



Model Assignment

Level 2 Cambridge Technicals in Engineering

Unit 6: Develop and present engineering 2D and 3D design solutions

Y/615/2136

Issued September 2016

Entry code	Title	Qualification Number (QN)
05888	OCR Level 2 Cambridge Technical Diploma in Engineering	603/0423/6

Contents

Guidance for tutors on using this assignment	3
General	3
Before using this assignment to carry out assessment.....	3
Resources to complete the tasks	4
Tutor information to support the tasks	4
Time.....	4
Format of evidence	4
Group work	5
After completing the assignment	5
Reworking the assignment.....	5
Modifying the model assignment.....	5
General information for learners	7
Assignment for learners	9
The tasks	10
Task 1: Create 2D and 3D drawings of standard engineering components	10
Task 2: Produce 2D drawings using 3D Computer Aided Design (CAD)	11
Task 3: Produce 3D SOLID models using Computer Aided Design CAD	12
Task 4: Be able to produce 2D CAD engineering drawings from 3D solid model.....	13
Evidence Checklist	14
Appendix A	15

Please note:

You can use this assignment to provide evidence for summative assessment, which is when the learner has completed their learning for this unit and is ready to be assessed against the grading criteria.

You can use this assignment as it is, or you can modify it or write your own; we give more information in this document under Guidance for tutors.

ALL THESE MATERIALS MAY BE PHOTOCOPIED. Any photocopying will be done under the terms of the Copyright Designs and Patents Act 1988 solely for the purposes of assessment.

Guidance for tutors on using this assignment

General

OCR Cambridge Technical model assignments are available to download from our website: www.ocr.org.uk.

The purpose of this assignment is to provide a scenario and a set of tasks that are typical of how engineers would use drawings and Computer Aided Design (CAD), to enable you to assess your learner against the requirements specified in the grading criteria. The scenario and its tasks are intended to give a work-relevant reason for applying the skills, knowledge and understanding needed to achieve the unit.

This assignment will not instruct learners how to meet the highest grade. Whether learners achieve a pass, merit or distinction will depend on what evidence they produce.

You can modify the scenario we provide in this assignment to make it more relevant to your local or regional needs. Please refer to the information under 'Modifying the model assignment' later in this section.

You don't have to use this assignment. You can use it as a guide to help you to design your own assignment, and we provide an assignment checking service. You'll find more information on these matters in section 8 of the qualification handbook.

In the tasks, we'll refer to the format of evidence. Learners are **not** required to follow that format **unless** we tell them otherwise.

It's essential that the work every learner produces is their own. Please make sure you read through the information we give on authenticity in section 8 of the qualification handbook and make sure that your learners and any staff involved in assessment understand how important authenticity is.

We provide this assignment to be used for summative assessment. You must not use it for practice or for formative assessment.

Before using this assignment to carry out assessment

Learners will need to take part in a planned learning programme that covers the knowledge, understanding and skills of the unit.

When your learners are ready to be assessed, they must be provided with a copy of the following sections of this assignment:

- General information for learners
- Assignment for learners
- Evidence Checklist

They may carry out preparation prior to undertaking the tasks and there is no time limit for this.

Resources to complete the tasks

There are resource requirements for this assignment. Every learner will need access to the following resources:

- a CAD package. Learners may use any suitable CAD package which enables design of 2D and 3D models and drawing and creation of assemblies. If you're using MAPS e-portfolio the CAD package must allow files to be exported in pdf format.
- the bracket dimensions given in the appendix of this assignment.

Tutor information to support the tasks

For task 1, ideas presented should show a range of 2D and 3D techniques. This could be achieved through learners considering simple shelving brackets designs which are creative and modern. Learners should not use the bracket design provided for tasks 2, 3 and 4 as inspiration for their own designs. Learners can show different design ideas presented with different drawing techniques or they can show a single developed design using both 2D and 3D drawing techniques.

For task 2, you can decide on the 3D software used to develop the shelving bracket from the supplied drawing given in the appendix.

For task 3, learners should ensure that their 3D solid model displays main features, applied features and pattern features. Learners will need to retrieve their drawing from task 2.

For task 4, learners should use the 3D solid model created in task 3, however it is permitted for you to provide a suitable 3D solid model for this task should it be necessary.

Time

You should plan for learners to have 8-16 hours to complete this assignment.

Learners must be allowed sufficient time to complete all the tasks. The amount of time may vary depending on the nature of the tasks and the ability of individual learners. To help with your planning, against each of the tasks we've given an indication of how long it should take.

Learners can produce evidence in several sessions.

Format of evidence

Learners have to produce evidence that demonstrates how they have met the grading criteria. At the very least they must produce evidence that meets **all** of the pass criteria.

