2016 Suite

OCR
Oxford Cambridge and RSA

Cambridge **TECHNICALS LEVEL 2**

Cambridge TECHNICALS 2016

ENGINEERING

Unit 3

Mechanical engineering – machine operations

Model assignment

F/615/2132

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Contents

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.

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 set of tasks that are typical of how engineers use engineering processes such as machine operations to create and form shapes 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.

When completing the assignment

You should use this assignment in conjunction with the unit specification and qualification handbook.

Resources to complete the tasks

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

- Relevant Health and Safety regulations, standards and codes of practice appropriate to the engineering workplace.
- Personal Protective Equipment (PPE) as appropriate to the given task(s).
- Engineering drawings in the appendix.
- Materials for the tasks.
- Marking out tools and equipment appropriate for the tasks.
- Measurement tools appropriate for the tasks.
- Hand tools appropriate for the tasks.
- Machines, machine tools and work holding devices to perform drilling and, milling or turning.

Tutor information to support the tasks

You may want to give a general introduction to the function of the work-holding device presented in the scenario.

Observation and witness statements can be a useful way of providing additional support and corroboration of learner-generated evidence and skills which are not easily represented in the portfolio of evidence (see the section on Internal Assessment in the Qualification handbook, and in particular the section on the use of witness statements).

In Task 1, learners need to interpret the 2D and 3D engineering drawings of the work-holding device in the appendix to this assignment. They should identify key features on these drawings see LO3 in the unit specification.

In Task 2, learners will demonstrate their knowledge of health and safety practices and procedures required in an engineering workplace, so that they can prepare to work safely when performing engineering activities. P4 in LO2 is assessed in tasks 3 and 4 as this is when learners will need to follow safe working practices as they perform engineering activities.

In Task 4, learners will select and use tools and work-holding devices as they perform machine operations to create the parts of the work-holding device. They will need to perform drilling, milling and turning operations to make these parts however they only need to submit evidence for:

- drilling and milling or
- drilling and turning.

Health and Safety and the use of resources

Health and safety will need to be considered should any of the tasks, or parts of the tasks be undertaken as practical activities. This should include appropriate risk assessments, safe working methods statements and the use of appropriate personal protective equipment (PPE). Learners should be encouraged to take part in assessing risk before conducting any practical activity.

Time

You should plan for learners to have 18–25 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 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 OCR Guide to Referencing* available on our website: http://www.ocr.org.uk/Images/168840-the-ocr-guide-to-referencing.

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. 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 say 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.

Unit 3: Mechanical engineering – machine operations

Scenario

A work-holding device like the example shown in Fig. 1 is a useful and versatile workshop tool designed to hold work together during fitting, drilling, tapping and other machining operations.

The work-holding device is sometimes referred to as a third hand and is a tool that should be in every tool box.

Fig. 1

The engineering workshop manager would like you to demonstrate your engineering knowledge, understanding and skills as you prepare and make a low-carbon steel work-holding device. See the appendix for detailed drawings of the device you will make.

Task 1: Interpretation of engineering drawings

(This task should take between 1 and 2 hours)

Learning Outcome 3: 'Be able to interpret engineering drawings to produce engineered component(s)' is assessed in this task.

Refer to the engineering drawings for the parts that make-up the work-holding device assembly in the appendix.

Your task is to review and annotate the engineering drawings of the work-holding device and interpret the key features so that you can plan and make the device.

Pass	Merit	Distinction
P5: Interpret key features of an engineering drawing that complies with standards such as BS8888.	M2: Explain different types of engineering drawings and how they are used in the production of an engineering component(s).	
Evidence		
Your evidence should be an annotated copy of the engineering drawings that demonstrates your understanding of the key features. You could include a written report explaining the different types of engineering drawings and how they can be used in the production of engineering component(s).		

Task 2: Preparing to work safely

(This task should take between 3 and 4 hours)

Learning Outcome 1: 'Know the Health and Safety practices and procedures required in an engineering workplace' and **Learning Outcome 2**: 'Be able to work safely when performing engineering activities' are assessed in this task. **NB**: LO2 P4 is assessed in Tasks 3 and 4.

Using your interpretations of the engineering drawings in task 1 you will now investigate and prepare a safe working environment before you make your work-holding device.

