IMS1 (or interactive MS1) mark sheet produced by Interchange should be sent along with the sample to your moderator so they can check the sample sent is correct.

Standard of assessment by centres is mostly consistent for this series. Where this is not the case, the assessment tended to be too generous or variable. Detailed reasons for this are highlighted in the separate 'Report to Centre on Moderated Work' provided to each centre for that unit. Generic comments for this unit are included in the next section of this report.

### **Teacher commentary on the URS**

Teacher commentary on the URS, along with clear indication of how the mark credited is derived, helps greatly with the moderation process. Page numbers of where evidence can be found in the candidate evidence is also extremely useful. Candidate work can also be directly annotated showing where each learning outcome and mark band is being addressed.

Centres are reminded that work cannot be double counted, and if used as evidence for one learning outcome, it should not be used for others. This is also the case for work that overlaps more than one unit within the qualification. Work that is double counted might be discounted if found during moderation, thereby disadvantaging the candidate.

If more than one marker is marking a cohort of work, it is crucial to standardise marking across markers. Internal standardisation ensures that the marks presented are accurate and consistent, and that the right order of merit is maintained. Order or merit errors are referred back to the centre by the moderator and often require the centre to remark work, thereby delaying the moderation process.

Photographic evidence should be annotated by the candidate to explain what is being presented. It should also clearly identify the candidate using their candidate number.

### ***Authentication***

It is essential that candidate work is authentic. This means that it is individual, and that sources of information are referenced. This is not only good practice but avoids the risk of penalties being applied. Moderators check for authenticity during moderation, referring any suspected cases to OCR for further investigation. This will delay moderation and may have serious consequences for the centre and candidate.

Centres are encouraged to use the witness statements included with the Live Assessments to support and corroborated candidate-generated evidence. They can also be used to support any other Learning Outcomes as appropriate.

### ***Witness statements***

Witness statements are used to support and corroborate evidence produced by candidates and are useful where this evidence is difficult to show directly. Examples include working independently, working safely and producing high quality finished items. They cannot be used as a sole source of evidence and must only be used to support other candidate-generated evidence. Moderation will impose penalties where a witness statement is presented without this additional evidence.

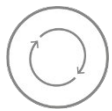
## R106 Comments by LO

### LO1 – Know how commercial production methods, quality and legislation impact on the design of products and components

Candidates often answered this LO well by identifying commercial production methods, end of life consideration and also legislative requirements such as CE and BS Kite marking. Materials, processes and commercial considerations etc., however, were in many cases covered in isolation with no impact on or reference to the product or item being examined. It would be more beneficial for this to be related to the product being investigated (e.g. the drill pump). It should be noted that the function and operation of products is not explicitly required for this LO, which were sometimes covered by candidates.

### LO2 – Be able to research existing products

Generally, this was well attempted with candidates demonstrating a good range of research skills. Sometimes the focus was a little too much on the research skills themselves being use. The focus of the research should clearly be on the product being investigated. The strengths and weaknesses were sometimes not clearly presented (and sometimes not evident at all), and so centres should encourage candidates to concentrate on this to access the higher mark bands.



**AfL**

Referencing:

This LO provides an excellent opportunity to develop and demonstrate skills at referencing materials found. Further guidance on referencing is available from the OCR website.

### LO3 – Be able to analyse an existing product through disassembly

LO3 was often very well attempted by candidates. Most candidates could provide a good analysis of a product through disassembly. Candidates are also required to make clear links back to Unit R105. Where candidates did not address this LO fully (and thereby access the higher mark bands), this was for inadequate detail of each stage of disassembly, safe use of tools and safe working etc.. One way in which this can be achieved is using an annotated photographic diary supported with a witness statement.

The analysis of the dismantled produce should also include the following to access the higher mark bands: components, assemblies, materials, production methods and maintenance.



**OCR support**

Witness statements:

Please ensure that the witness statement is correctly used to support and corroborate candidate-generated evidence.