Please make sure your learners realise that missing just one pass criterion means they will not pass the unit, even if they have successfully met the merit and distinction criteria.

We don't have specific requirements for the format of evidence in this assignment. We've said what format the evidence could take for each task. For example, if we say 'You could include a report on ...', the evidence doesn't have to follow any specific reporting conventions. You can modify the format of the evidence, but you must make sure the format doesn't prevent the learner from accessing the grading criteria.

It's possible that certain formats for evidence can naturally cover several grading criteria and avoid the need for excessive amounts of evidence. For example, a report can be a good way to pull together evidence to meet several grading criteria.

For more guidance on generation and collection of evidence, please refer to the section 8 'Internal Assessment', in the qualification handbook.

Group work

This assignment hasn't been written to include group work. If you plan to ask learners to work in a team to complete work for assessment, you need to determine at which point in an assessment task learners can work together.

You must be sure that each learner can produce evidence of their own contribution to each grading criterion. You can give constructive feedback to learners about working as a group and direct them on team working skills because evidence of team working skills is not required by the unit. See our information on authentication, including group work and feedback to learners, in section 8 of the qualification handbook.

If witness statements are used to support learners' evidence, you'll need to complete an individual statement for each learner.

After completing the assignment

Once the learner has submitted their work to you to be assessed, you must judge or 'mark' the work against the grading criteria for the unit and identify one grade for the unit. For further information about assessment, please refer to section 8 of the qualification handbook.

Your assessment decisions must be quality assured across the cohort of learners in your centre who are being entered for the same unit. This must be done through an internal standardisation process. We give information on internal assessment and standardisation in the qualification handbook.

Reworking the assignment

If you and the learner feel they've not performed at their best during the assessment, the learner can, at your discretion, improve their work and resubmit it to you for assessment. If a learner is working on improving their work before it is resubmitted, you and the learner must continue to make sure the work is the learner's own.

Any feedback you give to the learner must not direct them on how to improve their work. You can identify what area of the work could be improved but you cannot give the learner any details about how they could improve it. You must follow the guidelines given in section 8 of the qualification handbook under 'Authenticity of learner work'.

Modifying the model assignment

The tasks in this assignment allow learners access to the full range of grades detailed in the grading criteria of this unit.

If you modify this assignment you must **not** change the grading criteria provided in the tasks for the learner or in the evidence checklist. These grading criteria are taken from the unit.

You can modify the scenario to suit your local or regional needs and the tasks may be contextualised to match any changes you have made to the scenario. If you supply your own drawings to support a different scenario, these must be sufficiently detailed for learners to complete the tasks.

You can modify the type of evidence and the format it takes, unless we expressly state that evidence must take a specific format.

You must also make sure that you avoid discrimination, bias and stereotyping and support equality and diversity. For more information, please see the section 'Designing your own assignments for internally assessed units' in section 8 of the qualification handbook.

If modifications are made to the model assignment, whether to the scenario alone, or to both the scenario and individual tasks, it's your responsibility to make sure that all grading criteria can still be met and that learners can access the full range of grades.

If you're using this model assignment and delivering the Certificate or Diploma you have an opportunity to secure meaningful employer involvement by working with an employer to modify it.

General information for learners

Q *What do I need to do to pass this assignment?*

A You need to produce evidence to meet the requirements of **all** the pass criteria for the unit this assignment relates to. If you miss just one pass criterion, you will not achieve this unit and will receive an unclassified result.

Q *What do I need to do if I want to get a merit or distinction for this assignment?*

A For a merit, you need to produce evidence to meet the requirements of **all** the pass criteria for the unit this assignment relates to **and** you need to produce evidence to meet **all** the merit criteria.

For a distinction, in addition to the above, you also need to meet **all** the distinction criteria for this unit.

Q *What help will I get?*

A Your tutor will support you when completing this assignment and will make sure that you know what resources or facilities you need and are allowed to use. We've given your tutor information about how much support they can give you.

Q *What if I don't understand something?*

A It's your responsibility to read the assignment carefully and make sure you understand what you need to do and what you should hand in. If you are not sure, check with your tutor.

Q *I've been told I must not plagiarise. What does this mean?*

A Plagiarism is when you take someone else's work and pass this off as your own, or if you fail to acknowledge sources properly. This includes information taken from the internet.

It's not just about presenting a whole copied assignment as your own; you will also be plagiarising if you use the ideas or words of others without acknowledgement, and this is why it's important to reference your work correctly (see Q&A below for more information on referencing).

Plagiarism has serious consequences; you could lose the grade for this unit or you may not be allowed to achieve the whole qualification.

Always remember that the work you produce must be your own work. You will be asked to sign a declaration to say that it is.