Your investigation will include:

- Health and Safety regulations, standards and codes of practice associated with an engineering workshop including how these impact on employees and employers.
- The selection and correct use of personal protective equipment (PPE) for all engineering activities you will perform during the preparation and making of the work-holding device.
- Understanding why PPE is used and safety procedures are followed when operating engineering machines.

Your preparation will include:

- Setting up a safe working environment prior to performing all engineering activities required to prepare and make to work-holding device.

<table>
<tr><th>Pass</th><th>Merit</th><th>Distinction</th></tr>
<tr><td>P1: Describe how health and safety legislation and work place policies and procedures impact on employees and employers.</td><td rowspan="2">M1: Explain why PPE is used and safety procedures are followed when operating an engineering machine.</td><td rowspan="2"></td></tr>
<tr><td>P2: State the personal protective equipment (PPE) needed and safety procedures required when performing specific engineering operations and operating specific engineering machines.</td></tr>
<tr><td>P3: Prepare working environment prior to performing engineering activities.</td><td></td><td></td></tr>
<tr><td colspan="3">Evidence</td></tr>
<tr><td colspan="3">You could produce a written report or a presentation with detailed speaker notes that:
• describes how health and safety legislation and work place policies and procedures impact on employees and employers,
• details the PPE and safety procedures required when performing the specific engineering operations and operating specific engineering machines to make the work-holding device.
• explains why PPE is used and safety procedures are followed when operating an engineering machine.
You could produce an annotated checklist to show how you will prepare your working environment and follow safe working procedures when performing engineering activities.</td></tr>
</table>

Task 3: Preparing and marking out materials

(This task should take between 3 and 4 hours)

Learning Outcome 2 (P4 only): 'Be able to work safely when performing engineering activities' are assessed in this task and **Learning Outcome 4**: 'Be able to prepare and mark out materials to produce engineered component(s)' are assessed in this task.

Your task is to prepare and mark-out the low-carbon material to make the parts of the work-holding device as shown in the engineering drawings, showing how you have followed safe working procedures including, following instructions, using tools and disposal procedures.

You should use the engineering drawings to extract dimensions and tolerances necessary to prepare and mark out the parts.

You could evaluate the accuracy of your marking out of the components and explain why tolerances and accuracy are important when producing engineering components.

Pass	**Merit**	**Distinction**
P4: Follow safe working procedures when performing engineering activities to include: • following instructions • using tools • disposal procedures.		
P6: Prepare and mark out engineered component(s) from information given in an engineering drawing.	M3: Explain why tolerances and accuracy are important when preparing and marking out materials to produce an engineered component(s).	D1: Evaluate the accuracy of your preparation and marking out of an engineered component(s), with respect to dimensions, tolerances and scales.
Evidence		
Evidence should be in the form of annotated engineering drawings, which could be part of the evidence provided for task 1, as well as annotated photographs of the prepared and marked out parts showing how you have followed safe working procedures supported by witness statement(s) from your tutor. You could produce a written report or a presentation with detailed speaker notes evaluating the accuracy of your preparation and marking out of the engineered parts explaining why tolerances and accuracy are important when preparing and marking out materials to produce engineered components.		

Task 4: Performing machine operations safely

(This task should take between 11 and 15 hours)

Learning Outcome 2 (P4 only): 'Be able to work safely when performing engineering activities' are assessed in this task and **Learning Outcome 5**: 'Be able to select and use tools, and work-holding devices to create machined component(s)' and **Learning Outcome 6**:' Be able to perform machine operations to create machined component(s)' are assessed in this task.

Your task is to make the parts of the work-holding device as shown in the engineering drawings by:

- selecting and using the appropriate tools and work-holding devices for accurate drilling and, milling or turning.
- setting correct parameters prior to machine operations and during machining for:
  - drilling and turning or
  - drilling and milling.
- performing the machine operations, showing how you have followed safe working procedures including, following instructions, using tools and disposal procedures.
- performing safety and quality checks at critical points in the production of the work-holding device.

You could explain your selection of the tools and work-holding devices used for a specific drilling and turning or a drilling and milling task you have performed and state why each was suitable for the task.

You could evaluate your own accuracy and the quality of your machined parts, identifying strengths and areas for improvement and explain why it is important to establish and apply checks on tolerance, compliance and accuracy.

