

Cambridge **TECHNICALS LEVEL 3**

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ENGINEERING

Unit 18

Lean and quality

Model assignment

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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.

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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 would use their knowledge of lean principles, tools and quality processes 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.

Information to support the scenario/tasks

The scenario in this assignment has been developed so that it can be contextualised to individual centres or employers. Centres should therefore aim to develop a relationship with an employer who can set a context, scenario and product or process for analysis or they could create a manufacturing simulation in centre where students produce / assemble a product that they can then assess for improvement (see lesson element 2). In either case, it is recommended that centres make the assignment as practical as possible.

Resources to complete the tasks

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

- For task 1 there is no specific resources but tutors should refer to the recommended literature in the resources associated with this unit.
- For task 2 learners will need to be given a set of quality control data to interpret. This will usually be in the format of measurements and should be sufficiently detailed to provide enough scope for interrogation and identification to satisfy the teaching content listed in 2.4 of this unit. It is recommended where possible that centres customise their data based on their specific context or employer partners. An example set of data will be available on the OCR website, on the qualification page under model assignments.
- For task 3 learners will need to carry out a production or assembly process in centre or at an employer's premises that they can use for assessment. This can be simulated as a production environment by the centre (see lesson element 2 for a similar teaching and learning based suggestion). Where possible, centres are advised to liaise with an employer partner who could set the context for analysis. Learners could then visit the employers site and assess the process.
- For task 4 learners should use the production simulation or employer scenario used in task 3 as the basis for the creation of a production plan and manufacturing layout with supporting value stream map that applies lean tools and quality processes in its creation.

Health and Safety and the use of resources

There are no specific health and safety concerns to be addressed in this assignment but if centres decide to use practical simulations as part of the analysis or visits to employers they should ensure all health and safety requirements are met.

Time

You should plan for learners to have 15–20 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 has been written to allow for group work – for example if learners are assessing an employer's production processes or carrying out a simulation in centre then they may work as a team to highlight specific assembly or production processes. Following the simulation, centres must ensure that learners' reflection and analysis is their own. You must be sure that each learner can produce evidence of their own contribution to each grading criterion. When learners are working in teams, you must make sure that:

- all team members have equal opportunity to evidence their skills, knowledge and understanding
- you consider the team composition, for example with regard to learners' preferred learning/reviewing styles
- you consider the number of team members (though this is less important than the management and structure of the team) – small groups of three to six learners could comprise a team
- you monitor the team as work progresses so that you can be confident all learners are meeting the grading criteria.

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.

If witness statements are used to support learners' evidence, you have 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 Foundation Diploma, Diploma or Extended 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: <http://www.ocr.org.uk/images/168840-the-ocr-guide-to-referencing.pdf>.

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.

Assignment for learners

Unit 18: Lean and quality

Scenario

Lean Task Force

Lean manufacturing and quality processes, tools and techniques are an extremely effective way of improving productivity and performance in manufacturing businesses. When used effectively they can dramatically increase output, whilst reducing costs and maximising efficiencies within the company. Many companies aim to adopt lean and quality principles, tools and techniques retrospectively and improve processes that are already established.

OCR Engineering Ltd has asked you to investigate lean and quality principles, processes, tools and techniques. To compete against imported components, OCR Engineering has commissioned you to review their production processes and suggest how they can be improved through the application of lean and quality techniques.

You'll need to research lean and quality principles, processes, tools and techniques and make an assessment of the current manufacturing processes. As an overview, you will:

- explore the principles of lean manufacturing and the lean wastes
- explore quality tools and techniques used in manufacturing
- interpret quality control data using statistical mathematical techniques
- apply lean and quality tools, techniques and processes to a manufacturing scenario
- develop a production plan, manufacturing layout with supporting value stream map for a production scenario

You could present your findings in the form of an electronic or paper based report including annotated diagrams and commentary illustrating your understanding and subsequent application of the lean and quality processes, tools and techniques used within manufacturing.

Task 1: Lean manufacturing

(This task should take between 2 and 3 hours.)

Learning Outcome 1: 'Understand lean manufacturing' is assessed in this task.

Your task is to investigate lean manufacturing principles, lean waste and how lean tools and techniques can be used to improve the productivity of a business. Produce a report, addressed to the production manager of OCR Engineering Ltd, explaining how your findings can improve the manufacturing performance.

Your report to the Production Manager should explain the principles of lean manufacturing and how lean wastes occur in the manufacturing environment. You should also investigate lean tools and techniques to analyse how these can be used to improve productivity and business performance in manufacturing.

You do not necessarily need to practically explore the applications for this task, although you may include reference to some of the examples studied in other elements of this unit to illustrate the findings in your report.

Pass	Merit	Distinction
P1: Explain the principles of lean manufacturing	M1: Analyse how lean tools and techniques can be used to improve productivity and business performance in manufacturing	
P2: Explain how lean wastes may occur in a manufacturing environment		
Evidence		
You could produce evidence in the form of a written report or presentation (with detailed speaker notes).		

Task 2: Approaches used to ensure quality in manufacturing

(This task should take between 2 and 3 hours.)

Learning Outcome 2: 'Understand approaches used to ensure quality in manufacturing' is assessed in this task.