Q *What is referencing and where can I find out more information about it?*

A Referencing is the process of acknowledging the work of others. If you use someone else's words and ideas in your assignment, you must acknowledge it, and this is done through referencing.

You should think about why you want to use and reference other people's work. If you need to show your own knowledge or understanding about an aspect of subject content in your assignment, then just quoting and referencing someone else's work will not show that **you** know or understand it. Make sure it's clear in your work how you are using the material you have referenced **to inform** your thoughts, ideas or conclusions.

You can find more information about how to reference in the *The OCR Guide to Referencing* available on our website: www.ocr.org.uk.

Q **Can I work in a group?**

A Yes. However, if you work in a group at any stage, you must still produce work that shows your individual contribution. Your tutor can advise you how to do this.

Q **Does my work for each task need to be in a particular format?**

A You can present your work in a variety of ways – it can be handwritten, word-processed, on video or in digital media. What you choose should be appropriate to the task(s) and your tutor can advise you about this. There may be times when you need proof that you have completed the work yourself: for example, if you do something during work placement that you want to use as evidence, the tutor might ask the employer to provide a witness statement.

Make sure you check the wording in each task carefully. For each task, we'll tell you if your evidence has to be in a specific format:

- If we use the word '**must**', for example 'You must produce a report' or 'Your evidence/work must include a diagram', then you must produce the work in the stated format.
- If we use the word '**could**', for example 'You could include sketches of your ideas' or 'You could do this by annotating your diagram', this means that you are not required to follow the format we have given, but you must make sure that the work you do produce allows you to demonstrate the requirements of the grading criteria.

If you are unsure about what evidence you need, please ask your tutor.

Q **Can I ask my tutor for feedback on my work?**

A Yes, but they can't give you detailed feedback.

We have given your tutor instructions on what kind of feedback they can give you. For example, they are **not** allowed to tell you exactly what to do to make your work better, but they **can** remind you about what they've taught you and you can use this additional learning to try and improve your work independently. They can say what they've noticed might be wrong with your work, for example if your work is descriptive where an evaluation is required, but your tutor can't tell you specifically what you need to do to change it from a description to an evaluation – you will need to work out what you need to do and then do it for yourself.

Q **When I have finished, what do I need to do?**

A If you have included the personal details (such as name, address or date of birth) of someone other than yourself in your work, this must be blanked out (anonymised) – your tutor will tell you how to do this. You don't need to do this for information contained in references.

You can complete the evidence checklist to show your tutor where they can find the evidence for each grading criterion in your work.

You should make sure your work is labelled, titled and in the correct order for assessing.

Hand in the work that you've completed for each task to your tutor. They might ask to see your draft work, so please keep your draft work in a safe place.

Q **How will my work be assessed?**

A Your work will be marked by someone in your centre who has been authorised to do so. They will use the information in the grading criteria to decide which grade your work meets. The grading criteria are detailed in each unit and are also given in the tasks within this assignment. Please ask your tutor if you are unsure what the grading criteria are for this assignment.

Assignment for learners

Unit 6 Develop and present engineering 2D and 3D design solutions

Scenario for task 1

OCR Engineering has been commissioned to design a new shelving bracket that is simple and easy to manufacture. The bracket will be used to support shelving which is frequently used in schools and offices to store folders and books.

Bracket requirements:

- Two brackets per shelf
- Brackets to support a shelf with the following dimensions:
 - Length 805mm
 - Depth 240mm
 - Thickness 20mm

The Engineering Manager would like to see your ideas of designs that are creative and modern. Your drawings will be presented in 2D and 3D.

Scenario for tasks 2 - 4

The Engineering Manager has selected a bracket design that will be manufactured. (The bracket information can be found in Appendix A). You will need to produce a 2D drawing, 3D solid model and a 2D CAD engineering drawing for this bracket.

The tasks

Task 1: Create 2D and 3D drawings of standard engineering components

(This task should take between 2 and 4 hours.)

Learning Outcome 1: 'Be able to create 2D and 3D drawings to present engineering components', is assessed in this task.

Your task is to produce drawings that present design ideas for a shelving bracket using different 2D and 3D drawing techniques.

Your drawings should be in good proportion and show appropriate dimensions.

Pass	Merit	Distinction
P1: Create 2D drawings using 2D techniques	M1: Create 2D and 3D drawings that are well proportioned and dimensioned	
P2: Create 3D drawings using 3D techniques		
Evidence		
The techniques used must involve pictorial representation and drawing in good proportion with the addition of some dimensions. Evidence must consist of a portfolio of drawings to show different 2D and 3D drawing techniques, including orthographic, 3 rd angle projection, oblique and isometric.		

Task 2: Produce 2D drawings using 3D Computer Aided Design (CAD)

(This task should take between 2 and 4 hours.)

