

## **CAMBRIDGE NATIONALS**

*Moderators' report*

# ***ENGINEERING DESIGN***




**J831, J841**

## **R106, R107, R108 Summer 2019 series**

Version 1

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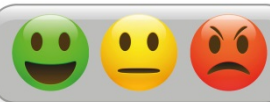


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## Introduction

Our Moderators' reports are produced to offer constructive feedback on centres' assessment of moderated work, based on what has been observed by our 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. 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 for moderation and make sure 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. Without a correctly completed URS for each candidate moderation cannot take place and will be delayed.

Please make sure that all candidates are correctly identified on their paperwork with the correct candidate number. This includes in the naming of electronic files.

### *Clerical errors*

Please check carefully the addition of marks on the URS and their transcription to Interchange. If they are incorrectly totalled or transcribed, we will need to reconfirm them with centres at moderation. This introduces delay to the moderation process.

A copy of the IMS1 mark sheet generated by Interchange should be sent along with the sample to your moderator so they can check the sample received is correct.

### *Marker comments on the URS*

Marker commentary on the URS, along with clear indication of how the mark given 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 LO and mark band is being addressed.

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

### *Internal standardisation*

If more than one internal 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 rank order of marks is maintained. If there was only one marker, it is still sensible to have another qualified member of staff within the centre to look over the marking. Rank order 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 individually undertaken by that candidate, 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 LOs as appropriate, and centres are permitted to modify them to suit their own needs.

### *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 direct source of evidence when the candidate is able to produce evidence themselves. Through moderation marks will be altered to take account of witness statements that are not used appropriately, where there is no candidate evidence to support the related internal marks.

Full guidance on how to use witness statements correctly can be found in Appendix A of the Specification Handbook, with further guidance on the OCR website.

## Unit R106 General overview

Whilst generally most candidates made a very good attempt at this unit, others did not fully address all the requirements of each part of the LO as set out in the Marking Criteria. As this unit requires candidates to undertake a practical activity in LO3, direct evidence of this activity being performed is essential.


### Comments by Learning Outcomes

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

Candidates clearly demonstrated that they could research and explain commercial production and manufacturing methods; end of life considerations; and legislation and conformity to standards. Referring to the requirements of this LO, these should be related back to the design of a component or product. Often, they were covered in isolation with little reference to design or to any component/product. Ideally, the product they are related to should be that researched and analysed in LO2 and LO3. Function and operation of the product is not required for this LO.

#### LO2 – Be able to research existing products

In general candidates demonstrated good research skills using a variety of methods to research and present their findings (including tables, charts, graphs etc.). Whilst it is useful to see a description of the research techniques used, the focus of the research should be on the specific product type. Research can be primary and secondary, and candidates should investigate a range of products (of the same type) using objective criteria. This will allow them to draw up strengths and weaknesses of the product, allowing easy comparison.


	<b>AfL</b>	<p>Referencing:</p> <p>This LO provides excellent opportunity for candidates to reference the information they have found whilst researching.</p> <p>Referencing is important to avoid potential plagiarism, and further guidance on referencing is available on the OCR website.</p>
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## LO3 – Be able to analyse an existing product through disassembly

LO3 was often well attempted by candidates who were able to safely disassemble and analyse a product provided to them by the centre. This LO relies both on direct evidence from the candidate and additional supporting evidence of independent working by the marker. Direct evidence can be provided by the candidate using a simple risk assessment along with step by step annotated photographs. Evidence of independent working can be corroborated using a witness statement. It is also a requirement of this LO to follow manufacturer's instructions for disassembly. These are often not available, and so an effective way to cover this is by the candidate producing these themselves prior to and during disassembly.

The analysis of the dismantled product needs to consider: understanding of the components, assembly methods, materials, production methods and maintenance. Often not all these points were covered.

Please remember that candidates need to clearly demonstrate how they have drawn on skills, knowledge and understanding from other units in the specification for this LO.

	<b>OCR support</b>	<p>Witness statements:</p> <p>Full guidance on how to use witness statements can be found in Appendix A of the Specification Handbook.</p> <p>It is important to remember that they cannot be used as a substitute for direct evidence that the candidate can produce. They should only be used to support and corroborate things like independent and safe working, or the quality of a finished product.</p>
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## Unit R107 General overview

Candidates demonstrated some excellent sketching and drawing skills in this unit, and were clearly able to use Computer Aided Design (CAD) software effectively and competently. Where evidence was sometimes lacking was in the communication of their final design proposal in LO3.

### Comments by Learning Outcome

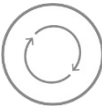

#### LO1 – Be able to generate design proposals using a range of techniques

Most candidates demonstrated very good sketching skills and were able to produce several initial design ideas. Rendering included shade, tone and texture. From the Marking Criteria it should be noted that both 2D and 3D sketches are required – often just 3D sketches were produced. Candidates should be encouraged to produce a range of different design ideas (5 or so) using sketches from which they select a single design to develop in LO2 and LO3.

This LO relies on the independence with which the candidate produces their sketches, and so this must be corroborated when marking. A good way to do this is with a witness statement.