Your first task is to investigate quality processes used in manufacturing and evaluate how quality issues can impact on business performance. You should produce a report for the Production Manager explaining a range of processes used to ensure quality in manufacturing including an evaluation of how quality issues can impact on productivity and business performance in manufacturing.

Your Tutor will provide you with a set of quality control data for the second part of this task.

Your second task is to use statistical mathematical calculations to interpret the results of the quality control data supplied identifying trends in the data and explaining what the data is telling you about the quality of manufacturing.

You should present your findings to the Production Manager. You could also use your results to inform your evaluation in the first part of this task of how quality issues can impact on productivity and business performance in manufacturing.

Pass	Merit	Distinction
P3: Explain a range of approaches used to ensure quality in manufacturing	M2: Evaluate how quality issues can impact on productivity and business performance in manufacturing	
P4: Interpret the results of quality control data through the use of statistical mathematical calculation		
Evidence		
You could produce evidence in the form of a written report or presentation (with detailed speaker notes). Your report must include the statistical mathematical calculations you have performed.		

Task 3: Apply lean manufacturing and quality tools and techniques to manufacturing situations

(This task should take between 5 and 6 hours.)

Learning Outcome 3: 'Be able to apply lean manufacturing and approaches used to ensure quality' is assessed in this task.

Your task is to assess a manufacturing situation or process to identify lean wastes and potential quality issues and recommend and evaluate solutions. Your Tutor will provide you with the information necessary for this task.

You have been asked by the Production Manager to assess all stages of a manufacturing process to identify lean wastes that could occur or are occurring within the process. You have also been asked to investigate occurring or potentially occurring quality issues in the manufacturing process and explain why these are happening.

You should make appropriate recommendations for solutions to remove lean waste and reduce poor or problematic quality issues, and provide an evaluation of the impact of the recommended solutions with reference to industrial best practice and measurement of the performance improvement.

Pass	Merit	Distinction
P5: Identify lean waste in manufacturing situations	M3: Recommend solutions to identified lean waste and quality issues	D1: Evaluate the impact of recommended solutions with reference to industrial best practice and measurement of performance improvement
P6: Explain potential quality issues in a manufacturing process		
Evidence		
You could produce evidence in the form of a written report or presentation (with detailed speaker notes).		

Task 4: Plan a manufacturing production scenario using lean and quality approaches

(This task should take between 5 and 6 hours.)

Learning Outcome 4: 'Be able to plan manufacturing production using lean and quality principles and approaches' is assessed in this task.

Your task is to produce a manufacturing layout, supporting value stream map and production plan that demonstrates the application of lean and quality principles and approaches to optimise production of a component or product.

Your Tutor will provide you with the information necessary for this task.

You should produce a production plan, manufacturing layout with supporting value stream map and supporting commentary that assesses the existing process, identifies where lean and quality tools have been applied and justifies how the process and layout adheres to lean and quality principles and approaches.

Pass	Merit	Distinction
P7: Assess existing process and manufacturing layouts for the production of a component or product.	M4: Design a process and manufacturing layout for the production of a component or product effectively using lean and quality principles and approaches.	D2: Justify how the process and manufacturing layout adheres to lean and quality principles and approaches.
P8: Create a production plan for a manufactured component or product which includes consideration of lean and quality principles and approaches, and influencing factors.		
Evidence		
<p>You could produce evidence in the form of a written report or presentation (with detailed speaker notes), that includes:</p> <ul style="list-style-type: none"> • Annotated diagrams of an existing manufacturing layout or production process. • A production plan with supporting commentary. • A diagram of an improved manufacturing layout with supporting value stream map and commentary highlighting where lean and quality principles and approaches have been applied. • A written commentary justifying how the manufacturing layout adheres to lean and quality principles and approaches. This should be supported by the value stream map. 		

Evidence Checklist

OCR Level 3 Cambridge Technicals in Engineering Unit 18: Lean and quality

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.
Explained the principles of lean manufacturing. (P1)	
Explained how lean wastes may occur in a manufacturing environment. (P2)	
Explained a range of approaches used to ensure quality in manufacturing. (P3)	
Interpreted the results of quality control data through the use of statistical mathematical calculation. (P4)	
Identified lean waste in manufacturing situations. (P5)	
Explained potential quality issues in a manufacturing process. (P6)	
Assessed existing process and manufacturing layouts for the production of a component or product. (P7)	
Created a production plan for a manufactured component or product which includes consideration of lean and quality principles and approaches, and influencing factors. (P8)	

For Merit have you:	Where can your tutor find the evidence? Give page no(s)/digital timings, etc.
Analysed how lean tools and techniques can be used to improve productivity and business performance in manufacturing. (M1)	
Evaluated how quality issues can impact on productivity and business performance in manufacturing. (M2)	
Recommended solutions to identified lean waste and quality issues. (M3)	
Designed a process and manufacturing layout for the production of a component or product effectively using lean and quality principles and approaches. (M4)	

For Distinction have you:	Where can your tutor find the evidence? Give page no(s)/digital timings, etc.
Evaluated the impact of recommended solutions with reference to industrial best practice and measurement of performance improvement. (D1)	
Justified how the process and manufacturing layout adheres to lean and quality principles and approaches. (D2)	

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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