Learning Outcome 2: 'Be able to save, store, organise and retrieve engineering drawings' and Learning Outcome 3 'Be able to produce and modify 2D drawing(s) using 3D Computer Aided Design (CAD) software' are assessed in this task.

Your task is to use 3D CAD software and the supplied drawings of a bracket (see appendix) to create a suitable 2D drawing that can be extruded into a 3D model in task 3.

You must save all drawings that you create.

You will need to re-open the file for task 3.

Pass	Merit	Distinction
P3 Save, store, retrieve* and print* CAD drawings and 3D solid models *see task 3		
P4 Use 3D Computer Aided Design to produce and modify a 2D engineered drawing		
Evidence		
<p>You must show the process by which you have arrived at your final 2D drawings and include the final 2D drawing. You could do this by using imagery that evidences the features used and the modifications made to your 2D drawing.</p> <p>Your evidence must be presented as an electronic or paper-based report, mainly image-based with annotations that communicate the processes you have used. When producing evidence of your 2D drawings, make sure that the files are saved in a printable format for example exported to a pdf.</p> <p>You must also present a file log that shows where you have saved your files. This could be in the form of screen shots.</p>		

Task 3: Produce 3D *SOLID* models using Computer Aided Design CAD

(This task should take between 3 and 6 hours.)

Learning Outcome 4: 'Be able to produce 3D solid model(s) using Computer Aided Design (CAD)' is assessed in this task.

Your task is to develop a 3D solid model of the bracket using 3D CAD software. You should retrieve your 2D drawing and use this as the basis of your 3D solid model. You should enhance your model by using main features, applied features and pattern features and explain the benefits of doing so. You must save all drawings that you create and print the final version(s).

N.B This task can be completed by producing more than one 3D solid model if necessary.

Pass	Merit	Distinction
P3 Save, store, retrieve and print CAD drawings and 3D solid models		
P5 Use CAD to produce a 3D solid model(s) for an engineered product using main features, applied features and pattern features	M2 Enhance your 3D solid model using a range of pattern features	D1 Explain how the features you have used have enhanced your 3D solid model
Evidence		
<p>You must show the process by which you have arrived at your final 3D solid model and include the final 3D solid model. You could do this by using imagery that evidences the features used and the enhancements made to your 3D solid model.</p> <p>Your evidence must be presented as an electronic or paper-based report, mainly image-based with annotations that communicate the processes you have used.</p> <p>You must also present a file log that shows where you have retrieved and saved your files. This could be in the form of screen shots. You must also present a final printed version of your 3D solid model.</p> <p>You should produce a written report to explain how the features you have used have enhanced your 3D solid model.</p>		

Task 4: Be able to produce 2D CAD engineering drawings from 3D solid model

(This task should take between 1 and 2 hours.)

Learning Outcome 5: 'Be able to produce 2D CAD engineering drawing from a 3D solid model' is assessed in this task.

Your task is to produce a 2D dimensioned engineering drawing of your bracket, including appropriate manufacturing information. The drawing should be created using the 3D model from task 3. You should write a report containing an evaluation of the benefits of using computer aided methods to produce engineering drawings.

Pass	Merit	Distinction
P6 Produce a 2D CAD engineering drawing that includes appropriate annotations and dimensions for an engineering component.		D2 Evaluate the benefits of using computer aided methods to produce an engineering drawing.
Evidence		
A print or screen shot of your annotated 2D dimensioned engineering drawing. A written report of your evaluation.		

Evidence Checklist

OCR Level 2 Cambridge Technicals in Engineering Unit 6: Develop and present engineering 2D and 3D design solutions

LEARNER NAME:

For PASS have you: (as a minimum you have to show you can meet every pass criterion to complete the unit)	Where can your tutor find the evidence? Give page no(s)/digital timings, etc.
P1: Created 2D drawings using 2D techniques	
P2: Created 3D drawings using 3D techniques	
P3: Saved, stored, retrieved and printed CAD drawings and 3D solid models	
P4: Used 3D Computer Aided Design to produce and modify a 2D engineered drawing	
P5: Used CAD to produce a 3D solid model(s) for an engineered product using main features, applied features and pattern features	
P6: Produced a 2D CAD engineering drawing that includes appropriate annotations and dimensions for an engineering component.	

For Merit have you:	Where can your tutor find the evidence? Give page no(s)/digital timings, etc.
M1: Created 2D and 3D drawings that are well proportioned and dimensioned	
M2: Enhanced your 3D solid model using a range of pattern features	

For Distinction have you:	Where can your tutor find the evidence? Give page no(s)/digital timings, etc.
D1: Explained how the features you have used have enhanced your 3D solid model	
D2: Evaluated the benefits of using computer aided methods to produce an engineering drawing.	

Appendix A

Learners should be given this appendix upon completion of task 1.