If you are unsure, please refer to the OCR CPD Hub website for many free face to face and online training events.



**AfL**

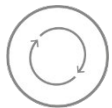
Synoptic teaching and learning:

Candidates are required for this LO to draw upon skills/knowledge/understanding from other units in the specification and it would be useful if this was made explicit within their responses.

## R107 Comments by LO

### LO1 – Be able to generate design proposals using a range of techniques

LO1 was well attempted. Most candidates were able to produce good quality 2D and 3D sketches applying techniques including shading and rendering. It should be noted that both 2D and 3D sketches are required, and candidates should be encouraged to generate several initial design ideas. Labelling was good, and in most cases, there was evidence of both labelling and annotation. CAD, in various forms, had been used to enrich and develop the design. It would be useful if centres could confirm the amount of assistance given to candidates in the commentary on the URS or using a witness statement in future submissions.



**AfL**

Candidates should produce both 2D and 3D sketches to satisfy this LO.

Please refer to the Assessment Guidance in Appendix B of the Specification document.

### LO2 – Know how to develop designs using engineering drawing techniques and annotation

There was clear evidence that candidates had attempted isometric and oblique drawings, or third angle projection i.e. using formal drawing techniques. More successful candidates were able to develop their drawings by adding detailed annotations and dimensioning which secures access to the higher mark bands. In many cases candidates clearly evidenced knowledge from other units, e.g. R106. Although the intention for this LO is for candidates to produce engineering drawings using hand-drawing techniques, the use of CAD to produce third-angle engineering drawings is acceptable. Again, please note that both 2D and 3D engineering drawings are required.



**AfL**

Candidates should produce drawings using at least two 2D and two 3D techniques to secure access to the higher mark bands.

Please refer to the Assessment Guidance on Appendix B of the Specification document.



**AfL**

Synoptic teaching and learning:

Candidates are required for this LO to draw upon skills/knowledge/understanding from other units in the specification and it would be useful if this was made explicit within their responses.

### LO3 – Be able to use Computer Aided Design (CAD) software and techniques to produce and communicate design proposals

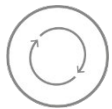
This LO was often well attempted. There was often excellent evidence of the use of CAD to present a final design. Final presentations, however, sometimes lacked detail to confidently secure marks in the higher bands for the following reasons. Although it is not required that CAD drawings be exactly to British Standards, they should include dimensions, surface finishes etc., and be detailed enough to enable the item to be manufactured. Where candidates did not access this LO fully, this was for poor detail on their CAD drawings making them insufficient in detail to be able to make the item.

## R108 Comments by LO

### LO1 – Know how to plan the making of a prototype

For LO1a candidates often provide an excellent interpretation of a product specification. Where candidates did not access the higher mark bands the interpretation was too weak or too generic (e.g. it should include user requirements, dimensions, weights, finishes etc.).

For LO1b most candidates' produced a detailed plan along with Gantt chart for the making of a prototype. This was often sufficiently detailed. Some candidates, however, produced a weak plan with little reference to tools, equipment and materials, and so did not access the higher bands. Centres could provide candidates with a tabular planning template for them to complete.



**AfL**

Candidates could be provided with a blank tabulated planning template to complete for this LO

### LO2 – Understand safe working practices used when making a prototype

In this LO there was often evidence of candidates producing a risk assessment, identifying hazards and how they can be mitigated, using safety equipment and PPE. There was also good evidence of the safe use of tools and materials in the form of annotated photographs, which was backed up by a witness statement. Some candidates did not address these important points relating to health and safety however and to demonstrate how they used tools and equipment safely thereby not securing access to the higher mark bands.

### LO3 – Be able to produce a prototype

There was often good evidence of a prototype being made both manually and sometimes using rapid prototyping. The inclusion of annotated photographs showing stages of production is extremely useful for the moderation process. These should clearly show the candidate number. There was also evidence of material selection, however this could be made more explicit. As usual, witness statements can be used to support and corroborate candidate-generated evidence.