<table>
<tr><th>Pass</th><th>Merit</th><th>Distinction</th></tr>
<tr><td>P4: Follow safe working procedures when performing engineering activities to include:
• following instructions
• using tools
• disposal procedures.</td><td></td><td></td></tr>
<tr><td>P7: Select and use appropriate tools for accurate drilling and turning or drilling and milling.</td><td rowspan="2">M4: Explain the use of each tool and work-holding device used for a drilling and turning or drilling and milling task, stating why each was suitable for the task.</td><td rowspan="2"></td></tr>
<tr><td>P8: Select and use work-holding devices for accurate drilling and turning or drilling and milling.</td></tr>
<tr><td>P9: Set correct parameters prior to machine operations and during machining for:
• drilling and turning or
• drilling and milling.</td><td></td><td></td></tr>
</table>

Pass	Merit	Distinction
P10: Produce machined component(s) that demonstrate drilling and turning or drilling and milling machine operations.	M5: Explain why it is important to establish and apply checks on tolerance, compliance and accuracy of machined component(s).	D2: Evaluate your own accuracy and quality of your machined component(s), identifying strengths and areas for improvement.
P11: Perform appropriate checks for tolerance, compliance and accuracy for drilling and turning or drilling and milling machine operations.		

Evidence

Evidence could be in the form of annotated photographs of you using tools, work-holding devices and machinery for drilling and, milling or turning, showing how you have followed safe working procedures and set correct parameters supported by witness statement from your tutor.

You should include evidence, such as annotated photographs, of your machined parts which could be as an assembly.

You could produce a written report or a presentation with detailed speaker notes explaining your selection of the tools and work-holding devices used for a specific drilling and turning or a drilling and milling task you have performed and state why each was suitable for the task. You could also include an evaluation of your own accuracy and the quality of your machined parts, identifying strengths and areas for improvement and explanation of why it is important to establish and apply checks on tolerance, compliance and accuracy.

Evidence Checklist

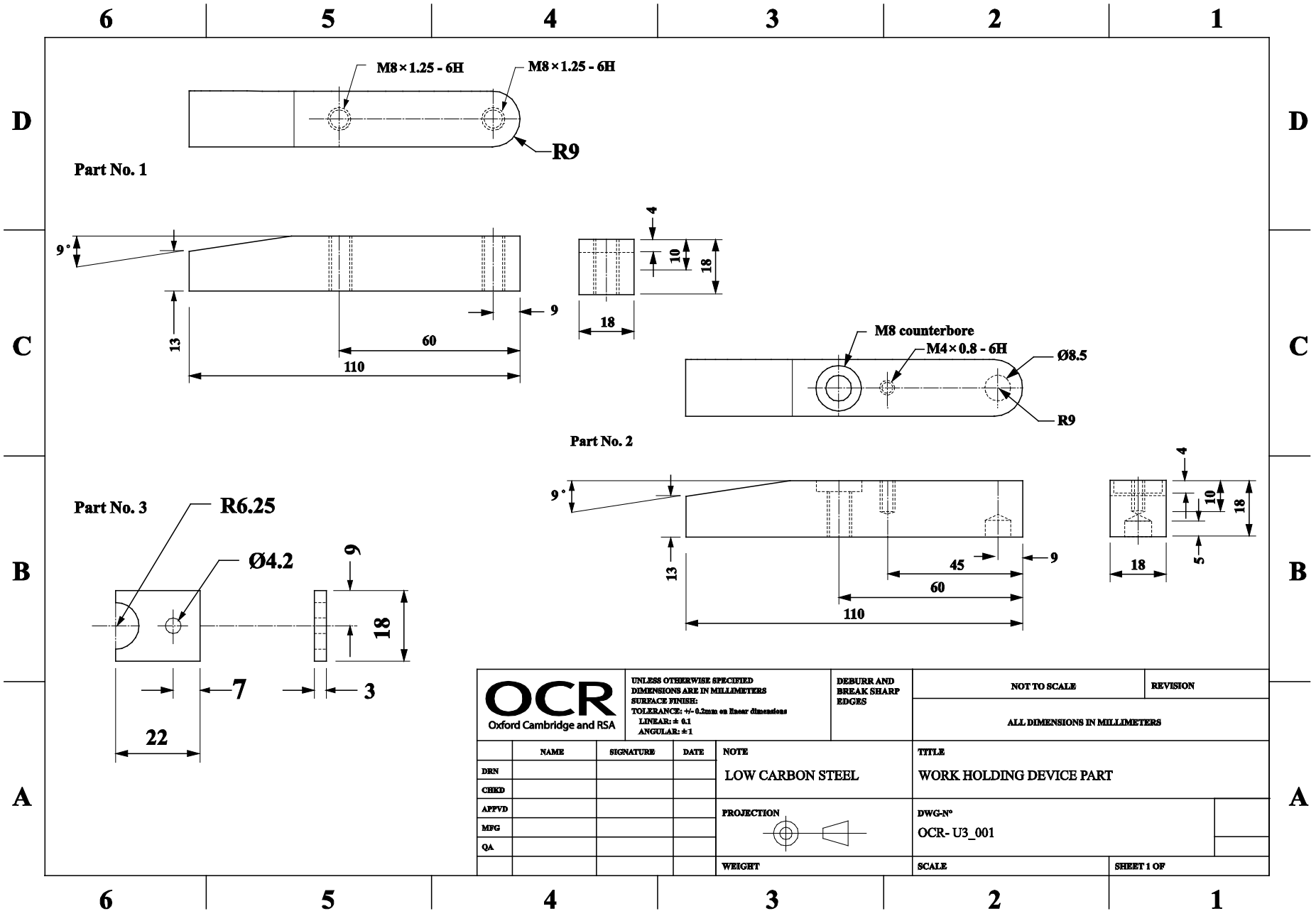
OCR Level 2 Cambridge Technicals in Engineering
Unit 3: Mechanical engineering – machine operations