Sketches should be labelled and annotated, and ICT used to modify and enrich them. The use of ICT could be a simple sketch produced using CAD software, or hand-drawn sketches could be scanned and manipulated.


Please remember that candidates need to clearly demonstrate how they have drawn on skills, knowledge and understanding from other units in the specification for this LO.

	<b>AfL</b>	2D and 3D sketches: Refer to the Marking Criteria for this LO. Both 2D and 3D sketches are required to satisfy this fully.
	<b>OCR support</b>	Witness statements: Full guidance on how to use witness statements can be found in Appendix A of the Specification Handbook. It is important to remember that they cannot be used as a substitute for direct evidence that the candidate can produce. They should only be used to support and corroborate things like independent and safe working, or the quality of a finished product.



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


There was clear evidence of a range of different 2D and 3D formal drawing techniques being used. Whilst the original intention of this LO was to produce drawings by hand, the use of CAD produced formal drawings is acceptable. Please refer to the Unit Specification for a range of suitable techniques. As for LO1, this LO requires candidates to produce both 2D and 3D formal drawings. More successful candidates were able to dimension and annotate their drawings.

	<b>AfL</b>	<p>2D and 3D formal drawings:</p> <p>Refer to the Marking Criteria and Assessment Guidance for this LO published in Appendix B of the Specification Handbook.</p> <p>To fully satisfy this LO requires candidates to produce 2 x 2D and 2 x 3D formal engineering drawings.</p>
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## LO3 – Be able to use Computer Aided Design (CAD) software and techniques to produce and communicate design proposals

Whilst well attempted, it was sometimes difficult to see the final design that candidates were proposing. Candidates often demonstrated excellent skills and ability in using CAD software. To fully satisfy this LO requires a minimum of two different CAD techniques to be used. Please see the Unit Specification for a range of techniques that could be used.

Final designs should be clearly identifiable if a range of pre-developed CAD drawings have been produced, and need to contain sufficient detail to enable a prototype to be manufactured (e.g. dimensions, surface finishes etc.). It is also a requirement for this LO to communicate in the final design proposal: materials, manufacturing processes and assembly methods. These were sometimes missing.

	<b>AfL</b>	<p>Use of evidence:</p> <p>Where there is overlap of content, it is essential that evidence used to satisfy one LO is not given twice (i.e. double-counted)</p> <p>In this unit, CAD drawings produced for LO2 and LO3 should be clearly separate for each LO so that they are marked just once.</p>
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## Unit R108 General overview


It was evident in this unit that candidates were clearly capable of planning for and making a prototype. This was sometimes let down by lack of step by step evidence of making in action. Final reviews also require some attention.

### Comments by Learning Outcome

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

Interpretation of the specification for the prototype was often detailed. Please note that it is not required for candidates to generate this specification themselves, rather interpret one provided in the assignment brief.

Planning was presented in a variety of styles including traditional tables, and flow charts. Different styles of presentation are perfectly acceptable so long as the key planning requirements are present. Good planning could include: correct sequence, inclusion of materials, tools and processes, health and safety and quality control considerations. Approximate timings should also be included which can be achieved using a Gantt chart.


	<b>AfL</b>	<p>Planning:</p> <p>Candidates could be provided with a blank planning template or table with appropriate headings for them to complete.</p>
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#### LO2 – Understand safe working practices used when making a prototype

An effective way of demonstrating the intention to work safely is by completing simple risk assessments for each activity to be performed. Candidates can demonstrate safe working in practice by including annotated photographs of themselves wearing PPE and using tools correctly. This can all be supported and corroborated using a witness statement.

Centres are reminded that witness statements cannot be used as direct evidence.

Please remember that candidates need to clearly demonstrate how they have drawn on skills, knowledge and understanding from other units in the specification for this LO.

	<b>OCR support</b>	<p>Witness statements:</p> <p>Full guidance on how to use witness statements can be found in Appendix A of the Specification Handbook.</p> <p>It is important to remember that they cannot be used as a substitute for direct evidence that the candidate can produce. They should only be used to support and corroborate things like independent and safe working, or the quality of a finished product.</p>
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#### LO3 – Be able to produce a prototype

There was often good evidence of prototype making in action. Please encourage candidates to provide detailed step by step annotated photographs of this activity taking place (noting the correct use of the witness statement).

Increasingly rapid prototyping techniques are being used to make the prototype. Whilst acceptable, it is essential that candidates demonstrate themselves safely setting up and operating the machine. It is not acceptable for them to simply demonstrate the programming aspect of this. It would be sensible for them

to also demonstrate some hand skills in prototype making, which could include finishing operations if the prototype is machine made.


Please make sure that there is clear evidence of the final item produced. Often step by step evidence is included with no apparent final outcome.

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

This was again probably the weakest part of this unit – review of the final plan and prototype.

To fully address this LO candidates need to evaluate their prototype against their original plan, review the plan itself and then make suggestions for improvements. Personal performance also requires review, including strengths and weaknesses.

Whilst some candidates were able to attempt some of the above, often not all parts were covered.

	<b>AfL</b>	Review: This LO provides an excellent opportunity to develop skills at reviewing a plan, prototype and personal performance.
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