**OCR support**

Witness statements:

Please ensure that the witness statement is correctly used to support and corroborate candidate-generated evidence.

If you are unsure, please refer to the OCR CPD Hub website for many free face to face and online training events.

### LO4 – Be able to evaluate the success of a prototype

This was perhaps the weakest LO for most centres. It requires an evaluation of the prototype against the requirements of the production plan and suggesting improvements in the making process. It also requires an assessment of personal performance including strengths and weaknesses. Candidates should consider improvements here, both to the finished prototype and the process by which the prototype is manufactured. All of these points together will enable access to the higher mark bands.



**AfL**

Review:

An important part of many of the units is the ability to review a plan, product or personal performance. Centres could provide further guidance on techniques required to produce an effective review.



## Supporting you

For further details of this qualification please visit the subject webpage.

### Review of results

If any of your students' results are not as expected, you may wish to consider one of our review of results services. For full information about the options available visit the [OCR website](#). If university places are at stake you may wish to consider priority service 2 reviews of marking which have an earlier deadline to ensure your reviews are processed in time for university applications.

## activeresults

Active Results offers a unique perspective on results data and greater opportunities to understand students' performance.

It allows you to:

- Review reports on the **performance of individual candidates**, cohorts of students and whole centres
- **Analyse results** at question and/or topic level
- **Compare your centre** with OCR national averages or similar OCR centres.
- Identify areas of the curriculum where students excel or struggle and help **pinpoint strengths and weaknesses** of students and teaching departments.

<http://www.ocr.org.uk/administration/support-and-tools/active-results/>



Attend one of our popular CPD courses to hear exam feedback directly from a senior assessor or drop in to an online Q&A session.

<https://www.cpdhub.ocr.org.uk>



We'd like to know your view on the resources we produce. By clicking on the 'Like' or 'Dislike' button you can help us to ensure that our resources work for you. When the email template pops up please add additional comments if you wish and then just click 'Send'. Thank you.

Whether you already offer OCR qualifications, are new to OCR, or are considering switching from your current provider/awarding organisation, you can request more information by completing the Expression of Interest form which can be found here:

[www.ocr.org.uk/expression-of-interest](http://www.ocr.org.uk/expression-of-interest)

#### OCR Resources: *the small print*

OCR's resources are provided to support the delivery of OCR qualifications, but in no way constitute an endorsed teaching method that is required by OCR. Whilst every effort is made to ensure the accuracy of the content, OCR cannot be held responsible for any errors or omissions within these resources. We update our resources on a regular basis, so please check the OCR website to ensure you have the most up to date version.

This resource may be freely copied and distributed, as long as the OCR logo and this small print remain intact and OCR is acknowledged as the originator of this work.

Our documents are updated over time. Whilst every effort is made to check all documents, there may be contradictions between published support and the specification, therefore please use the information on the latest specification at all times. Where changes are made to specifications these will be indicated within the document, there will be a new version number indicated, and a summary of the changes. If you do notice a discrepancy between the specification and a resource please contact us at: [resources.feedback@ocr.org.uk](mailto:resources.feedback@ocr.org.uk).

OCR acknowledges the use of the following content:  
Square down and Square up: alexwhite/Shutterstock.com

Please get in touch if you want to discuss the accessibility of resources we offer to support delivery of our qualifications:  
[resources.feedback@ocr.org.uk](mailto:resources.feedback@ocr.org.uk)

#### Looking for a resource?

There is now a quick and easy search tool to help find **free** resources for your qualification:

[www.ocr.org.uk/i-want-to/find-resources/](http://www.ocr.org.uk/i-want-to/find-resources/)

[www.ocr.org.uk](http://www.ocr.org.uk)

OCR Customer Contact Centre

#### Vocational qualifications

Telephone 02476 851509

Facsimile 02476 851633

Email [vocational.qualifications@ocr.org.uk](mailto:vocational.qualifications@ocr.org.uk)

OCR is part of Cambridge 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 2018** 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.



Cambridge  
Assessment



001