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: Described how health and safety legislation and work place policies and procedures impact on employees and employers?	
P2: Stated the personal protective equipment (PPE) needed and safety procedures required when performing specific engineering operations and operating specific engineering machines?	
P3: Prepared working environment prior to performing engineering activities?	
P4: Followed safe working procedures when performing engineering activities to include: • following instructions • using tools • disposal procedures.	
P5: Interpreted key features of an engineering drawing that complies with standards such as BS8888?	
P6: Prepared and marked out engineered components from information given in an engineering drawing?	
P7: Selected and used appropriate tools for accurate drilling and turning operations or drilling and milling?	
P8: Selected and used work-holding devices for accurate drilling and turning or drilling and milling?	
P9: Set correct parameters prior to machine operations and during machining: for drilling and turning or drilling and milling?	
P10: Produced machined component(s) that demonstrate drilling and turning or drilling and milling machine operations?	
P11: Performed appropriate checks for tolerance, compliance and accuracy for drilling and turning or drilling and milling machine operations?	

For Merit have you:	Where can your tutor find the evidence? Give page no(s)/digital timings, etc.
M1: Explained why PPE is used and safety procedures are followed when operating an engineering machine?	
M2: Explained different types of engineering drawings and how they are used in the production of engineering component(s)?	
M3: Explained why tolerances and accuracy are important when preparing and marking out materials to produce engineered component(s)?	
M4: Explained the use of each tool and work-holding device used for a drilling and turning or drilling and milling task, stating why each was suitable for the task?	
M5: Explained why it is important to establish and apply checks on tolerance, compliance and accuracy of machined component(s)?	

For Distinction have you:	Where can your tutor find the evidence? Give page no(s)/digital timings, etc.
D1: Evaluated the accuracy of your preparation and marking out of an engineered component(s), with respect to dimensions, tolerances and scales?	
D2: Evaluated your own accuracy and quality of your machined component(s); identifying strengths and areas for improvement?	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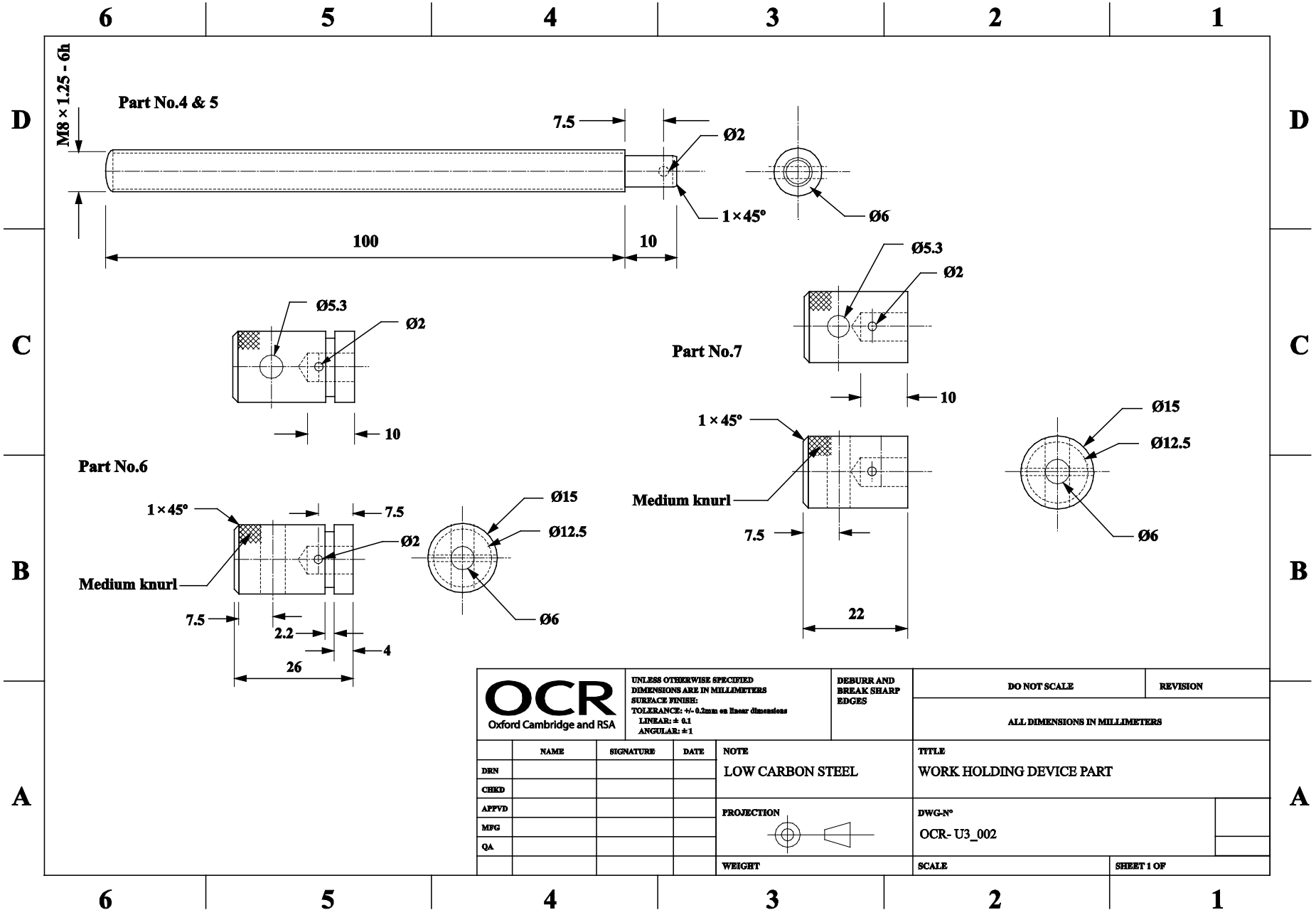
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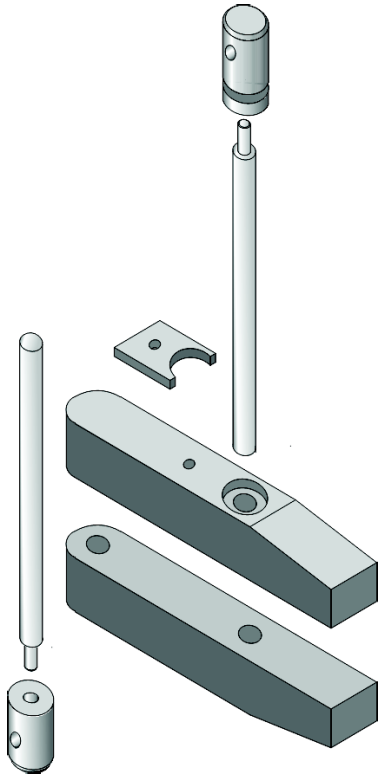

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To find out more
ocr.org.uk/engineering
or call our Customer Contact Centre on **02476 851509**

Alternatively, you can email us on **vocational.qualifications@ocr.org.uk**

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